Fall 2023 Newsletter

From the Director



Seed Bank director Dr. Gabriel Campbell

This has been a very fruitful season for the Rae Selling Berry Seed Bank & Plant Conservation Program thanks to our wonderful group of hardworking and dedicated staff and volunteers! Expansion of our labor capacity has been possible thanks to the generous donations of our supporters and to several grants and contracts from organizations including the Oregon Department of Agriculture. In the past year we have been excited to welcome four part-time staff including lab technician Riley Katynski, student intern Kristen Malacara, Jacob Rose, and Louis Stokes Alliance for Minority Participation intern Ryan Colunga, volunteer intern Kathryn Ketel, and several other volunteers. We hope to continue to grow our labor capacity and staff expansion as we build our financial network to

support it.

This has also been a fantastic year for learning and sharing native plant knowledge, as we have been involved with several tours and workshops. In the spring, we hosted seed biologist Tia Tyler from the Forest Service seed testing lab in Macon, Georgia, for a seed viability workshop. Dr. Tyler taught staff how to determine if seeds are "alive" by interpreting tetrazolium staining patterns and analyzing images of x-rays of several Oregon native plants.



Seeds undergoing a tetrazolium test

Additionally, staff visited the Institute for Applied Ecology in Corvallis and were given a tour of their spectacular facilities, with several species in row crop production and state of the art seed processing facilities. And I was invited to tour the Forest Service Bend Seed Extractory, one of the nation's largest native seed processing facilities. There, the dedicated staff process and test seeds for large scale restoration projects. Think hundreds of pounds of native seeds packed to

MAKING A DIFFERENCE

VOLUNTEERING

Your support helps us to do our best work.

Please call Kris at (503) 725-2468 or email kfreitag@pdx.edu if you would like to support our program.

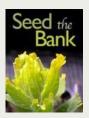
MAKE A GIFT TODAY



Have you included or considered including the Rae Selling Berry Seed Bank in your estate plans? For more information, or to notify us of your plans, contact Crystal Froembling, Senior Director of Development, at (503) 725-6071 or froemblingc@psuf.org.



Stay up-to-date with the Seed Bank through Instagram!



See details of our activities on our Facebook page



Restoration project seed stores at Bend Seed Extractory

your height on pallets! Lastly, this month seed bank staff and volunteers, led by greenhouse assistant Roxy Olsson, will give a presentation on native seed germination hosted by the local, worker-owned SymbiOp Garden Shop.

Public interest in what we have been doing this year led to various media organizations reaching out to the Seed Bank and "shout outs" in important new stories. This includes a radio interview with me on the local syndicated community radio show *Beyond Your Front Door*. In the program that aired on local NPR stations I discussed our costal dune seed collection project and how it relates to climate change and rare species. I was also interviewed by *Axios* for the article, "Climate disasters are fueling the rise of



Sidalcea nelsoniana Image: Ed Guerrant

'doomsday' seed vaults" which highlights the important connection between native seed banks and global food security. We were also contacted by the university's unofficial newspaper, *PSU Vanguard*, for an article about citizen science. Finally, we were mentioned as key partners in a United States Fish and Wildlife Service press release "Prairie Conservation Continues to Blossom in the Pacific Northwest as Nelson's Checker-Mallow Delisted Due to Recovery", citing our hard work in helping to delist the formerly federally listed *Sidalcea nelsoniana*.

Despite the amazing work we and other native plant conservation professionals across the state have been doing, there is a lot more work that needs to be done. Habitat loss, invasive species, and climate change all threaten our native plants and the Oregon ecosystems, economy, and cultures that depend on them. Right now, we have very limited (~26 hours a week) permanent staff capacity with the ability to manage interns and volunteers. We rely nearly entirely on "soft" money from grants and contracts and generous donations. Please consider making a sustained, tax-deductible donation today to help us continue our mission of Oregon native plant conservation.

Seed Bank Partnerships in Our Region

Kris Freitag

Four forty years, the Seed Bank, as part of The Berry Botanic Garden and now of Portland State University, has been an integral part of the network of regional conservation. Much of what we do involves collection and long-term storage of seeds against future need. But a large part of our work requires that we process fresh collections for immediate use, or provide stored seeds to researchers for study and

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Seed banks: the last line of defense against a threatening global food crisis

Sounds emitted by plants under stress are airborne and informative

A first in fossil research: Seeds sprouting from an amber-encased pine cone

Native Seeds: Supplying Restoration, presented by the International Network for Seed-Based Restoration

Removing Five Species That Occur on San Clemente Island From the Federal Lists of Endangered and Threatened Wildlife and Plants

How planting 70 million eelgrass seeds led to an ecosystem's rapid recovery

A hunt for fungi might bring this orchid back from the brink

CONTACT US

Seed Bank Director, Dr. Gabriel Campbell gec2@pdx.edu reintroduction to the wild. We have been collecting narratives about studies and projects involving "our" seeds.



Silene douglasii var. oraria

Silene douglasii var. oraria (Cascade Head catchfly) is endemic to steep, rocky grasslands on the northern Oregon Coast. Populations appear to be in significant decline, and minimal efforts at reintroduction have been attempted. Wild seed is extremely limited, making plant material availability for reintroduction a barrier. Using stored seed from the Seed Bank, as well as freshly collected wild seed, the NRCS Corvallis Plant Materials Center is refining a germination protocol and formalizing container and agronomic seed production protocols in order to be able to provide

significant plant materials for reintroduction of the species. In 2021, Citizen's Rare Plant Watch contributed data as well as seeds by surveying a historical site of this species.

The Oregon Department of Agriculture's Native Plant Conservation Program (ODA) has been working with the Oregon Department of Energy and NextEra Energy Resources LLC on mitigation for a wind energy project that impacts Lawrence's milkvetch (Astragalus collinus var. laurentii), a state threatened species. As part of the mitigation, ODA collected thousands of Lawrence's milkvetch seeds from impacted plants in 2021 and 2022 that were either stored for conservation at the Seed Bank or used in germination and cultivation trials conducted at ODA's greenhouse facility at Oregon State University. In late 2022, a total of 380 cultivated plants were transplanted back at the central Oregon site in a non-impacted location and were monitored in 2023. While avoiding impacts to listed plants is always ODA's first choice,



Astragalus collinus var. laurentii

mitigation can provide the means to study rare plants and either augment natural populations or introduce the species to other suitable areas.



Eriogonum tiehmii

Because populations of *Eriogonum tiehmii* (Tiehm's buckwheat) are impacted by their mining activities, international corporation ioneer created the Tiehm's Buckwheat Conservation Center to enhance populations of this narrow Nevada endemic. In an initial study of the species' needs, scientists at the University of Nevada, Reno and Nevada Division of Natural Heritage extensively sampled elements of *E. tiehmii* populations, including soil. Occupied sites were, on average, lower in sulfur, zinc, potassium, and magnesium

and, on average higher in boron, pH, and silt, among other differences. Soil collected from population sites was used to grow seedlings in greenhouse experiments, using seeds extracted at the Seed Bank. Among other findings, seedlings demonstrated sensitivity to soils and had higher biomass and root allocation when grown in soils collected from population sites, suggesting that the plants are not simply highly stress-

(503) 725-2456

Location: SRTC Room B1-81 1719 SW 10th Ave Portland, Oregon 97201

Mailing address: Rae Selling Berry Seed Bank-ESM Portland State University PO Box 751 Portland, OR 97207-0751 tolerant, but are specifically adapted to their native soil types. This research is ongoing, as is the Seed Bank's involvement with this species.

In order to take into account habitat suitability issues caused by climate change, Clean Water Services, Tualatin Soil and Water Conservation District and the Institute for Applied Ecology are developing a new native plant materials strategy. Using mapping and modeling, researchers selected areas with current conditions that are likely analogous to those of the Tualatin River basin in the next 20-50 years. Based on plant surveys and a number of criteria, 24 trees and shrubs were selected for seed collection and grow out. Seeds sampled from these "future analogue reference sites" are being stored at the Seed Bank while analysis continues. This analysis will begin a planning process to inform decisions about



Seeds collected with climate change in mind

emphasizing or deemphasizing certain species in planting plans, as well as to create recommendations for climate-adjusted seed collection and assisted migration.

Sharing Native Plants With Our Community

Gabriel Campbell



Monardella odoratissima seedlings in the greenhouse

Berry Seed Bank staff have been collecting native plant propagation data in the research greenhouse and nursery located on the PSU campus. We now have a fully operational intermittent mist bench system which allows for year-round propagation, the propagation of stem cuttings and divisions. Since 2022 staff have propagated approximately 200 species from seeds, cuttings, or divisions, and grown plants in 4-inch containers all the while recording important data, such as time to

germination and time to a "finished" plant that could be used in active restoration projects or could be sold in the native plant trade.

All of this had led to an interesting problem--we ended up with hundreds of plants from this research that need a home! In the past, we have given away plants to a diverse audience, including folks at the Portland Farmer's market, fundraising raffles at conferences, individuals who attend our in-person workshops, Native Plant Society of Oregon members and many more. Homes for our plants include the PSU campus itself, namely four native plant gardens on campus.



Oak Savanna planting in Winter and Fall

We are proud to have contributed several dozen plants to the Native American Student and Community Center Garden. This exciting garden includes an urban green roof, an often-overlooked use for many native species. Our next two (brand new!) gardens are located adjacent to the Smith Memorial Student Union and include a Willamette Valley prairie garden and a teaching garden. These gardens have exceptional species diversity given their small footprint. Installation was supported in part by a grant from local Plantzy Gardens and Designs, in association with the PSU Student Sustainability Center. Last but not least, we donated and helped install dozens of plants for use in the Oak Savanna project led by faculty and staff from the Indigenous Traditional Ecological & Cultural Knowledge program at PSU. This lovely garden is located just to the south of the Science Research and Teaching Center, our own building!

We recently had our largest plant donation event since coming to PSU. We gave away approximately 1,000 plants worth nearly \$10,000 to various community groups, PSU organizations, faculty and students, and local native plant businesses. Notable recipients include Oregon State Parks who received several coastal dune species for use in experimental restoration outplantings and the PSU Student Sustainability Center for yet another native plant garden.

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Citizen's Rare Plant Watch 2023



Thank you, Citizen's Rare Plant Watch (CRPW) volunteers! It was a lovely field season for CRPW--we played chicken with the smoke clouds in late summer, but the cool spring gave us good bloom and healthy plants for our monitoring trips.



It was still cold and wet when we found our first quarry in May at a site not visited in over 40 years. We found two lovely clumps of *Dodecatheon austrofrigidum* (frigid shooting star) down the steep bank of the Trask River, on the way to Tillamook. Unhappily a scanty population, but still an auspicious beginning!

Dodecatheon austrofrigidum (Image: Margret Harburg)

In June, for the Bureau of Land Management

(BLM), we visited central Oregon sites where *Botrychium pumicola* (pumice grape-fern) has been in decline, but we found several plants at two different sites. The odd, lovely sporophyte of this rare plant was a treat to encounter, seemingly miraculously, as there were so few and they were so widely scattered.



Botrychium pumicola



Also for the BLM, we monitored a site where *Castilleja chlorotica* (green tinged paintbrush) has been holding on, in the Sagebrush Steppe of central Oregon. We found a healthy population of a plant that is distinctive at all stages of development.

Castilleja chlorotica

It was difficult to see how dry the small tributaries of the Clackamas River can be in July these days, but after walking among dry and then algae covered rocks, we finally encountered the cold waters for which *Corydalis aquaegelidae* (Clackamas or cold-water corydalis) was named. These luscious clumps of pink flower spikes with their feathery green skirts were the highlight of my field season.



Corydalis aquae-gelidae



Phemeranthus spinescens on BLM rangeland in late July. This plant is an attractive succulent that resembles Lewisia columbiana until after it blooms, when its leaves turn a flaming red. It has the BEST common name, "spinescent fameflower." We waited to survey until after blooming, when it stood out amazingly in the tan landscape.

season was clearly waning when we sought out

Phemeranthus spinescens late summer leaves

Our BLM, Forest Service and Oregon Parks partners have expressed consistent gratitude for CRPW activities, and we've had a great deal of fun doing them. These partners receive the updated site data, as does the Oregon Biodiversity Information

The growing

Center, who in turn makes the data available to Oregon Flora. We hope and expect that our activities contribute to the conservation of our wonderful rare plants. Read more about our program on the Native Plant Society of Oregon web site.

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Volunteer and Student Led Seed Collection

Gabriel Campbell



Greenhouse Assistant Roxy Olsson and intern Kat Ketel

'Tis the seed-son at the Berry Seed Bank. We enjoyed three seed (and propagule) collection trips this fall led by volunteer Zak Weinstein and student interns Roxy Olsson and Kathryn Ketel. Seeds were collected from Forest Service land in the Columbia Gorge and on Mt. Hood. These trips were remarkably productive and resulted in the collection of over 100 species of seeds, cuttings and divisions. Native plant species with high ethnobotanical value including edible and medicinal plants and species with high ornamental value were targeted for collection. These species will be used to conduct propagation research and many of these seeds will be stored in our seed bank.

Our first two trips occurred on wonderfully sunny and warm fall days near Mt. Hood Meadows on the southeastern side of glorious Mt. Hood. The crisp temperatures and ample sunlight were perfect conditions for collecting fruits and seeds in paper bags. Both of these trips were led by volunteer extraordinaire Zak Weinstein. Our first trip was in late September and spanned a diversity of excellent, intact ecosystems including montane forests, meadows, and riparian areas. Notable species of collection for this trip included seeds of the highly ornamental Cascade grass-of-Parnassus (Parnassia cirrata var. intermedia), divisions of the lovely groundcover Oregon wintergreen (Gaultheria ovatifolia), seeds of the dominant graminoid Hitchcock's woodrush (Luzula hitchcockii), seeds of the pollinator paradise subalpine spiraea (Spiraea splendens), and seeds of the highly ornamental western pasqueflower (Anemone occidentalis).

Our second trip occurred in early October and this time we went to alpine habitats with lovely, dwarfed shrubs and dramatic snowfield influenced areas, and finished our evening collecting plants in a spooky bog. The bog was made even spookier by the fact we were collecting around dusk in nearly dark conditions. Notable species of collection for this trip included seeds of the tasty-fruited alpine wintergreen (*Gaultheria humifusa*), seeds and divisions of



Gaultheria humifusa

the carnivorous roundleaf sundew (*Drosera rotundifolia*), divisions of a few well-behaved willows (*Salix*), and seeds of the medicinal black elderberry (*Sambucus racemosa* var. *melanocarpa*).

Our last trip seed collecting trip occurred in the Columbia Gorge in mid-October, on a quintessentially Pacific Northwest fall day. This trip was led by student interns Roxy Olsson and



Kathryn Ketel. Notable species of collection for this trip included seeds of the striking mountain hollyhock (*Iliamna rivularis*), seeds and divisions of two species of stonecrops (*Sedum*), and seeds of important riparian restoration species including red alder (*Alnus rubra*) and goldenrod (*Solidago*).

Drosera rotundifolia

These three seed collection trips significantly increased the number of species stored safely for future use in conservation, research, and education at the Rae Selling Berry Seed Bank & Plant Conservation Program. Seeds and plants from these collections could potentially be used in large-scale ecosystem restoration projects, in cutting-edge invasive species research, could be the progenitors of future crops needed to cope with climate change, and could be used by future generations in ways that we can't currently fathom. These seed collection trips are also an invaluable professional development training opportunity for student interns and volunteers gaining real-world botanical skills. Importantly, they are also a way to stay connected with the natural world, to feel the past and have hope for the future, and to develop a sense of community and healing.

Berry Volunteers Connect

Thank you to all our volunteers! We couldn't do it without you. Here are four individuals who have been especially helpful with our seed banking efforts:



We recently welcomed **Ryan Colunga**, student intern through the Louis Stokes Alliance for Minority

Participation (LSAMP) Program. Ryan has this to say about himself: "I am interested in the ecology of our world and the preservation of species. I grew up in the high desert of southern California, where one would assume not many species exist, but that is far from the truth. In my hometown of Colton, there is a species called the Delhi Sands flower-loving fly (*Rhaphiomidas terminatus abdominalis*) that is critically endangered. This

fly species' challenges sparked my desire to prevent further harm to existing ecosystems and to learn of every avenue of conservation.

"At the Berry Seed Bank I have been processing a collection of *Perideridia erythrorhiza* (red root yampah). While doing so, I have been able to collect parasitoid insects that prey upon this plant species. The relationship between *P. erythrorhiza* and its parasites are an important feature of the environment they both inhabit, and one could not thrive or even exist without the other. It is this relationship that summaries the importance of conservation from an ecosystem perspective, as if one species is removed, the whole system is diminished."

Volunteer intern **Kat Kete**l says: "When I was a summer intern at Leach Botanical Garden a few years ago, I visited the Berry Seed Bank and immediately wanted to get involved with its work. When I decided to earn a

Bachelor of Science degree through Oregon State University (remotely), I decided to see if I could do my required internship with the Seed Bank. I began by volunteering with Kris and Citizen's Rare Plant Watch. I have since been working with every facet of Seed Bank work, including processing seed samples for storage, propagating plants and field work. I will finish this, my



final year of undergraduate work, with a degree in Horticulture and a minor in Botany and a greatly improved understanding of *ex situ* plant conservation."



Volunteer Jon with wife Lisa

Newest volunteer **Jon Giles** has this to say: "While strolling through the booths at the Saturday morning farmer's market on the Portland State University campus I saw someone sitting at a table with several small plants and information on volunteering at the Rae Selling Berry Seed Bank & Plant Conservation Program. When I owned a home I set up a certified butterfly garden in the backyard and enjoyed researching and cultivating the variety of plants which attract butterflies and provide a safe location for them to rest and eat while on their long journeys. I was drawn to the idea of working directly with the plants that are so important to the health of other

species and the larger ecosystem. I enjoy the opportunity to support the efforts of the Seed Bank to ensure that rare and endangered species of the Pacific Northwest exist for future generations."

Congratulations to volunteer **Maryam Heydari**, who graduated this year! Mary helped out in the field, lab and greenhouse while finishing her degree. We wish her well in her future efforts for the health of our ecosystem.



Graduate Maryam with Kris

Making a Difference - Private Support

We are deeply grateful to **Gilbert and Laurie Meigs** for the tremendous support they gave us over the years. Our most recent "Meigs interns," profiled in the last newsletter, provided invaluable support in this past year. Laurie passed away this spring, five years after Gilbert's passing. We miss these unique and lovely individuals, and we are glad that their



spirits live on in the internship endowment they established, as well as in countless other gifts to the wider community.

Our dear friend, Laurie Meigs



Jane Hartline and Mark Greenfield, owners of Sauvie Island Natives Nursery, have recently given us a generous gift to support our native plant greenhouse propagation efforts, through their Greenfield-Hartline Habitat Conservation Fund. Jane is the founder of Sauvie Island Habitat Partnership and is deeply committed to the integrity and health of Portland's ecosystem. Thank you!

Private gifts and grants make all the difference in the life of our program. You can go directly to our giving page, or for more information about estate giving or other ways to make a gift, please contact Crystal Froembling, Senior Director of Development, at (503) 725-6071 or froemblingc@psuf.org.

Upcoming Events

Native Seed Germination Workshop Presented by Seed Bank Director Dr. Gabriel Campbell at SymbiOp

Sunday, November 12, 1:00-4:00 pm SymbiOp Garden Shop 3454 SE Powell Blvd, Portland \$40, pre-register

Find yourself perplexed by how and when to propagate native plants from seed? Join the Rae Selling Berry Seed Bank, Oregon's native seed bank, to explore the wonderful diversity of PNW seed dormancy and germination requirements. You will learn about seed physiology, dormancy



Polygonum paronychia seeds

types, and citizen seed science methods that will set you up for germination success! Seed Bank staff will compare home methods with research methods as well as teach you proper transplanting and early plant establishment techniques. We will provide tools, materials, seeds, and professional guidance to sow seeds using different treatments. Be a part of the citizen seed science community and contribute to the conservation of our region's plant biodiversity!

More details>>

Maintaining Lichen Diversity in an Era of Global Change

Presented by rare plant botanist **Jesse Miller**, Washington State Department of Natural Resources Tuesday, November 14, 7:00 pm Native Plant Society of Oregon Free, virtual, pre-registration required

Although often overlooked, lichens are diverse and beautiful and play critical roles in ecosystems. Currently, lichens face a number of ecological threats, making their future uncertain in the Pacific Northwest. In this talk, Jesse will focus on the



Image: Mathieu Landretti

effects of larger, hotter wildfires on rare lichens, and discuss management strategies we can take to keep our rare lichens present on the landscapes over the long term. He'll also talk about how community scientists can help with this work by documenting lichen distributions.

More details>>

Urban Ecology and Conservation Symposium 2024

22nd Annual Urban Ecology and Conservation Symposium

March 11, 2024 At Reed College



Keynote Speakers:

Dr. Sara Petrita Bombaci, assistant professor with the Department of Fish, Wildlife, and Conservation Biology at Colorado State University in Fort Collins, Colorado. Her multidisciplinary research blends conservation science and social science to explore how ecological systems interact with social and environmental gradients in pursuit of innovative solutions to conserve biodiversity while meeting diverse human needs. Her current research areas include acoustic ecology, urban ecology, community-centered conservation, and human-wildlife interactions.

Dr. Mason Fidino, quantitative ecologist with the Conservation & Science Department at the Lincoln Park Zoo in Chicago, Illinois. Mason's research, for the most part, is in biodiversity informatics. He integrates large and complex data sources, develops new quantitative techniques, and uses high-performance computing to determine how biodiversity responds to environmental change across multiple spatiotemporal scales. Mason is especially interested in understanding ecological principles in urban environments and, through their research, looks for ways to leverage the vast data sources that exist in cities to answer pressing social-ecological issues.

More details>>

The Wide World of Seed Banking

Saving seeds for future use is as old as human civilization and as timely as today's headlines. Our focus has been on rare and endangered species, but the world of seed banking is far more expansive. It probably began with storing seed for next year's crop, and agricultural plants are likely still the most common focus of seed banks around the world. But recent decades have seen an explosion of seed banking of a

much wider array of plants for many different purposes. In this section, we seek to provide a glimpse of the wide and wonderful world of seed banks.

In Our Country: Texas Plant Conservation Program

Plant diversity is being lost at an alarming rate. It is this same diversity that supports human livelihoods and many of our most precious natural resources. One of Fort Worth Botanic Garden's major goals is to raise awareness of the value plants bring to life, and the threats they face worldwide. We are committed to working toward conserving plant diversity at home in Texas, and around the world.



Texas rare plant, Abronia macrocarpa (Image: Greg Wieland)

The Conservation Seed Bank collects seed from wild populations of rare plants as an insurance policy against extinction. The seed is used for research and restoration efforts for these rare species. The seed bank is an essential component of our Plant Conservation program. It provides baseline data and plant materials for research efforts seeking to understand how we can best conserve these species while actively conserving genetic diversity of our most imperiled plants.

Continue reading at the Botanical Research Institute of Texas web site>>



Brazil nut, Bertholletia excelsa (Image: Miguel Jorge Villavicencio Oliva)

In the World: Camino Verde Living Seed Bank Biodiversity Program

Wild populations of the most useful species of the Amazon have diminished steadily over the last 500 years--and precipitously in the last 100 years.

Extractive economies continue to grow, reaching regions that were previously conserved through isolation, threatening not only the populations but the genetic diversity of the region's most valuable tree species, upon which the Amazonian economy directly relies.

The Living Seed Bank Biodiversity Program is meant to safeguard in living planting systems the genetic resources (in the form of seeds and cuttings) of as

many as possible of the useful species of the Amazon; propagate, plant, and make available to farmers and institutions the greatest diversity possible of the economic botany of the Amazon; improve the understanding of the production potential of littlestudied native species in a context of silviculture, reforestation, and agroforestry (on farms and plantations rather than in forests).

Continue reading about Camino Verde >>

Stay informed on upcoming events and news by regularly visiting the Rae Selling Berry Seed Bank web site.

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