

RAE SELLING BERRY SEED BANK & PLANT CONSERVATION PROGRAM



Fall 2017 Newsletter

From the Director



Director Ed Guerrant

It's been quite a summer into fall. The Chetco Bar Fire in southern Oregon, an area home to many rare plant species, was the largest in the USA for weeks on end. Smoke and ash from the Eagle Creek fire in the Columbia Gorge turned the Portland sky an eerie reddish brown for days. For two days at least, I could look directly at the sun without eye protection as it rose over the West Hills. It was like watching the total solar eclipse with eye protection, but not at all delightful.

It has been a busy six months. In her article below, Kris describes her work with Citizen's Rare Plant Watch (CRPW), which seeks to re-locate known rare plant populations that have not been seen in decades and provides a way for volunteers to do meaningful work while exploring some out of the way places with like-minded plant people.



CRPW spring training

In addition, we were in the field monitoring our long term western lily (*Lilium occidentale*) study and our second planting of eared rockcress (*Arabis hastatula*). The first eared rockcress outplanting, planted in fall 2014, did not thrive, presumably because of the subsequent warm, dry spring. The second planting in the fall of 2016, monitored this spring, yielded more encouraging results. A greater proportion survived the first year, and those that did were much larger in the second planting.

Much of my time has been spent working to finish the relational data base. The underlying programming, by a colleague at the Chicago Botanic Garden, is nearing completion. We are well into populating it with a veritable mountain of collection data the seed bank has been amassing since 1983. So far we have almost 90,000 records entered,

MAKING A DIFFERENCE

VOLUNTEERING

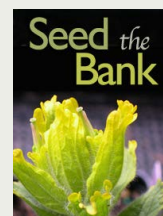
Your support helps us to do our best work.

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? If so, or if you would like to learn more, please contact Kathleen Hampton, Major Gifts Officer, at (503) 725-3526 or hamptonk@psuf.org.



Stay up-to-date with the Seed Bank on our Facebook page!

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*Fruiting eared rockcress,
Arabis hastatula*

many of which consist of numerous fields, or types of information. We are also "alpha" testing (do the various "buttons" do what they are supposed to do?) and beginning on "beta" testing it

(do the functions work as they are supposed to, do the various parts interact as they should, and so forth?).

Two undergraduate students have been working with us this term--Troy Craine and Rheanna Williams--as the latest of the Laurie and Gilbert Meigs Conservation Education Interns/Scholars to assist. They are of great assistance, and it is always good to have more young people in the lab.

This year has also been very challenging financially. Funding from the federal government has fallen off considerably, a situation not unique to us, but troublesome nonetheless. Interest payouts from our endowment are also down sharply, unexpectedly so, given the economy and stock market. I tell you this uncomfortable information because the value of individual donations--always important--is greater than ever now. We will be sending out our annual appeal letter soon, and we are most grateful for all the support so many of you have provided over the years, first at the Berry Botanic Garden, and now at PSU.

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Rare Plant Watch, Season Two

Kris Freitag



*Volunteers Roger (back)
and Marci in the field*

From Florence to Seaside, from the Columbia Plateau to the Ochocos, Citizen's Rare Plant Watch (CRPW) volunteers visited some of Oregon's most cherished natural areas this year. We also fulfilled assignments in places where the native flora is particularly challenged by invasive species and human-caused impacts. Nearly 40 volunteers participated in 2017, visiting more than 20 rare plant populations to update old population data or to document newly discovered sites.

My second full season as coordinator is now drawing to a close. It was another eventful one, starting last winter, even as cold as it was! In February, I watched the calendar, conferred with seasoned botanizers and public land managers and began to put

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Tropical Forest Seed Banks: A Blast From The Past

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together a schedule of monitoring trips.

The bloom-delaying cold continued through March, and we held our spring training in mid-April before I finally took a group of three out to Stanley Rock in the Gorge the third week of April. Incredibly, white meconella (*Meconella oregana*), normally one of the earliest to appear, was still blooming among the grasses and other low forbs. The plant was such a treat to find, almost unexpected because the flower is so small and nondescript. Luckily, its distinctive bright green fruits stand out to the sharp eye, allowing even newbies to positively identify it.



Flowers and fruit of *Meconella oregana*

We had a full house at our volunteer training in April, comprising avid plant people, retired professionals and citizen scientists exploring the local options. Wendy Gible, of University of Washington's Washington Rare Plant Care and Conservation (Rare Care) was co-instructor and generously donated precious time during her busy spring. Having managed Rare Care for 15 years, Wendy knows well the value of a clear curriculum and has provided great guidance to us. In the training, we covered safety in the field, techniques for estimating the size of plant populations, necessary equipment, site visit protocol, instructions for filling out the survey form and many other topics. I very much appreciate that although a number of Wendy's volunteers have also become involved with CRPW, she is very supportive of our effort, demonstrating how little place competition has in our collective goals for Cascadia.



Douglasia laevigata in its preferred near-vertical habitat

With the training and our first monitoring trip behind us, the season was well launched by late April. Although I continued to receive warnings of snow-blocked roads and buried sites, we worked our way up in elevation over the next few weeks. In the nature of field work, things went FAST once they started. Working in spitting rain in the Gorge in April gave way to a hot day in May documenting stiff milkvetch (*Astragalus conjunctus* var. *rickardii*) on the Columbia Plateau. By end May, we finally ventured into the Cascades with a search for purple sicklepod rockcress (*Boechera atrorubens*) at Bald Butte.

I am pleased with the success of this season's group efforts. We kept groups small (5 max) and thus flexible and focused. We had hands to mark coordinates, eyes to look for our target, individuals to deploy measuring tapes and quadrat, without people feeling at loose ends. This year we also acquired two new independent monitors. I

provide such trained individuals with necessary documents and maps and clear their activities with land managers. They select from a list of target sites, set their own schedules and collect data, returning the results to me.



Erythronium elegans group
(Image: Jennifer Devlin)

We also acquired a new trip leader in volunteer Roger Brewer, who led a successful search for Coast Range fawnlily (*Erythronium elegans*) in the Coast Range. Whether as an independent



Boechea atrorubens growing
in shelter of shrubs

monitor or leading a group, a trip leader has to run with whatever resources are available. This may be no more than a hand-drawn map, a brief description, and a set of GPS coordinates that

indicate the center of a very large circle where the population "may" occur. As was the case with Roger's trip, the supporting materials may alternatively consist of quite good maps and reports if the land manager is interested in updating sites that have received more recent visits. I have found that flexibility, a minimum skill with GPS devices and software, and dedication to providing useful data are essential in this work.

Searching without finding our target species is data, however unsatisfying it might seem. Sometimes due diligence means being "skunked" in our search of a particular area so we can collect data that may spare another the same effort in the future. Only once this season were we entirely skunked. In July, three of us looked for a small population of Henderson's checkermallow (*Sidalcea hendersonii*) at Nestucca Spit that had not been documented for 30 years. On the map generated from the old report, the population of this tidal marsh dweller was now situated squarely in the hind dunes of Nestucca Spit. The dynamic nature of coastal ecosystems and shorelines means that drastic changes may occur in intervening decades, with salt marsh giving way to shrubby forest.



Lewisia columbiana var. *rupicola*
in June at Saddle Mtn

We duly visited the old site anyway, pushing through well-established and tragically overgrown Scotch broom, to no avail. The conditions appeared to be far from what they were 30 years ago, and the small Henderson's checkermallow population found then was apparently no longer on Nestucca Spit.



Chloropyron maritimum ssp. palustre
with *Jaumea carnosa* at Netarts Spit

Our season was cut short by the terrible fire in the Gorge--Columbia cress (*Rorippa columbiae*) is a late season bloomer we had meant to seek in September. The closures and disruption in the Gorge prevented us. But all told, this has been a very satisfying season. We have deepened connections to our bioregion and the people who also feel the ties of love and responsibility. We have provided useful data to managers of Oregon's public lands across about one-third of the state, some of which

can be of use right away. For example, three days after our final trip to assess saltmarsh birdbeak (*Chloropyron maritimum ssp. palustre* (syn. *Cordylanthus maritimus ssp. palustris*)) at Netarts Spit, Oregon Parks Botanist Noel Bacheller asked if we had collected data there, as he had an immediate need for current information. He also requested updated information for a population of Tygh Valley milkvetch (*Astragalus tyghensis*) that we had collected in May. That was deeply gratifying.

The desire to do good and love of our region's natural endowments takes us to these seldom-seen beauties, but we can't let sentiment blind us to the real need for practical and scientific work. In the end, it is the sometimes routine, sometimes grueling effort that may bring the world we hope for. But it's still a great time. If you would like to get involved with Citizen's Rare Plant Watch, please contact me at kfreitag@pdx.edu. We already have a long list of sites lined up for next year!

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Soil Seed Banks: Peck's Penstemon Persists

Ed Guerrant



Penstemon seeds

"The glory of the garden lies in more than meets the eye." So said Rudyard Kipling. It's also true of nature. It is easy to think of plant populations that what you see is all there is, but there is much that does not meet the eye. Seeds are living plants, too. And some seeds can survive, dormant for years, decades, centuries and even millennia. The presence, or absence, of a viable soil seed bank can have a tremendous

impact on population viability, and land management decisions. It's also an evocative way of looking at the landscape: what species are out there, echoes of a former age, just waiting for the right conditions to present themselves?

Soil seed banks of some species can persist well after the actively growing portion of the population no longer survives. Such was the case of the extremely rare Humboldt County milkvetch (*Astragalus agnicidus*) in California (see article below that I wrote in

1990 for the Berry Botanic Garden Newsletter, describing this case.) The only known population was rediscovered in 1987, not having been seen since 1954 despite numerous searches over the years. A skid trail resulting from the removal of a fallen tree disturbed the ground, created suitable habitat, and seedlings emerged. In the last few years, several other populations have been discovered in similarly situated and disturbed patches of habitat.

How long can these hidden gardens lie dormant waiting for suitable environmental conditions to germinate? Species vary widely: some do not form soil seed banks, others have seeds that may live a few years, some can survive a very long period of time.

Perhaps the most striking and well documented example is of date palm (*Phoenix dactylifera*) seeds unearthed at the site of the ancient fortress of Masada. A number of these two thousand year old seeds were

germinated; at least one has flowered, a fertile male that produced viable offspring.



Date palm called "Methuselah"
(Image: benjitheijneb)

What species might be out there, with viable seeds waiting for the right conditions to present themselves? This is not an idle question for a land manager charged with maintaining a rare plant species like Peck's penstemon (*Penstemon peckii*) that requires abundant sunlight to flourish, *P. peckii* germination is also stimulated by light, although some seeds will germinate without light.



Peck's penstemon, *Penstemon peckii*

Penstemon peckii is a species that grows only in a relatively small area on the east side of the Cascade Mountains, in Oregon. A large majority of the populations and a greater share of the plants are found on United States Forest Service (USFS) land, so it is not surprising that the USFS has paid special attention to it in a series of conservation strategy documents, most recently in 2009. It was hypothesized in the first conservation strategy, from 1992, that the species likely did not have a long lived soil seed bank. We set out to test

that hypothesis in 1992 with an experiment that is still ongoing.

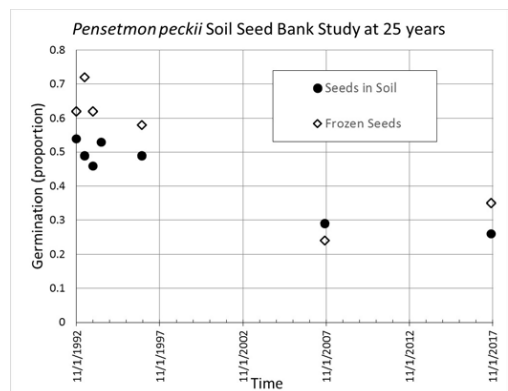
To determine if the species can form a viable soil seed bank requires we test seeds of known ages that have been in the soil. In order to do that, we collected seeds from a large number of populations and individuals, combining some into a large bulk collection and dividing it into two groups. One group was dried, frozen, and retained in the seed vault for later study; the other was further divided into 120 groups of 100 seeds each and sewn into Dacron pouches. These were divided into three groups of 40 pouches each, placed into stainless steel hardware cloth (to protect them from rodents) and



Germinants from seeds stored in soil for 15 years

Penstemon peckii seeds germinating

shallowly buried to allow the seeds to experience ambient fluctuations in temperature and moisture, but not to light. These areas were then covered with a combination of black weed barrier overlaid with a soil-covered layer of fabric. These prevent light from reaching the seeds, without increasing the temperature unduly.



Graph of *Penstemon peckii* study results at 25 years

We conducted an initial series of trials in the months after the seeds were collected, comparing some that had been dried and frozen with "fresh" seeds that had not been frozen. Since then, all trials have compared seeds that have been kept frozen in the seed vault with those that have experienced ambient fluctuations in temperature and moisture in three locations, all within the natural range of the species.

Subsequently, we have conducted germination trials at 6 months, 12 months, 18 months, four, fifteen and now twenty-five years. For each of these tests, we retrieved 5 pouches with 100 seeds each from each of the three field sites, and compared them with 500 seeds that had been in frozen storage, for a total of 2,000 seeds used for each trial.

Now, after 25 years, about 35% of *P. peckii* seeds from the seed vault still readily germinate when first tested, as do 26% of seeds left in the field to experience soil seed bank ambient conditions. In earlier tests, we found that even after months of appropriate germination conditions, some viable seeds would not germinate, but if dried again and re-tested, additional seeds would germinate, even through three cycles! It is clear that this species can produce a soil seed bank that persists at least 25 years, and perhaps much longer.

When you are walking in nature, imagine what abundant life could be resting out of sight, just waiting for the right conditions for a dormant part of the population to waken and grow again.

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Down, But Not Out

Ed Guerrant, reprinted from BBG Newsletter Vol 3, No 4, Fall 1990



Rare California endemic, *Astragalus agnicidus*

Thomas Jefferson sent the Lewis and Clark Expedition to explore the West in search of many things, including woolly mammoths and mastodons. This most intelligent and learned president knew of their fossilized remains in eastern North America, and because even the concept of extinction was not generally accepted at that time, Jefferson reasoned that the West might still harbor some of these

great beasts. Today there is no doubt whatsoever that extinction can and does occur. Indeed, the rate at which species are currently vanishing rivals the greatest mass extinctions that have occasionally punctuated the last half billion years of the history of life on the planet. The death of a species, like that of a person, is final and absolute. However, as Mark Twain quipped about the reports of his death being exaggerated, not all reportedly extinct organisms are actually gone. A case in point is the Humboldt milkvetch (*Astragalus agnicidus*). In cooperation with California's Endangered Plant and Natural Heritage Programs, the Garden's Seed Bank has recently acquired a small seed sample of this more rare and endangered plant.

The genus *Astragalus* is also called loco weed, and the specific epithet *agnicidus* means "lamb killer." True to its name, this species is indeed quite toxic to sheep and even deer, which are reputed to "fall into holes and flop around" under its influence. The sole known site in southern Humboldt County, in northern California, has been owned by generations by a single family that ran sheep on it in the 30's and 40's. Concerned about their sheep (which in hindsight may actually have been poisoned by lupines) they systematically eradicated every Humboldt milkvetch plant they saw, and apparently succeeded in destroying it entirely.

Despite repeated attempts to find it, the plant had not been seen since 1954, and was officially regarded as presumably extinct. That is, until 1987 when several botanists again searched for it at the location where it was reported to have grown. After a long and unsuccessful day of scouring the area for appropriate habitat-- small forest openings-- they hit pay dirt in the form of a two year old bulldozer skid trail on a ridge where a single tree thought to be a fire hazard had been removed. The localized disturbance appears to have provided the stimulus necessary to germinate seed that must have lain dormant for almost three decades!



Astragalus agnicidus seeds

The same family that had attempted to eradicate the Humboldt milkvetch no longer raises sheep, and is now cooperating with The Nature Conservancy and California's Endangered Plant Program to protect and nurture the plant. Given its narcotic and toxic properties, several research groups are assaying the plant for medicinal uses.

This story illustrates well a couple of points about conservation in the 1990's. First, the change of this family's attitude toward *A. agnicidus* exemplifies the evolving change in values of our society at large. A narrow, exclusively short-term, economic point of view is giving way to a broader, long-term, economic point of view is giving way to a broader, long-term view of the value of nature. Secondly, that a plant once thought to be extinct has arisen, like the phoenix, out of the incidental spoils of human activity, demonstrates, ironically, that human caused disturbance is not always detrimental to the diversity of life on this planet.

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Volunteer Ari Sindel

Grad student **Ari Sindel** has been a great help, both during the summer with CRPW and in the lab this fall. He says: "Working as a Natural Resource Technician, planting native vegetation and eradicating invasive species, I was always on the lookout for ways I could learn more about Pacific Northwest plant communities. When I heard about Seed Bank's program to monitor rare plants, it sounded like an excellent opportunity to further a good cause and learn some botany in the process. These excursions were always an unexpected adventure whether we were hiking rocky hills or tromping through marshes. Besides helping to conserve the region's sparsely occurring species, I

was able to vastly increase my plant knowledge and observe rare flowers hardly anyone else has seen.

"Now well on my way to graduating from Portland State University with a Master of Environmental Management degree, I have been helping out at the Seed Bank's office on campus. Lately, I've been using my knowledge of GIS (Geographic Information Systems) to learn more about the ecoregions and soil qualities of the places where the species in the Seed Bank's collection occur. I'm looking forward to seeing how else I can be of service."

Brenda Hamilton has been equally versatile, giving valuable service in the field and providing database support. She says: "Volunteering for the Rae Selling Berry Seed Bank & Plant Conservation Program has been a natural fit for me. I've been a plant lover since my grade school days in Sioux Falls, SD, when the branches of my family's weeping willow tree created one of my favorite playgrounds. Ultimately, I gravitated toward the study of human-environmental interactions in my undergrad and graduate programs in the SF Bay Area, while sustaining a passion for the environment. After moving to Portland a few years ago, the vital role of Oregon's native plants in protecting local watersheds and maintaining biodiversity in this beautiful state was driven home to me in local workshops offered by East and West Multnomah Soil & Water Conservation Districts, as well as through a membership in the Portland chapter of the Native Plant Society of Oregon. I feel every Oregonian should do what they can to help conserve our native plants, and volunteering for the Rae Selling Berry Seed Bank & Plant Conservation Program is one great way to help address this need."



Volunteer Brenda Hamilton

Staunch CRPW volunteer **Marty Skinner** says:

"When I retired in 2011, I wanted to return to my long-time interest in natural history and botany. I had been an active birder for many years, but was getting slower and deafer, so I had to change my approach. As an Oregon Master Naturalist, I work with Leach Botanical Garden and with Hoyt



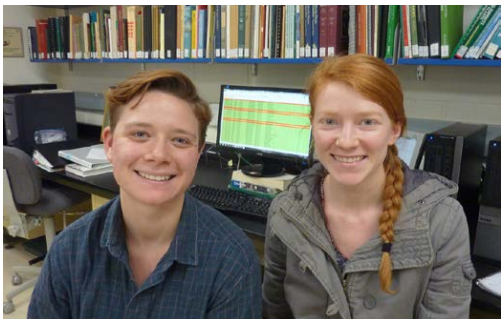
Volunteer Marty Skinner in the field

Arboretum and Herbarium. Through NPSO, I learned about Citizen's Rare Plant Watch. This has been great! I contribute energy, hiking and observations, and also get a field trip with experienced botanists. They have been marvelous in answering my questions. So, in addition to contributing experience in transects and sampling, I get a lot of botanical knowledge. And this translates into more contributions to Leach and Hoyt. The three trips this year were so rewarding, I'm looking forward to more next season."

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Making a Difference - Private Support

Many thanks again to the **Gilbert and Laurie Meigs Conservation Education Endowed Scholarship** for enabling us to hire two PSU undergraduate students to support us in lab and database work. Gilbert and Laurie have been staunch friends for almost four decades--for most of the existence of the Berry. We are deeply grateful!



Interns Troy (left) and Rheanna

Interns **Troy McKinlay Craine** and **Rheanna Williams** join us for fall term. **Troy** says of his path to us: "I am a Senior at Portland State finishing my degree in Environmental Science and Management with aspirations in the fields of ecological restoration and outdoor education. My career goal is to follow in my grandfather's footsteps and work for the forest service or become a forest steward. In my spare time I enjoy

hiking, paddle boarding, kayaking and back packing, especially with my dog, Luna. I came to the seed bank on a recommendation from Christa Von Behren with whom I worked last year on a project looking at seed dispersion in urban forests. I think that cataloging and preserving habitat is important and seed banks play a crucial role in that as well as functioning as a reserve to restore the environment after a major disturbance. I love working for the seed bank and enjoy knowing that the work I do matters."

Rheanna says: "I am an Environmental Sciences and Spanish student here at PSU hoping to one day make those two degrees merge. The ESM major is a broad one, but I've been most interested in invasive species and forestry practices. Since most of my course load has been related to environmental policies, invasive species, and ecosystem restoration, I wanted to get more experience related to native species and their conservation. It has been fun and eye-opening to work with folks who know so much about plants and to assist them with a bit of the Seed Bank's work."

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 on ways to make a gift, please contact Kathleen Hampton, Major Gifts Officer, at (503) 725-3526 or hamptonk@psuf.org.

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Upcoming Events

Urban Ecology and Conservation Brown Bag Series and Urban Ecology and Conservation Symposium 2018

Brown Bag Series:

Friday, December 1, 2018

12:15 - 1:00 p.m.

Metro, 600 NE Grand Ave, Portland, Room 370

Free and open to the public



Johnson Creek (Image: Emilia12345)

December Brown Bag: "Strategic prioritization of restoration projects in an urban stream under climate change"

Speaker: **Kaitlin Lovell**, City of Portland - Bureau of Environmental Services

Hear about the use of computer modeling to assess habitat enhancement results under the pressures of increased water temperatures and other changes.

16th Annual Urban Ecology and Conservation Symposium

Monday, February 5, 2018, 8:00 a.m. - 6:00 p.m.

PSU, Smith Center Ballroom

Early registration: \$45; Student: \$15; Volunteer: \$10

[More details>>](#)

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Citizen's Rare Plant Watch - Presentation at NPSO Portland's Monthly Meeting

Thursday, January 11, 2018

7:00 p.m.

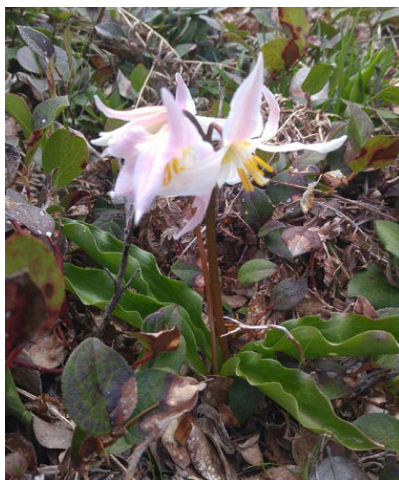
Copeland Commons at TaborSpace

5441 SE Belmont St, Portland

Free!

****Native Plant Society of Oregon, Portland Chapter's monthly meeting is on the second Thursday of most months****

Botanist Kris Freitag, of the Rae Selling Berry Seed Bank at PSU, is coordinator of Citizen's Rare Plant Watch (CRPW). CRPW is a community



Erythronium elegans
(Image: Jennifer Devlin)

science program that was begun by NPSO members and is dependent on dedicated volunteers for its existence. A kind of serious treasure hunt for rare plant populations, CRPW

provides crucial support to public agencies across the state that are tasked with managing our natural riches. She'll tell you about past monitoring trips and lessons learned, and about upcoming opportunities to explore Oregon lands while serving your Northwest community.

[More details>>](#)

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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: Mid-Atlantic Regional Seed Bank

The Mid-Atlantic Regional Seed Bank (MARSB) aims to increase the availability of genetically appropriate native seed across the Mid-Atlantic through targeted seed collection and active seed banking. We are also building a network of diverse partners to collaboratively meet the seed needs for region-wide, landscape-scale restorations. MARSB is a conservation program established by the New York City Department of Parks and Recreation that works closely with Seeds of Success (SOS), a national effort that seeks to collect and bank the entire US Flora.



Endangered Pennsylvania native, Clematis viorna (Image: Fritz F Reynolds)

[Continue reading at the Mid-Atlantic Regional Seed Bank site>>](#)

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Rare New Zealand native, the parasitic Dactylanthus taylorii (Image: NZDOC)

In the World: New Zealand Indigenous Flora Seed Bank

The New Zealand Indigenous Flora Seed Bank (NZIFSB) aims to collect the seeds of New Zealand flora, to conserve the biodiversity within New Zealand's indigenous flora.

New Zealand is recognised as a biodiversity hotspot. We have around 2600 taxa of indigenous plants, with 80 per cent of these classified as endemic and 40% at risk or threatened. Seed banking is a recognised conservation strategy to support in-situ conservation efforts.

[Continue reading at the New Zealand Indigenous Flora Seed Bank site>>](#)

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Stay informed on upcoming events and news by regularly visiting the [Rae Selling Berry Seed Bank web site](#).

This e-newsletter is a publication of the Rae Selling Berry Seed Bank & Plant Conservation Program at Portland State University