

RARE PLANT PRESS

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Cracking the Coat

A seed's journey from its mother plant to long-term storage in the Miller Seed Vault involves many steps. As our volunteers know, locating wild populations and ensuring optimal timing for collecting ripe seeds takes careful planning, and cleaning them requires close attention to detail. But for Kylie Gates, a fourth-year University of Washington student and Rare Care volunteer, once all the seed collecting and processing is finished, her work can begin.

Kylie started volunteering with Rare Care last year to help with the next step in our seed storage and research process — germination testing. Germination testing serves two purposes: it allows us to check what portion of the seeds in a collection are viable, and to research how to get each species' seeds to germinate.

Kylie has her work cut out for her. For native plants in general, and especially rare species, the best methods to coax seeds out of dormancy and germinate are not known. Species have adapted a diverse array of strategies to delay germination until conditions are best for growth. Germinating before a hard freeze, heat wave, or dry spell could be fatal, so seeds will remain dormant until conditions are just right. In the Pacific Northwest, many species require a period of cold, moist temperatures followed by warmer temperatures to trigger germination.

Other species may require scarification, a process that breaks an impermeable seed coat to allow germination, through physical abrasion, exposure to extreme heat, strong acids, or chemicals in smoke.

By helping us with germination testing, Kylie is uncovering each species' germination needs. To start a test, she removes seeds from the seed vault and places them onto several petri dishes with wetted filter papers.

To germinate a species that we have never grown before, we start by assessing how many seeds germinate when we expose them to "winter" (cold, moist conditions), followed by "summer" (warm conditions). We compare germination in this group to seeds placed only in "winter" or only in "summer". Kylie checks each petri dish of seeds weekly to document how many seeds germinate over time. When a test is complete, these data reveal which treatment worked best, or whether we need to try other techniques to break seed dormancy.

These results help cover a gap in our understanding about how to germinate these species, the first step needed if and when we need to reintroduce these species back in the wild. It also helps us understand the viability of our seed collections and which species need to be recollected.



A germinant of tall beardtongue (*Penstemon hesperius*) with cotyledons (first leaves) and radicle inside a germination plate. Photo: Naomi Reibold



Kylie Gates taking germination plates out of a germination chamber to assess whether seeds have germinated. Photo: Naomi Reibold

GROWING THE SEED BANK (ONE FREEZER AT A TIME)

The Miller Seed Vault will reach a major milestone in 2026: our chest freezer, purchased in 2002 when the facility opened, will be filled. The freezer, securely situated within the 4-hour fire-rated walls of the seed vault, protects over 1.1 million seeds of 160 rare native plants of Washington. Compiling this collection took thousands of hours and in-kind contributions of volunteers, donors, staff, and conservation partners.

When we first started collecting seeds back in 2003, seed banking as a conservation tool was not widely appreciated nor prioritized. Nonetheless, botanic gardens across the country started adding seed banks, understanding that a time would come when these collections are needed to restore rare native plant populations.

Fast forward to today, and seed banking has taken on a new urgency. We routinely see conservation and restoration planning documents explicitly prioritize preserving wild-collected seed at the Center for Plant Conservation (CPC)-affiliated seed banks such as the Miller Seed Vault. This shift stems from the noticeable changes observed and measured in our climate and ecosystems. For instance, just in the past 30 years, over 2.5 million acres of forest have burned in the

East Cascades. In the shrub-steppe ecosystem, big sagebrush (*Artemisia tridentata*)-dominated plant communities have been converted to cheatgrass (*Bromus tectorum*)-dominated grasslands due to repeated wildfires that are too frequent to allow the sagebrush to reestablish. The toll on our native flora has been significant.

Recognizing the impact that repeated wildfires are causing in the arid west, the National Park Service and Department of the Interior (DOI) launched a multi-state effort to conserve seeds of rare plants found in fire-prone ecosystems. Rare Care leads this effort in Washington State in partnership with CPC. We have a target list of 30 species found on DOI land in the Columbia Basin, with a goal of collecting seeds from two populations of each species. Last year, we made 13 collections at National Wildlife Refuges and Bureau of Land Management lands.

This year, our goal is to complete another 47 collections. This is a significant challenge and will easily exceed the most collections added to the seed vault in a year, which currently stands at 29. As we said, we are going to need a new freezer.

MEET RARE CARE'S 2026 FIELD TECHNICIANS



My-Lan Le will be heading our rare seed collections this field season. My-Lan grew up in the Bay Area of California and has eight years of experience working across the West in various botany jobs. She most recently earned a master's degree from the University of Colorado in Biology. She is most excited to spend time in unique plant communities and the chance to compare different rare plant populations to better understand them. "We still have so much to learn about rare plants, and their seed form is such an integral part of a vascular seed plant's life -- it's great to know that we are working on creating a resource to advance conservation," My-Lan said.



Anabelle Manrique will assist with monitoring several rare plant reintroduction projects Rare Care has implemented and conduct rare seed collections. Anabelle grew up in Chicago, Illinois, and went to the University of Washington for her bachelor's degree in plant biology, where she fell in love with the region's biodiversity. She has three years of field work experience, working in various botany positions in Washington, Hawaii, and Oregon. "There is no greater feeling than holding rare seeds in your hand, knowing you're directly contributing to the conservation of an imperiled species, and I'm excited to continue this work," Anabelle said.

PARTNER SPOTLIGHT: DAN TURCK AND GABRIEL CAMPBELL

The Washington Natural Heritage Program has two new state botanists in its ranks, Dan Turck and Gabriel Campbell. Two sides of the same coin, they bring a collective 30 years of ecological experience to the program.

Both botanists had winding paths to end up here in Washington. Dan grew up in western Oregon. When he was 11, his family moved to North Dakota, where the striking difference in the physical environment made him notice and start to take an interest in plants. Dan started his career working for several years on wildland fire crews in Idaho and Wyoming. At the University of Montana, Dan obtained a bachelor's in resource conservation. He then spent six seasons working in Antarctica for the US Antarctic Program. Most recently, Dan earned a PhD in comparative phylogenetics of temperate rainforest taxa at the University of Idaho, where he was also the collections manager of the Stillinger Herbarium.

"I like exploring, and I like solving puzzles. I think that might be just kind of the base drive (for botanical work)," Dan said.

Gabriel stumbled into botany via a chemistry lab while an undergraduate at the University of Oklahoma, where he realized what he liked most about the work was taking care of the study plants. He soon went on to earn a master's and PhD in environmental horticulture at the University of Florida, where he studied how to grow and cultivate native plants for restoration. For the past four years, Gabriel was the botany program manager for the Institute for Natural Resources and the director of the Rae Selling Berry Seed Bank at Portland State University.

"I don't want to say compulsive behavior, but plants and botany and horticulture is just something that I'm drawn to naturally. I get a lot of great personal joy and fulfillment out of this type of work," Gabriel said.

Dan and Gabriel complement one another, having worked in different specialties at the intersection of botany and ecology. Both bring their experiences into how they'd like to increase conservation initiatives in their roles. Coming from a horticultural background, Gabriel wants to increase ex-situ conservation practices such as seed banking. Dan, with his experience in phylogenetics and species modeling, hopes to increase DNA sampling to better understand population genetics and gene flow, which in turn can better inform activities such as reintroductions.

One of the projects Dan and Gabriel are currently working on is surveying candidate species for federal listing status across the state. Both are looking forward to getting out into the field and learning about the many different ecosystems and rare plants that live in Washington.



Dan Turck, state botanist with the Washington Natural Heritage Program



Gabriel Campbell, state botanist with the Washington Natural Heritage Program.



Olympic milkvetch, fruiting on a hillslope in the Olympic Mountain Range. Photo: Allie Howell

FOCUS SPECIES PROFILE

Along the basalt crescent formation in the northeast quarter of the Olympic Peninsula, where alpine cushion plant meadows give way to jagged cliffs, grows Olympic milkvetch, *Astragalus australis* var. *cottonii* (also called Cotton's milkvetch). Its blue-green compound leaves held on pink stems, while distinctive, surprisingly blend into the dark gray shale and basalt substrate. Its fruits, however, are easy to spot, as a raceme of white and lavender-smudged flowers yields deep red, inflated pods.

Olympic milkvetch inhabits steep slopes with loose scree, gravel, and sand where few other plants grow. On top of these harsh conditions, like all alpine plants, this species tolerates icy winters and baking hot summer soil temperatures. Decreased snowpack and hotter, drier summers expected with climate change will only make growing here more difficult.

That's why we became concerned when we visited four of the eight known populations between 2020 and 2021 and noticed a 60% decrease in population size at three populations as compared to estimates made in 1985. Declines appear to be ongoing: Rare Care revisited one population in 2025 and only found 15 plants, down from 100-300 plants we found in 2021.

With a generous gift from private donors, Rare Care is taking action by collecting seeds from five of the seven populations. Banking these seed collections will help preserve the genetic diversity remaining in these populations in the event they blink out and provide material we need to introduce to appropriate sites. We are also summarizing our findings in a species status report that we hope will trigger consideration for listing the milkvetch under the Endangered Species Act.



Rocky, alpine habitat of Olympic milkvetch, in the Olympic Mountain Range. Photo: Earl Doan

VOLUNTEER SPOTLIGHT

Each year Rare Care recognizes volunteers for their outstanding contributions.

Barbara Varnum-Finney loves learning about life, all the way down to the cellular level. After earning a Ph.D. in developmental biology, studying a slim mold (*Dictyostelium discoideum*) at the University of Iowa, Barbara moved out to Seattle and spent most of her career as a research scientist at the Fred Hutchinson Cancer Center. Concerned about increasing threats to native plant habitats, Barbara switched the microscope for a hand lens in her free time, joining Rare Care in 2012. Over 14 years, she has contributed a total of 46 monitoring reports and four seed collections, logging over 500 hours of her time. Barbara does it all here at Rare Care: monitoring, seed collecting, and seed cleaning. This year, she came in twice a week, every week, for several months to help clean a backlog of seeds for the Miller Seed Vault. Barbara loves the hunt of relocating rare plants and the adventures that come with it, helping get her out to explore Washington State's wilderness. Thank you, Barbara, for being such a consistently dedicated volunteer with Rare Care!



Barbara Varnum-Finney collecting seed for Rare Care.

UPCOMING EVENTS

SEED COLLECTOR TRAINING

May 9th
Center for Urban Horticulture

CHECKER-MALLOW MONITORING

June 29th - July 1st
Camas Meadows NAP

ANNUAL MONITORING WEEKEND

July 10th - 12th
Tiffany Mountain