



watersheds
program

treeline

partnering for climate adapted forests

February 2022

Missed the December 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](#).

*Wapato stand at Ridgefield.
Photo Credit: C. Sutherland*

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.

In this issue, we highlight the many overlapping collaborative networks that sustain ecological restoration in the Pacific Northwest, and how this work feeds those who do it. Read on for stories from restoration practitioners, seed collectors, Indigenous land stewards and more.

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:

Insights into Wapato Restoration Along the Lower Columbia



An interview with:



Curtis Helm
*Principle Restoration Ecologist,
Lower Columbia Estuary
Partnership*



Doug Kreuzer
*Restoration Ecologist, Lower
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**Jasmine Zimmer-
Stucky**
*Communications and Outreach
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Eric Anderson
*Deputy Project Leader,
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Wildlife Service*

This year marks the third and final year of construction for a major habitat restoration project at Steigerwald Lake National Wildlife Refuge that has been in the making for nearly a decade. The project aims to “reconnect 965 acres of Columbia River floodplain, reduce flood risk from Gibbons Creek, improve habitat for fish and wildlife, and create new trails for recreation at the Refuge” (Lower Columbia Estuary Partnership, 2021). The work has already shown improvements in floodplain function during heavy rains in late 2021. One element of the project: wapato restoration, aims to enhance the abundance of the once prolific first food plant on the banks of the Columbia. Wapato (*Sagittaria latifolia*), whose tuber is similar to a potato, was widely consumed and traded by Indigenous people of the Pacific Northwest prior to colonization. Though the extent of wapato has been seriously reduced across its range due to habitat conversion, it remains culturally significant as a former food source for the Indigenous communities of the Lower Columbia River today.

In an interview, Lower Columbia Estuary Partnership and U.S. Fish and Wildlife staff spoke to the importance of wapato restoration, relevance in a changing climate and more.

How does wapato factor into the overall restoration goals for the refuge and associated ecosystems?

CURTIS: Wapato, frankly, just belongs here on this site. It was abundant along the Columbia River. When Lewis and Clark came through, they called the lower Columbia “Wapato Valley;” Sauvie Island was referred to as Wapato Island. There were over 7,000 acres of wapato growing on Sauvie Island alone. Native people had established villages and would come in the wintertime to harvest wapato. It’s a plant that’s an incredibly valuable part of the ecosystem. I would almost consider it a keystone species as much as salmon are along the Columbia River. The area we’re doing our restoration within was once a vast floodplain, historically, before it was diked and dammed off. It was likely common locally, prior to the construction of the levee, and we know that it grows well at Steigerwald if the hydrology is correct, as we have three healthy stands onsite, and we have seen it re-colonizing portions of the alluvial fan in areas where we have performed invasive species control.

DOUG: In addition to wapato we’re planting other wetland plants, mostly in the form of seeding, and then with [bare

root] shrubs and trees, we are covering about 250 acres. By the end of this winter we’ll have installed about half a million native trees and shrubs alone, which includes six species of willows, 18 species of shrubs and 11 species of trees. Willows and cottonwoods will be installed as live stakes or pole cuttings. We’re trying to cover all of the different zones, from wetlands to riparian to some upland habitats.

ERIC: Wapato is a huge swan food resource. I have seen them stomp around in the shallows, trying to identify tubers by foot. They’ll flip them up and grab them with their beaks and consume the wapato tuber. So in addition to being a first food and a trade item for Native Americans, it’s significant to the swan population in the lower Columbia.

How does wapato restoration help address issues posed by climate change?

CURTIS: Wapato is really valuable in emergent wetlands for fish and wildlife. It takes up a lot of nutrients as it grows, and because it grows aggressively and rapidly colonizes areas, it will slow water down which will help trap sediment and drop it out. It grows in dense, thick stands, which may provide some shading to the surface water, provide

cover, refuge and habitat for salmon, small fish, insects and all sorts of aquatic organisms. Beavers love to eat it, muskrats really favor it.

The emergent wetland plants generally can adapt to sea level rise and changes in hydrology as these subtle changes occur. As high marshes become inundated the low marsh plants can move up, and the high marsh plants can move further upslope if there's a place for them to go to.

In addition to wapato, we have added seven additional species of native wetland plants in the form of seed. The more diversity you have, the more niches you can fill, and the more resilient the site will be because you have all these plants that will take advantage of different opportunities as hydrology changes across the site. So we've tried to plant a lot of different things.

ERIC: Some of our planting for climate change emphasizes having an intact riparian zone which is going to benefit the water conditions. If we have shaded areas, we've got large woody debris recruitment, which ultimately becomes detritus, which becomes food for insects, which becomes fish food. Having that riparian zone intact in big chunks is going to be important, because if that lake is too warm, it's going to be uninhabitable by fish.

DOUG: The site has been opened back up to the river, and we have some pretty good ideas, based on a number of years of observation, design and modeling of where the water levels will be, but we don't really know for sure. We'll find that out in the next few years as it will have a lot to do with water releases from Bonneville dam and the height of the spring freshet on the Columbia River. My general approach is to overlap species so that we do get coverage depending on the hydrology fluctuations and the plants will sort themselves out. Having a wide palette of plant species and overlapping where we think they might do best at various elevations, will build in resiliency.

Tell me about your experiments planting wapato.

CURTIS: We have learned that the tubers have next year's growing tip slightly expanded from their distal end and

while digging it is good to handle them gently and not break off this initial growing point. We are planting a number of broken tubers and tubers missing these growing initials this spring to see if they will sprout and grow normally. Similar to how potatoes can be divided and planted.

DOUG: Another thing that was more opportunistic was we had some wetland areas where wapato was growing that were going to be modified by the construction work that took place this summer. We were able to get an excavator out and grab buckets of soil with fully leafed out wapato plants. A few of us, including volunteers, picked through and extracted leafed-out wapato plants with rhizomes, and were able to transplant them to some of the newly graded out wetlands. They did surprisingly well. We anticipate those coming back in full force.

CURTIS: We also transplanted four, healthy, young wapato plants early in the spring into a baby pool to find out how many tubers the plants would produce. We dug those out at the end of the growing season; I think we got 68 tubers from those four plants. There were no tubers on those plants when we planted them. It was interesting to see how truly prolific they are.

Have you encountered any challenges that you attribute to climate change and/or extreme weather events?

CURTIS: The wapato doesn't suffer much from drought or from heat problems. It grows in a substrate that is fully watered; it has to have a source of water all season long. It is not going to suffer from drought problems the way upland plants are. One of the real problems is with the bare root plants and live stakes; they have to get established in the spring so they can make it through the typical Pacific NW hot dry summer. It's that first growing season that is super critical. If we don't have so-called normal summers, we're gonna have a hard time establishing plants on large restoration sites, which of necessity, are typically planted with bare root or live stake plants. This drought [in 2021] was incredible. It was terribly hot and dry, as we all know. Again, with these extremes, we're also having a crazy rainy fall, that's



*Prune Hill 5th at Steigerwald.
Photo Credit: Lower Columbia
Estuary Partnership*

maybe also due to climate change. Either extreme is not helpful.

ERIC: You'd think if you are putting riparian plants in the right place they will very likely over summer fine but all the supplemental watering that was required north of SR 14 in the last two seasons, just to get those things to establish and be able to survive over the summer, it was a valiant effort. Probably, in a typical year, it wouldn't have been required, but it was absolutely this year when we had triple digit weather for back to back days.

Have you historically irrigated or watered your planting?

DOUG: Generally, no. In my experience working on larger restoration projects, I've never watered. Smaller ones, certainly, or working in more urban settings where you have access to water we might do that. But we did do some watering at Steigerwald this past year. We were lucky that we had a collaborating landowner that allowed us to tap into his well, and run garden hoses to a small (1 acre) area. When we're planting 250 acres and there's no irrigation, it's not practical or possible. If we run into another extended drought this coming year we'll try to prioritize some areas if we can get to them, but in most areas it's just not practical.

ERIC: I did a lot of planting at Ridgefield in the 90s and I never had to irrigate. If it's the right plant in the right ecological place, it shouldn't be required, but [the watering this year] was a new experience for me.

Have you started implementing any assisted migration practices to adapt to changing conditions?

CURTIS: For the wetland seeding that we did, all the seed that we had harvested came from wetlands along the Willamette and the nearby Columbia. As much as possible, we've always tried to harvest seed from the same eco-region as our project sites, but assisted plant migration is something that we need to think about in the future.

DOUG: We are planting some white alder and Ponderosa Pine which are a little more southern and may tolerate drier conditions. We are also trying some black oaks from California in the mix with the Oregon white oaks. We're certainly thinking about it, but it's not a big part of what we're putting in the ground at Steigerwald at this time.

How have community members/students responded to the opportunity to engage with this project?

JASMINE: Steigerwald is a well loved wildlife refuge, and the Steigerwald Reconnection project created this great opportunity for people to love the refuge in a whole new way. Since the project broke ground, over 1000 people contributed to restoring the wetlands through volunteer planting events or through partnerships with local schools. People love getting their hands dirty, physically connecting to this restoration site; it's creating a lifelong connection to this place.

The Estuary Partnership environmental educators work hand in hand with Doug, Curtis and other staff to make the most out of this project. Our educators go into the local schools and teach students about native and invasive plants. They teach them about watersheds and birds. And then those students, after receiving those in classroom lessons, actually go out to Steigerwald and they look at birds. They plant native plants. They identify invasive species. It's this comprehensive opportunity for the community to both learn more about wildlife and what happens at the wildlife refuge and also be part of its future. I'm looking forward to what these students who had such a big

role today are going to think about the refuge in 10, 15, 20 years.

There's a really wonderful stewardship community that's developed around Steigerwald. The Friends of the Columbia Gorge and the Gorge Refuge Stewards have been wonderful partners in promoting opportunities to get the community involved in the restoration project.

The other really great thing that's come out of this wapato planting is when it showed up on the evening news and on the radio in people's homes, we started to get emails from community members asking how they could plant wapato in their own backyards, whether they had a pond or some wetland habitat. So that was really interesting to see people getting so excited about this plant that they wanted to bring it to their own land. It's been really inspiring backyard gardeners throughout the region.

Anything else to share?

ERIC: I've been associated with this refuge for 27 years. This project has needed to happen for a long time. We took a couple of runs at it historically and never completed as far as connecting the partners and the funds. A tip of my hat to the Estuary Partners because they were the spark plug that kept herding the cats for seven years now connecting all of the partners and all the funding sources to make this thing a reality.

DOUG: In terms of collaboration on the project, it's been huge. Chris Collins, who has been the lead on the project, really made this whole thing come together. And all of the other partners on the projects have been so important in getting it to this point.

I think it would be really interesting to come back to the site in the next five to 10 years and see the changes on the landscape. We've seen fish coming back in the last six weeks, which has been amazing. We've seen coho in the alluvial fan, which probably haven't been there in 50 years. This is largely a fish funded project, but there's so many other benefits to other wildlife and people associated with this project.



Bees on Wapato. Photo Credit: Lower Columbia Estuary Partnership

Partners:

Bonneville Power Administration
Burlington Northern Santa Fe Railroad
Camas School District
City of Camas
City of Washougal
Columbia Gorge Refuge Stewards
Friends of the Columbia Gorge
Port of Camas-Washougal
US Army Corps of Engineers
US Fish & Wildlife Service
Washington Department of Transportation
Washougal School District

Funders:

Bonneville Power Administration
Camas-Washougal Community Chest
Washington Department of Ecology
National Fish & Wildlife Foundation
US Fish and Wildlife Service
One Tree Planted / Promise the Pod
Arbor Day Foundation



The Value of Cultural Burning in Forest Management

A conversation with Gabe Sheoships

Gabe Sheoships (Cayuse/Walla Walla) is the executive director of the Friends of Tryon Creek, the nonprofit arm of the Tryon Creek State Natural Area in Portland, Oregon. Its mission is “to inspire every community to identify, cultivate, or reclaim their relationship with nature in this cherished urban forest.” In this interview, Gabe talks with Ecotrust staff Emilie Chen, Jessica Douglas, Brent Davies, and Lisa Watt about the impacts of climate change on forest and ecosystem health, the benefits of conducting cultural or controlled burns, and the importance of Indigenous-led stewardship efforts that reconnect tribes to land, support tribal cultures, and ultimately benefit everyone.

In general, people are afraid of fire on the landscape but not Indigenous peoples. Tribes have used fire as a tool since time immemorial. Why, how, and when was fire used?

The Pacific Northwest tribes I’m familiar with were conducting controlled cultural burns a good portion of the year before settler contact. As an example, the mountains that we frequented like Mount Adams in southern Washington had fires started by lightning and other natural elements but those lands were also stewarded by tribes setting controlled fires in the fall and spring.

Tribes know fire has always played an important role in fostering healthy

ecosystems, forests, and streams. It’s been an important tool to restore the landscape, burn back weeds and brush, promote Native plants, berries, and roots, and build healthy soils. It’s also used in some areas to cultivate old growth cedar for carbon and procurements. So, fire has an intact relationship with North America or Turtle Island, but it’s been suppressed for 150 years or so.

What happened to the landscape when cultural or controlled burning was stopped?

Cultural burning stopped around the same time as the introduction

of noxious, non-native plants by European settlers, who brought them here for cultivation or botanical uses, plants like English ivy and Himalayan blackberry. The lack of fire built up forest fuels but it was also the time of peak logging and clearcutting in the Northwest which released carbon into the ecosystem and air.

It’s the arc of colonization, frankly, from the removal of Native peoples from our lands and subduing our traditional stewardship to promoting livestock grazing, forest clearcuts and damming rivers. Forests became viewed and managed more like a crop rather than a living, functioning ecosystem. It’s an ecosystem shock.



Gabe Sheoships (Cayuse/Walla Walla)

Executive Director of the Friends of Tryon Creek

An enrolled citizen of the Confederated Tribes of the Umatilla Indian Reservation, Gabe Sheoships is the Executive Director of the Friends of Tryon Creek, where he leads efforts for community building, environmental stewardship, and protection of the natural world. He has dedicated his life’s work to protecting Indigenous First Foods, encouraging healthy ecosystems, and empowering people to act as stewards of the land and water. He serves as board co-chair of Nesika Wilamut (formerly Willamette River Network), board president of the Tributaries Network, and board member of Center for Diversity and the Environment and Freshwaters Illustrated. As Adjunct Professor at Portland State University, he instructs students in the Indigenous Nations Studies Program, Environmental Science and Management, and University Studies departments. Gabe has an MSc in Fisheries Biology from Oregon State University.

What are some of the cultural benefits of traditional burning for tribal people?

Just the act of returning fire to traditional places is restoring Indigenous relationships to fire. It's about the reclaiming, reconnecting, re-stewarding of Indigenous lands. Fire is part of larger cultural movements that promote intact, healthy forests and First Foods such as fish, game, roots, and berries, while building fire resilience in our modern communities and forest systems and restoring important parts of our ecosystems that have been without fire for so long.

Cultural burning and tribes have received a lot of attention after the wildfires in the west over the last couple of years. What does that say?

It says, nothing gets people talking or thinking more than when their own safety is threatened. 2020 was the perfect storm of high winds and temperatures and severe droughts that fueled the fires that we saw in Clackamas, Multnomah Counties, including the greater Portland metropolitan area, and other places. These perfect storms happened in other places, too, like California where wildfires devastated homes, communities and cost lives. And with climate change, along with

several converging ecological factors, the frequency of these intense and aggressive wildfires will only increase until more Indigenous stewardship of these lands is returned.

To me, one of the most important takeaways is that tribes still practice controlled fire and some conduct seasonal fires. Where tribes conducted cultural burns, there wasn't the level of intense wildfires because the landscape was tended to and had become more resilient. Burns led by tribes were conducted safely, which created a succession of fire resilient forests. I think that's still one of the biggest educational pieces - **tribes have a lot of experience doing this**. We only need to look at what's happened to landscapes and forests that have gone without it.

What does it look like for tribes to be able to fully reclaim fire stewardship? What are all of the elements that would need to be in place?

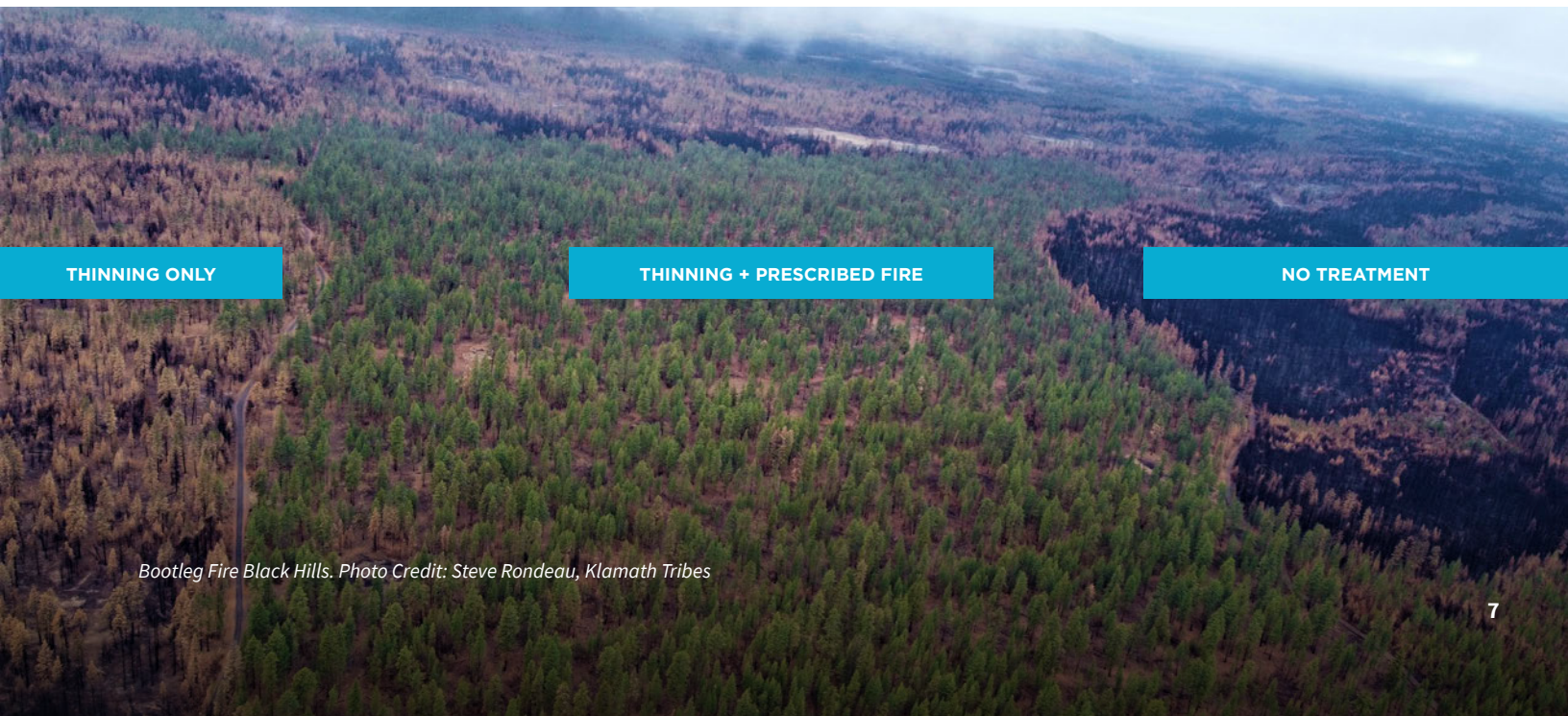
Tribes have to be in positions to lead cultural burns, which includes leading the planning processes that create and inform long-term management and stewardship that incorporates burning, planting, and tending. Most of our forestlands are still in state, federal, and other hands that are less likely to bring traditional burning and fire stewardship

back. Tribes have important seasonal knowledge, long-term observations, and Traditional Ecological Knowledge (TEK) that provide a different kind of management, much different than some wildland tactics or just burning your excess or dead wood.

Here in Oregon, the Forest Service and Bureau of Land Management manage most of the culturally important, intact lands. I think these agencies need to partner more or, in some places, give lands back to tribes to co-manage or co-steward, or both in certain areas. Tribes can then create and implement plans that bring back fire annually or biannually, and develop plans that address all the converging factors that enable climate change. Those plans could be seasonal but they would also have a much longer timeframe, 10 or 20 years or more.

Those recent fires were terrifying. We know what the answer is - it's better stewardship of forests and lands. But we're not doing it. What do you think keeps us from doing what we should to be responsible to the land?

I think government agencies are afraid to give up power and face the unknown. It's a western sense of ownership. Indigenous-led cultural burns could well advance a bigger, broader cause



THINNING ONLY

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Bootleg Fire Black Hills. Photo Credit: Steve Rondeau, Klamath Tribes

that would ultimately benefit them and everyone else. But for folks that have been in power for so long, all of this is new. Who wants to give up power? Also, the Forest Service, which is the largest landowner in the state, logs and sells commercial timber; staff might see cultural burns as burning up profits.

Indigenous stewardship would benefit everybody as well as our ecosystems, First Foods, and keystone species like salmon. Recently, there have been western scientific articles devoted to developing a relationship with fire in a different way. But those articles say what our TEK and our elders have been saying all along, that fire has an important place on this landscape and is effective in stewarding these lands. It's just a different way of looking at the ecosystem.

How is climate change impacting the landscape and our forests now?

Climate change is a very complex and more relational systematic problem. Federal agencies primarily look at systems through a western, linear lens, where they treat ecological problems or single species issues on a year-to-year basis and treat them often as commodified agricultural products. But the reality is, there are many different variables that depend on one another in the natural world.

With climate change, we can expect to see more droughts and higher temperatures like this past summer on the West Coast where it was 115 and 116 degrees in Portland, Oregon, creating more dry, fire-ready, uncontrolled fire conditions. This intense heat wave cost human and aquatic species losses. We'll see snow melting faster and we'll see water temperatures getting warmer more quickly each spring. We'll see certain types of beetles and other insect predators that are harmful to our native trees, plants, and animals. In eastern Oregon today, there are several viruses related to heat-induced drought that have been spreading disease within deer populations through vectors such as gnats (epizootic hemorrhagic disease and bluetongue disease). We'll see more of the rapid and intense wildfires that we've witnessed recently, which create poor air quality and harm all living things and people.

All these issues are going to put more pressure on our complex ecosystems issues. It's almost like death by 1,000 cuts to the ecosystem, as a former mentor of mine often put it.

Many cultural burns take place in rural areas now but you see the benefit of having controlled cultural burns near or in urban forests as well. What are some of the challenges that would need to be overcome to do a traditional burn in an urban setting?

We are in the infancy of thinking about what a traditional or cultural burn could look like in urban environments, but, yes, it is something we'd like to see happen since urban forests need help as well.

To do so, there would have to be a lot of education in the nearby communities since there are still many people who are afraid of fire or associate all fires with the intense and devastating wildfires we've witnessed in recent years. Part of that education would be showing how good fire can create fire resiliency and actually protect and stabilize neighborhoods. We would want an initiative to be Indigenous-led and partner with nearby tribes and tribal people to promote cultural fire training and pilot a few different sites. We would also enlist specialists like Dr. Frank Lake (Karuk/Yurok), who is a research ecologist with the Forest Service and an expert on [Indigenous fire stewardship](#). And we would have to work through appropriate channels in partnership with Oregon State Parks.

Our hopes for this type of project are that cultural burning would benefit the entire community by creating ecosystem resilience and returning fire to the landscape in an Indigenous-led program that would hopefully extend throughout the Metro area.

What are some of the opportunities you see with the reintroduction of an urban-based cultural burn?

There are many educational opportunities. For instance, students of all ages and backgrounds could examine an ecosystem pre- and

post-fire and monitor changes that occur over the long term, witnessing the traditional stewardship that has always taken place on these lands. In our work, we also promote First Foods stewardship through food plants such as salmonberry, Oregon grape, thimbleberry, elderberry, stinging nettle, and students could monitor their re-establishment and succession.

The ecological benefits include creating fire resilience by control burning much of the slack or brush and noxious plants. Even in places that have been well stewarded in the lower Willamette River Basin there's still a lot of English ivy, Himalayan blackberry and other noxious plants that are well established. The use of controlled fire would inform an effective, long-term management plan that could complement a lot of the hand pulling or removal of noxious plants.

If people are able to see the benefits, which is obviously not going to happen overnight, they will then look at the long-term benefits of controlled fire within an urban/rural landscape. It would ultimately bring about lessons for other urban areas to be stewarded and reconnect cultural fire in a good way.

We know cultural practices are lost across generations; they're often lost for entire families, bands, and tribes. An initiative like this, which could connect nearby tribes and be Indigenous-led, would be an important step in reconnecting and restoring cultural knowledge for current and future generations. As younger people get interested and lead efforts like these, it bolsters our communities to teach and promote this practice to more Indigenous peoples and their children.

Burning is a cultural act, it's about cultural knowledge and identity of place. So connecting as the Indigenous stewards of this landscape will have a greater effect in promoting First Foods, cultural fire, and Indigenous stewardship throughout our region.

Ecotrust



A Decade of Coordinated Plant Procurement Increases Planting Capacity and Collaboration in the Willamette Basin

By Hannah Buehler and Jean-Paul Zagarola, Bonneville Environmental Foundation (BEF)

BEF's Collaborative Grow Program was established in 2011 to streamline native plant procurement for groups advancing reforestation and plant establishment as part of ecological restoration, soil and water conservation, and habitat initiatives in Oregon's Willamette Basin. From an initial order of 66,000 plants over a decade ago, the program will distribute a record 1,042,500 plants grown by seven different nurseries to thirteen tree planting partners in 2022.

Modeled after programs developed by large agencies in the Portland Metro area who sought ways to increase internal efficiencies, the Collaborative Grow Program was created to bring those same efficiencies and other benefits to smaller organizations and departments, and works with:

- Watershed Councils
- Land trusts
- Tribes
- Agencies
- Other NGOs

One of a number of initiatives developed to support partners in their efforts to increase the pace and scale of primarily riparian and floodplain plantings on public and private lands, the Collaborative Grow Program has evolved to also support fire recovery efforts.

With limited staff capacity and significant demands placed upon groups, the program offers a means to leverage economies of scale to:

- Reduce staff time within individual organizations and nurseries directed towards plant ordering and distribution.
- Centralize quality control and plant specification development and adaptation (i.e. minimum and maximum size specifications, target root:shoot ratios, seed source ranges).
- Increase the diversity of species grown at scale by local nurseries (the Collaborative Grow program currently offers 52 tree and shrub species) by building a clear and more reliable demand.
- Provide access to plant stock with greater genetic diversity because partners receive plant stock from numerous nurseries.
- Soften the impact of species failures in a given year due to factors such as flooded nursery fields, seed issues, etc. by facilitating species substitutions, spreading the impact of shortages across groups and supporting partners in offering plants to each other.
- Support use of bare root planting stock to reduce plant, transportation and labor costs.
- Offer financial benefits to groups that often rely on reimbursement-style grant funding and for whom carrying large balances for 5-8 months in the form of plant deposits can be difficult or untenable.



Project Manager Jean Paul Zagarola inspects bare root plants. Photo Credit: Hannah Buehler

Through a centralized cooler rental agreement with a local flower farmer, the Collaborative Grow program stores plant materials after they are lifted, bundled and bagged at nurseries in January of each year and allows partners to stagger site planting timelines through March. This arrangement allows multiple partners to coordinate more effectively with planting contractors, helps increase flexibility among project managers and contractors to support better alignment with factors ranging from schedules to landowner/manager preferences to variable and sometimes unpredictable site conditions such as flooding that can impact access or planting feasibility.

Over time, the program has evolved to provide additional benefits, including:

- Coordination with researchers, restoration practitioners and nursery operators to develop and adapt practical seed source and seedling specifications
- Sharing of best management practices
- Guarantees to nurseries that they will have a purchaser for the stock they are growing
- Funding for plant materials and stewardship

The Next Ten Years: Continued Adaptation and Collaboration

As nurseries and planting partners alike work to adapt to a changing climate, the Collaborative helps strengthen the adaptive capacity of all groups involved. Diverse partners allow the Collaborative Grow Program to absorb impacts of nursery shortages or restoration projects that fall through. If nursery partners have species strained by extreme weather conditions, planting groups can still usually receive that species from one of the many other nursery partners. If planting partners have a project fall through due to unforeseen access or weather related challenges, the plants they ordered can be distributed to other regional planting partners rather than going to waste.

Small planting entities and nurseries have a significant role to play in climate change mitigation and adaptation. These entities are well positioned to observe and track how plants are responding to climate-driven changes. Through the Collaborative, partners can share lessons learned and strategies to adapt to new conditions. For example, Collaborative Grow partners are finding that under some conditions and with some species earlier planting dates are correlated with higher plant survival. In response, the program is working to

coordinate with nurseries to lift and distribute plants earlier than previous years where it does not negatively impact the integrity of seedlings.

The work of partners to scale revegetation efforts has led to the development of significant regional expertise and a vibrant contractor sector. But challenges remain:

- Certain species are difficult to grow, and some nurseries are shifting their production capacity.
- Labor shortages have caused significant stress and strain, and have driven price increases that can pose a challenge to groups who are locked in to grant budgets written years previous.
- Large scale fires have increased demand for plants.

As the program continues to grow, change and adapt in the coming years, we are working to assess the need for a similar collaborative in other areas of the Pacific Northwest. We'd love to **hear from you** if coordinated plant procurement is something that is needed in your region!



*Dull Oregon grape Mahonia nervosa.
Photo Credit: Tori Yoder*



Cooler manager Juan tracks inventory, pulls project orders and keeps operations running smoothly. Photo Credit: Kas Guillozet

BEAVERTON SCHOOL DISTRICT



AMERICAN INDIAN ALASKA NATIVE PROGRAM

Filling the Gap: Addressing the Problem of Missing Oaks on the Land Through Public Education and Indigenous Stewardship

An Interview with Brandon Culbertson

Hi Brandon. Could you provide some background on how this project got started?

The project got started in association with where I work right now [at Beaverton School District]. One of the hats that I wear as a Native Education Development Coordinator is being out at Terra Nova, a career and technical education, or CTE agricultural program. There's a lot of space out there, and so the admin and staff invited the Native Education Program to intertwine with the site and curriculum. This program aims to help bring about the resilient ecosystems that we're going to need as we move further into climate change through the restoration of native plants. A lot of that looks like restoring habitats to pre-settlement conditions to the best of our ability, and the oak savanna in the Willamette Valley is not what it used to be. About 95% of it is gone. As we continue to see growth boundaries

expand further out and agricultural needs continuing to grow, we're seeing that more and more oak savannas are under threat. A lot of the oaks that we do see at present on the landscape are fairly old, which is awesome, but there's a generational gap between the trees. And so the thought was how can we partner this CTE ag school in association with tribal community and interested community partners around creating positive change?

One of our goals in addressing this environmental need is to create a native plant nursery at Terra Nova, where we can propagate native plants and grow some oaks to an older age for planting out at other sites. We're starting off with an oak garden and then we will start sending trees home with students that have property where it makes sense [to plant them]. We'll also plant on district and municipal property

where appropriate. Basically we seek to saturate the community with oak starts. I also think it makes sense to integrate conservation groups and large, private land owning individuals that would be interested in having a few people on their property to gather acorns and/or plant oaks.

Where are you at in this work now?

At present myself and my babies are gathering acorns for school and community planting endeavors. We're also doing some germination experiments with floaters and non floaters, some bark chips, some oak debris, as well as clay and then potting soil to introduce elements of science into it. Activities like these get students and families doing STEM based bonding wrapped around that umbrella of cultural and environmental sustainability.



Brandon Culbertson

Native Education Coordination and Development TOSA for the Beaverton School District

Brandon is from the Northern Arapaho Nation (WY) and Fort Peck Assiniboine and Sioux Tribes (MT). He is an alumnus of the University of Oregon and Wind River Tribal College. He has 15 years of experience working on and off-reservation within Native Education. Currently, he works as the Native Education Coordination and Development TOSA for the Beaverton School District. His work there involves implementing tribal history/shared history, tribal language(s), and Indigenous science into curriculum, CTE, and classrooms (K-12). Brandon has had success progressing institutional change in partnership with the board and staff to include disaggregating AI/AN Data, changing Columbus Day to Indigenous Peoples' Day, recognizing Native American Heritage Month, and renaming Timberland to Tumwater Middle School. He currently serves as the vice-chair of the Oregon Department of Education American Indian/Alaska Native Advisory committee and serves as a sergeant within the Oregon National Guard.

We were fortunate this year to pull in a grant from Oregon Metro, and right now we're in the process of procuring additional funds from Meyer Memorial Trust and the Oregon Department of Education CTE grant to recover and restore around three acres that are currently covered in invasive species or lawn at Terra Nova into pollinator friendly traditional food and cultural product systems.

Who is involved in the oak collection and propagation teams?

About 10-15 students have signed up to propagate acorns, and other than that it's been primarily Native community members. Two Native Studies professors, one from Portland Community College Rock Creek and one from Portland State University, are interested in teaming up as well. There's been a lot of word of mouth amongst Native families. All said and done, there are around 3000 acorns in the ground right now, so we're all very excited about that.

Some people have gathered [acorns] on their own. Some are more likely to show up to an event to plant, or have

expressed supportive interest, but lack access to acorns or soil or pots. So it's just meeting people where they're at and providing what they need to be able to participate in community based environmental restoration.

Why oaks?

As mentioned, around 95% of the white oak range has been decimated since European contact/settlement. Therefore, it's important for all of us that live within this region presently to help restore the environment to the way that it was stewarded since time immemorial. White oaks are a keystone vegetative species that are providers of shelter, food, and are really a prairie marker species in the Willamette Valley. It's critical for all of us to pitch in and help do our part to restore these areas to a semblance of what they were like in a pre-contact landscape.

Around 750 wildlife species visit oak habitat, and from what I've heard, almost all of the mammals and birds within the valley will spend some time on a white oak or draw sustenance from it in some way. It is time to get in front of situations where we see Douglas firs being monocropped in areas that

What is Terra Nova?

Terra Nova Science & Sustainability is an experiential learning campus that is operated by the Beaverton School District, complete with growing space, an industrial kitchen and a workshop/makerspace. Here, students have an opportunity to get their hands dirty, applying classroom knowledge as they grow food plants and learn about stewarding native habitat, among other things. This half day field science program is open to high school students already enrolled in Beaverton schools.

were traditionally white oak savannas, hillsides giving way to vineyards and population growth, otherwise we may collectively suffer under ecological collapse. Population in the valley is expected to double in the next 15 years, so now is the time to try to mitigate white oak habitat loss and really try to mitigate that generational gap that exists between heritage trees and what's currently on the ground.



Students proudly display freshly potted acorns. Oregon white oaks can live up to 500 years; this is the first day of a very long life for these trees. Photo Credit: Brandon Culbertson

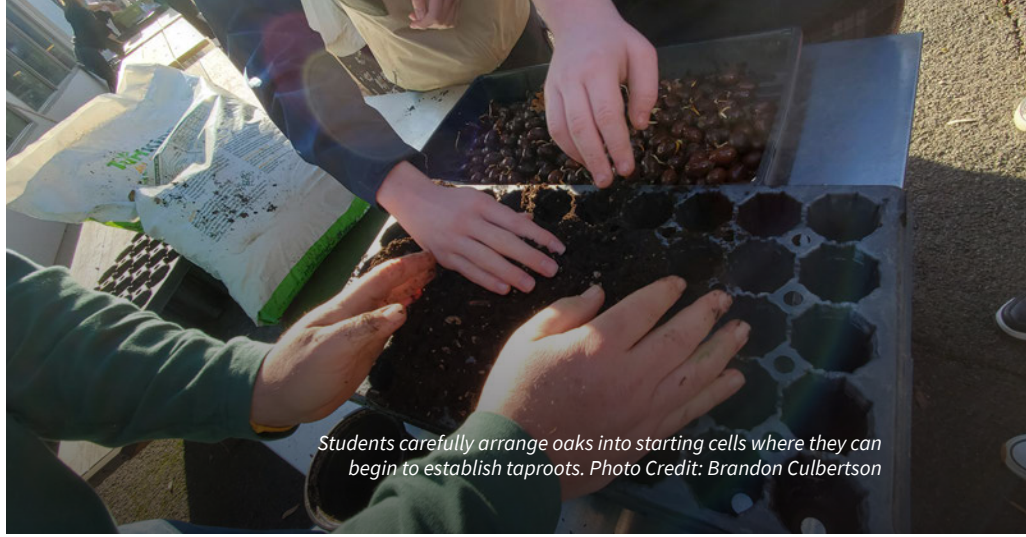
How have the participants responded to this project?

Different audiences have different feelings, I think. But with youth in general, most are caught off guard; they don't know that what we see today isn't always the way it was. This project is neat in that it feeds into the young people's concern around climate change and planting oaks is a tangible way for somebody to make a difference immediately, but is also long term. I've seen young people get really excited about the idea of planting something that then will outlive them and their future generations, but also be excited about the fact that someday they can point to a tree and say to their kid "I remember when I planted that."

To be able to mix in education, and some of the cultural significance to tribal people around stewardship, and ideas of symbiotic association, reciprocity and interconnectedness which are central and integral to Indigenous lifeways and ways of knowing provides unique teaching and learning opportunities. It also provides an opportunity for [non-Indigenous] people to gain insight into an area that they might not otherwise have access to by learning the importance that ecological balance and reciprocity holds within our lifeways. This is important to take note of as historically educational systems either ignored, devalued and/or sought to eradicate what makes us special as culture based environmental stewards.

Is there anything else you would like to share?

I think whenever we do outdoor education, finding engagement strategies for conservation is a no brainer. When people visit natural areas, I'd really like for there to be ways that they can help with direct action based stewardship. Whether that looks like invasive species removal as a natural act when you're walking through a park or green space, or even having opportunities to propagate natural native plants and then bring them in or just take them home and have that be okay, I think is the next step. I really look forward to the opportunity to create those types of learning and leadership modalities for the students that we serve.



Students carefully arrange oaks into starting cells where they can begin to establish taproots. Photo Credit: Brandon Culbertson



Trays of acorns ready to be potted. Photo Credit: Brandon Culbertson



Are you interested in planting oaks grown at Terra Nova? Or would you like to provide acorns from Oregon white oaks on land that you own or manage? Please reach out to Brandon Culbertson at brandon_culbertson@beaverton.k12.or.us



Institute for
Applied Ecology

Seeds for Change: Growing a Resilient Ecosystem

By Alexis Larsen, IAE Native Seed
Partnership Coordinator

Successful habitat restoration depends on an adequate supply of native plant materials. Planting a diverse array of native species provides ecosystem services for pollinators, wildlife, and people, and increases ecosystem resilience in the face of climate change and invasive species. Lack of quantity and quality of native plant materials, both seeds and nursery stock, has significantly hindered landscape recovery efforts. To address this need, native seed partnerships are collaborating to expand native plant materials programs in many regions of the country, including the Pacific Northwest. The Willamette Valley Native Plant Partnership (WVNPP) and the Coastal Native Seed Partnership (CNSP) are two regional plant materials partnerships coordinated by the Institute for Applied Ecology (IAE).

Historically, the Willamette Valley of Oregon was lush with fields of purple camas and rosy seablush in the spring, and goldenrod highlighted by the last rays of sun in the fall. Today prairie habitats are among the most endangered ecosystems in North America, with over 90% of upland and wet prairie habitat converted to other uses. Restoration practitioners have been actively restoring this critical habitat for decades but have been challenged to find high quality, diverse native seed for their projects.

In 2012, 21 partners came together to form the Willamette Valley Native Plant Partnership (WVNPP) to address this problem. These restoration organizations and native plant producers formed a collaborative group with the goal of creating a supply of seed that is genetically and ecologically

appropriate for the Willamette Valley. To achieve this, participating organizations collected seed from many source populations throughout the ecoregion to capture a broad genetic base for each species. This seed was used to establish farm fields of high priority native species for partners to use in restoration and revegetation projects.

Since its inception nearly a decade ago, the WVNPP has much to celebrate: the partnership has collected over 75 pounds of wild seed from 35 species, established 21 seed production fields, produced 4,810 pounds of native seed, and distributed nearly 3,300 pounds of seed. This genetically diverse, local seed has been broadcast throughout the ecoregion in prairie and oak habitat, and is an essential part of creating more resilient and robust systems.



The IAE native seed production farm. Photo Credit: Shinji Kawai



Trifolium wormskioldii (springbank clover) plug which will be used to establish a native seed bed.
Photo Credit: Alexis Larsen



Lomatium nudicaule (barestem biscuitroot) seed.
Photo Credit: James McAuliffe

In contrast to this longer running partnership, IAE is also coordinating a budding partnership on the Oregon coast. The coast is host to a diverse array of habitats that support unique flora and fauna. However, these places are among the most rare and impacted ecosystems in the Pacific Northwest. As a result, threatened species like the Oregon silverspot butterfly (*Speyeria zerene hippolyta*), Coho salmon (*Oncorhynchus kisutch*), western snowy plover (*Charadrius nivosus nivosus*), and other plant and animal species that make their home in these habitats are greatly imperiled. In response to these impacts partners are working together to restore coastal grasslands, estuaries, and dunes to recover the listed species that depend upon them.

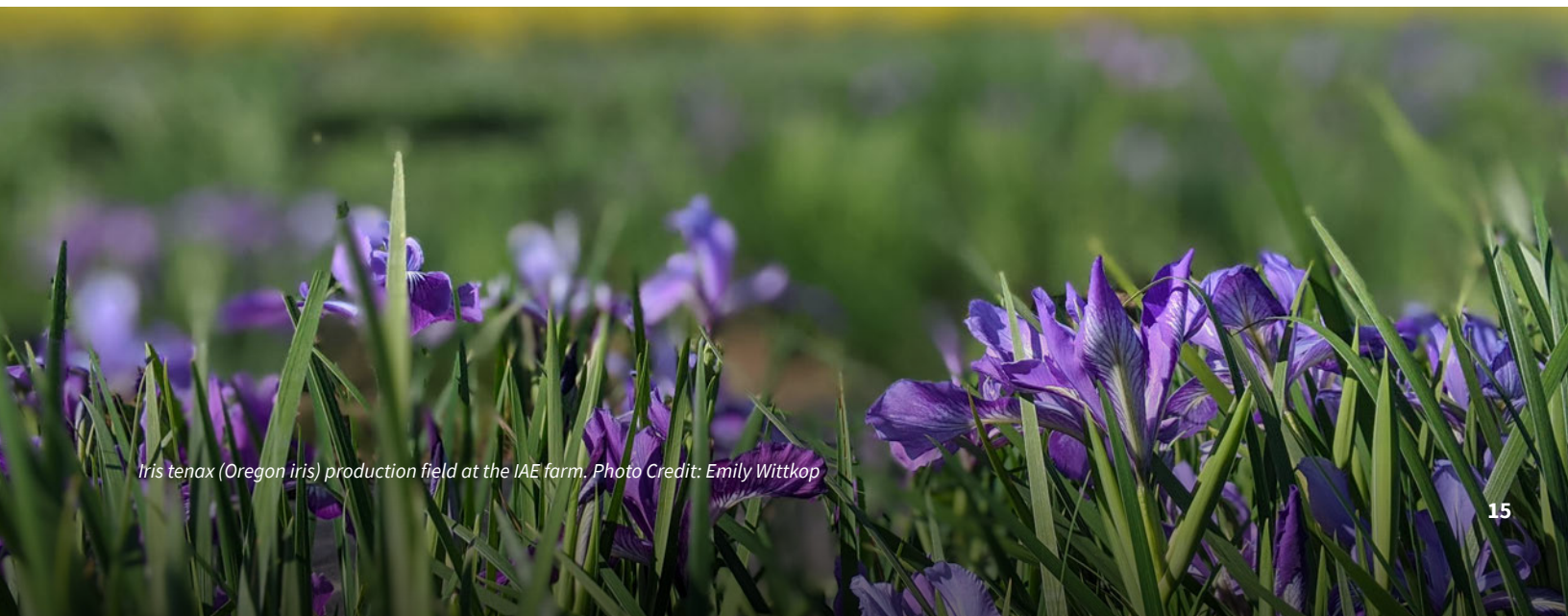
Successful habitat restoration for these species depends on having sufficient supplies of native seed and plants, which restoration practitioners in the region have found to be lacking. To remedy this, partners along the coast have come together to develop the Coastal Native Seed Partnership (CNSP). This collaborative group is developing a seed strategy to establish a dependable and sustainable supply of native seed that is genetically diverse, ecologically appropriate, and available in sufficient quantities to meet restoration goals on a landscape scale.

The CNSP began with a kickoff meeting in January 2020 which brought together coastal partners from Astoria to Bandon to discuss target habitats, geographic scope, and partnership structure. From

this meeting, an Operations Plan was developed followed by a 5-year strategic action plan. On the cusp of its third year, the CNSP is focused on developing a priority species list, wild seed collection, and finding new potential growers for seed production beds.

A regional approach to the coordination of native plant materials development, production, and restoration may contribute to a more cohesive ecoregional effort to conserve and restore increasingly rare habitats such as wetlands, oak savanna, and upland prairies. Plant material partnerships can help land managers and restoration practitioners meet their plant materials needs by increasing the quantity and quality of plant materials available. These partnerships have a unique opportunity to increase the genetic diversity of native plant material available on the market, and therefore play a crucial role in preparing for and mitigating climate change.

If you are interested in joining either of these partnerships please reach out to Alexis Larsen at alexislarsen@appliedeco.org



Iris tenax (Oregon iris) production field at the IAE farm. Photo Credit: Emily Wittkop

Rapid Changes Create New Challenges in Seed Collection

Interview with Carl (Carlos) Jackovich

What led you to want to become a seed collector and how long have you been collecting?

I have always collected stuff since I was a little kid of maybe six or so. I would collect things like berries, fish and all kinds of stuff in the woods, all throughout my childhood and teenage years. I then started becoming more involved in arborist, thinning and climbing work. Then in 1980, some foresters asked if I would climb the ponderosas around my house to gather cones for seeds. In the 80s, there was a lot of energy around research and all these scientists started having projects for me. I started working for more and more agencies like the Forest Service as well as for private folks. I started doing more difficult collections because I like challenges. I began working with mature giant sequoia and coast redwoods, which are some of the most difficult species to get seeds from. I don't keep exact track, but I've worked with maybe 150 species of trees all throughout California, Oregon, Arizona, Nevada and New Mexico. I've done projects in Mexico, Chile and New Zealand, so it's a job that has taken me all over the place.

How have extreme weather events impacted seeds and seed collection?

Huge areas that I usually collect on have been burned are just simply not there anymore, so they certainly won't be collectable again during my lifetime. In some of these burned areas, it will take a really long time for anything to even get established there and it'll be years and years before they're old enough to produce new cones and seeds. Some

species are gone totally or they're just remaining in remnant stands with hardly any cone and seed production. Some of the cypresses like the tecate and the cuyamaca cypress, they've been burned and as far as I know from what I've seen and heard, there could only be one little stand of each species left. These species are serotinous, and so they put out seedlings after a fire, but if another fire comes through before they start to make new cones and seeds at ten or fifteen years old, then they'll be gone. There could be some other hidden pockets of these species, but everywhere I look that seems to be the case.

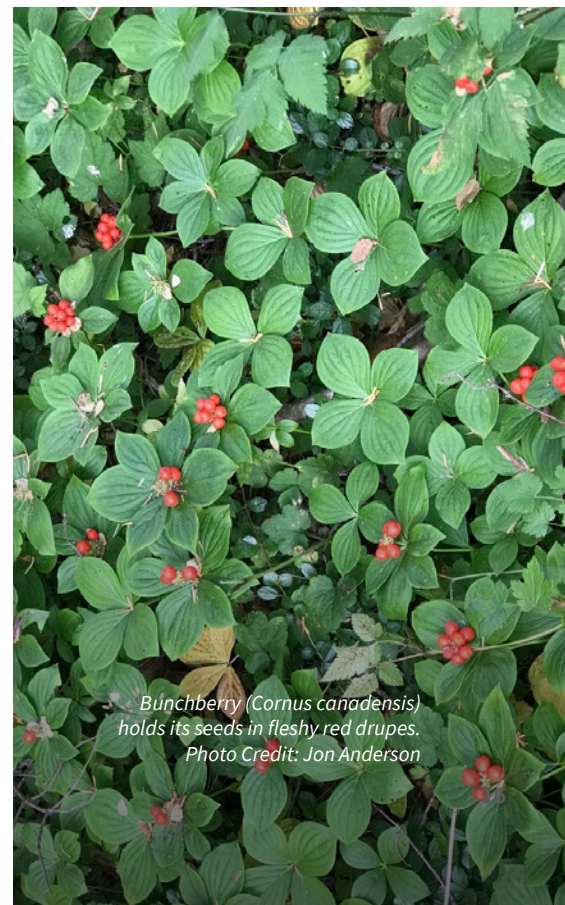
This last summer, after doing a giant sequoia collection, I heard that all the sequoia cones had opened from a fire and bunches of them were burned so badly they died. Even in places where the fires didn't go, the heat waves were so bad that it opened all of the cones in the serotinous trees, so there's no residual cones except for maybe this year's crop. I've never seen anything like that. The heatwaves definitely are having an impact.

What do you foresee as future impacts you might imagine on seed availability and cost in coming years?

Probably like with everything else, prices will keep going up as there are fewer and fewer places to collect. One major barrier to seed collection is that it's really hard to get permits on Forest Service property. The last 10-15 years, the Forest Service has been really reluctant to allow for any collections in a lot of areas. You'd think the Forest Service would be happy to see seeds and trees being planted, but for some reason

they seem to be very reluctant. People want these huge insurance policies to enter their lands and so it just gets to be more cumbersome and the area where you can collect keeps shrinking.

It is way easier to get permits on private land. Big private ranches and Timber companies in particular are easy to work with and allow collecting on their properties. Generally however, the future of seed collection looks pretty grim. The timber companies have been high grading for years, and they're logging for clear cut, so a lot of their ground isn't very good for collecting diverse seeds. With the fires and the



Bunchberry (*Cornus canadensis*) holds its seeds in fleshy red drupes.
Photo Credit: Jon Anderson

droughts, the seed quality of many species of pines has been pretty dismal the last 15-20 years, so there are a lot of empty cones and often lots of insects. It's always been challenging work and could become more challenging. I don't know if these heat waves will continue, but all these trees have their limits of what they can take. Some species are just not making it anymore, they're just too stressed out and they're dying or burning. You never know, things might turn out great actually, but who knows?

How are you adjusting your work and meeting or not meeting demand?

I'm looking for seeds in a lot more places. I probably drove 15,000 miles this year just searching areas for cones and seeds. I'm always adapting by making new tools, trying to get new contacts and find new places to collect. A lot of the agencies I work with have really strict specs for their seed and cone quality. So in marginal areas that don't meet the standards of these agencies, I have started doing my own collection and then working to find somebody who wants them. There are just so few seeds, and so many of these areas are burning up. At least if I'm doing my own collection, there will be seeds available to be planted somewhere rather than a fire coming through and then there's nothing available. I'm also starting to work with another group that is interested in creating a big seed bank, so we're talking about that and how we might go about that task.

What future needs do you foresee and how could partners support?

Having the Forest Service be more willing to allow collections would be a huge help. Allowing collections in State and National Parks would also help. I think some of these entities are becoming more willing to allow collections because of all the fires and that's a good thing. Seed collectors could offer to store some of the seeds they collect for these agencies in exchange for allowing collections. That way in case they have any catastrophic fire events they will have seed stored. These parks and lands often have some of the better holdings of seeds with great diversity because they don't log there.

Any place or agency with large holdings of land that haven't been cut heavily that would be willing to allow seed collection would be super helpful.

Have there been any really meaningful or profound things you've encountered while seed collecting that you'd like to share?

Once I was collecting redwood seed in Sonoma where a big fire had gone through and burned almost all the trees. The area surrounding the redwood I was in wasn't totally clear cut, but you had this incredible view. I was in the top of this redwood and saw these bald eagles flying right at my same level and then I

watched them fly down beneath me. It was a pretty unique thing to see, to be looking down on a bald eagle flying.

Another time I was working in the bristlecone pines with some scientists and I got a permit to collect some wood pieces because I do a lot of woodworking. The scientists were telling me that these bristlecone pines can grow to be 4,000 years old, and the oldest one they found was 8,000 years old. They said that the pieces of wood that I was getting were likely dead and down for 10 to 15 thousand years and alive for at least 4,000 years. That was pretty interesting to think about. These trees had likely been in this spot since about the last ice age or so.



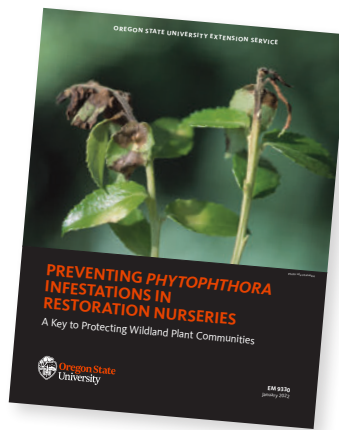
Osoberry (Oemleria cerasiformis) seeds nearly ready to be propagated.
Photo Credit: Jon Anderson

Preventing Phytophthora Infestations in Restoration Nurseries

Publication in Press Now

Phytophthora species are water molds that can kill plants. They can spread undetected in container plants and equipment. Once they are introduced to an ecosystem, it's difficult or impossible to eradicate them. Nurseries can help prevent the spread of Phytophthora by following some simple steps. Learn how to protect native plants from sudden oak death and other Phytophthora species.

View the publication here:
<https://catalog.extension.oregonstate.edu/em9330>



Ripe wapato seed heads and leaves.
Photo Credit: C. Sutherland

LISTEN

The Treehugger Podcast

Hosted by Michael Yadrick

Michael Yadrick recently interviewed a cohort of tree lovers about the stress that climate change is causing PNW tree species, eco-grief, assisted migration and more.

Listen here: <https://www.treehuggerpod.com/episodes/climate-feels-change>

WATCH

Webinar

We hosted a webinar about the challenges and joys of seed collection. The recording includes reflections from six experienced seed collectors.

Watch here: <https://www.youtube.com/watch?v=PRX-QNK9QRA>

We want to hear from you!

Have you seen the effects of extreme weather events like the heat dome of 2021, deep freezes or flooding on woody plant species? We are collaborating with climate modeler Dominique Bachelet to reflect on the effects of recent extreme events in the context of climate modeling.

Share your stories with us here: https://docs.google.com/forms/d/e/1FAIpQLScv4A4sKpW0IaZ7QBVIMaJxIN_QhVdhxYrl2KG8BKHiKILB9Q/viewform



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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