



President's Message

Restoration ecology has been called “the science of applied optimism¹.” This January, I am keeping that positive message close at hand. There is much hope for the next year; 2021 marks the start of the U.N. Decade of Restoration, a global effort to focus attention on the potential for ecological restoration to combat climate change, alleviate poverty, and reverse ecosystem degradation. On a national scale, there are increasing calls for societal investment in restoration—and not just from scientists or environmentalists, but also policymakers who sense the opportunities for economic revitalization that restoring America’s ecosystems could provide². In the Great Basin, I am filled with optimism by the efforts of restoration practitioners hard at work to revitalize our native ecosystems.

While the past year has thrown some challenges at SER GB, including the unfortunate cancellation of our biennial in-person conference, we are continuing to pursue our mission to promote the science of ecological restoration among practitioners, researchers and the general public in the Great Basin. Our activities for the next year will include several virtual symposia, including a spring sagebrush symposium. Please watch your inbox for specific details on these events. We will also be giving out awards to recognize those who have made outstanding contributions to restoration ecology in our region. Awards provide a way to formally acknowledge the roles that key individuals play in restoring our Great Basin landscapes. This year, we are seeking nominations to award a researcher, a practitioner, and a student to recognize excellence and innovation in our region. If you would like to nominate someone, please email me the name(s), short biography, and rationale for awardees.

I am very appreciative of our officers that have kept SER GB running. These include our Treasurer, Stanford Young, our website editor, Sarah Barga, and the newsletter editor, Anne Halford. I also wish to acknowledge Matt Germino and Nancy Shaw for their continued guidance of SER GB. Maintaining leaders in SER GB is essential for our organization to move forward in a sustainable way. To this end, we invite nominations for the President-elect and Treasurer positions in SER GB. If you wish to throw your name (or someone else’s) in the ring, please contact me. We will aim to have elections in late spring.

I am looking forward to serving you as President of SER GB for the next two years. Please feel free to reach out to me with any questions, ideas, or restoration stories!

Sincerely,

Trevor Caughlin (trevorcaughlin@boisestate.edu)

¹<https://onlinelibrary.wiley.com/doi/full/10.1111/rec.13044>

²<https://thehill.com/changing-america/opinion/532211-why-biden-should-launch-an-ecosystem-restoration-corps-in-2021>

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“Establishing plants in the desert is a major challenge, but we have to try.”

Dr. Beth Leger, Univ. of Nevada Reno

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A Trait-and-Community Approach to Restoring Degraded Sagebrush Steppe Communities

Alison Agneray, Tom Parchman, Elizabeth Leger
Ecology, Evolution, and Conservation Biology Program, University of Nevada, Reno

Two miles may be an easy hike, but as PhD candidate Alison Agneray can tell you, washing and scanning two miles of plant roots is a whole other story. Alison has spent the last four years looking at above and belowground traits of native plants, working in Dr. Beth Leger's lab at the University of Nevada, Reno. Along with Dr. Tom Parchman, their work is testing how different species, populations, and seed mixes perform when planted in degraded habitats in the Great Basin. This has involved collections of 149 populations of thirteen taxa of grasses, forbs, and shrubs, 21,060 seeds planted in the field, and 7,178 seedlings grown in the greenhouse, and yes, over two miles of roots separated from the soil and scanned.

The goals of this work are three-fold: 1) determine which traits are associated with establishing seed in invaded systems, and determine whether if there are consistent patterns among species, 2) determine whether there are some field locations that, for whatever reason, are excellent sources of seed for restoration for multiple species, and finally, 3) ask whether restoration is most successful when we identify and combine the best seed sources of multiple species (irrespective of their original location), or whether it is more effective to restore communities using collections from a single community of plants that may share an evolutionary history.

This population and community-level question is an innovative approach to restoration in this region, where the current practice is to use seeds originally sourced from multiple locations. There is growing evidence from community ecology experiments that suggest we might have more success if we use seeds collected from single sites that have evolved together, though this idea has not been tested in a restoration context.

As we wait for the full results to come in (our different community types are growing, and, as of last month, were "invaded" with an experimental rain of cheatgrass seeds), a direct result of our research is that we are working in partnership with state and federal land management agencies to collect seeds from the most promising locations, for potential use in restoring ecosystems.

If you are interested in learning more, we will be presenting at the SER 2021 World Conference in June, and you can contact Alison at aagneray@nevada.unr.edu.

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Left: One of our experimental communities (sagebrush, rabbitbrush, bottlebrush squirreltail, Sandberg's bluegrass, and Thurber's needlegrass) waiting to be invaded by cheatgrass. Right: These 55-gallon drums create conditions where differences in rooting depth and phenology can be expressed, allowing us to test ecosystem services (biomass, resistance to invasion) of different types of population mixes.



Left: PhD student Alison Agneray washing one, of many grass seedlings in the greenhouses at the University of Nevada Reno. Right: The finished product.



Squirreltail—*Elymus elymoides*—Stock photo—Great Basin Seeds



Sandberg's bluegrass—*Poa secunda*—Post Big Foot Butte Fire 2011—Snake River Birds of Prey Nat'l Conservation Area—Photo by Anne Halford

Developing Seed Technologies for Sagebrush-Steppe Recovery

Olga Kildisheva, Matt Cahill, Owen Baughman, Maggie Eshleman,
and Jessie Griffen

As restoration ecologists and land managers, we are all too familiar with how the invasive annual grass-fire cycle continues to devastate our native plant communities throughout the sagebrush steppe. Despite ongoing efforts to re-establish native plants through direct seeding, restoration failures are common. These failures often occur during early plant development, driven by barriers to establishment and survival, such as seed dormancy, freezing- or drought-induced mortality, competition from invasive annual grasses, among many others.

To help address this issue, the Sagebrush Sea Program (a 6-state, multi-organizational partnership, facilitated by The Nature Conservancy) has been working closely with the seed industry, the Agricultural Research Service (ARS), and other agency partners to develop, test, and scale innovative seed technologies that target barriers to native plant recovery.

We are partnering with public and private land managers to test these technologies across degraded sagebrush steppe areas, that are a priority for restoration. Field pilots are underway in ID, NV, OR, UT, and WY to test performance in ecologically, geographically, and climatically diverse conditions. For technologies that are deemed effective following field-testing, our direct partnership with the seed industry on product development will facilitate scaling for broadacre testing and implementation.

Even a modest improvement in restoration success can help prevent ecosystem loss. The goal of our work is to offer additional tools for the practitioner's toolbox that can help improve restoration outcomes across the sagebrush steppe and beyond.

If you are interested in collaboration or would like to learn more, please reach out to SagebrushSea@tnc.org.

More information about restoration barriers and the potential for innovation to address them can be found in our recent [Restoration Ecology article, "Improving restoration success through a precision restoration framework"](#).



BLM Shoshone Field Office— Seeds of Success Smug Mug photo.

Meeting restoration needs with native seeds

by Sara Cobble, The Nature Conservancy in Nevada and Rebecca Allured, the Nevada Department of Agriculture

A surprising fact: a majority of native seeds planted in Nevada are not actually grown here. Most seeds come from sources outside the state, in other parts of the West and North America, often from places that differ from Nevada's unique, dry climate.

But the Nevada Native Seed Partnership (NNSP) is trying to change that. The coalition of 11 agencies and organizations in Nevada has a mission to keep Nevada lands diverse and functioning by using the right seed in the right place at the right time, and a goal of creating an adequate supply of locally adapted native seeds that can meet Nevada's restoration and rehabilitation needs.

"There are many ecological benefits of native seeds," said Kevin Badik, rangeland ecologist for The Nature Conservancy in Nevada (TNC). By increasing native seed use, we can create more materials for restoration, use less water, help prevent catastrophic wildfires, and generate economic boosts for local growers, Badik said.

Every native seed that successfully establishes is one less opportunity for cheatgrass to come in. It's one more step in reducing extreme fire behavior. Using seed that's locally adapted increases the likelihood that the seed will take and successfully establish.

Inspired by the National Seed Strategy, developed by the Plant Conservation Alliance in 2015 to address widespread shortages of native seed, three federal agencies in northern Nevada (Bureau of Land Management (BLM), U.S. Fish and Wildlife Service (USFWS), and U.S. Forest Service (USFS)) began having conversations in early 2016, laying the foundation for what is now the NNSP.

The partners came together to better understand the roles and abilities of each agency and the opportunities that could be created by working together to increase the availability of native seed in Nevada. Monthly meetings began in fall 2017, and the partnership has now grown to include TNC, Natural Resources Conservation Service, Nevada Department of Agriculture (NDA), Nevada Division of Forestry, Nevada Division of Conservation and Natural Resources – Conservation District Program, Nevada Department of Wildlife, University of Nevada – Reno (UNR), and Walker Basin Conservancy.

"Healthy native plant communities (sustained by native seeds) not only support humans and wildlife; they are resilient and resistant to disturbances and are instrumental in combating some of our biggest ecosystem challenges such as drought, hurricanes, wildland fire, and invasive species", said Sarah Kulpa, restoration ecologist and botanist for the U.S. Fish and Wildlife Service.

"We are trying to change how restoration is currently being done in Nevada", Kulpa said.

This is quite ambitious, but the loss of the sagebrush ecosystem to wildfire and invasive or non-native species is what keeps me up at night. The loss of the sagebrush ecosystem would be devastating to Nevada's wildlife, people, communities, and economies.

The process of increasing native seed availability starts with identifying a source population, such as seeds from wildland collections. Once enough seeds are collected, they are turned over to a farmer or grown in a small greenhouse to increase a bank of starter seeds, then given to another farmer to grow pounds of it in fields for use in restoration projects.

Beth Leger, a professor in the Department of Biology at UNR, is working on finding the best native seed sources for use in restoration by identifying plant characteristics within populations that are more likely to grow in disturbed areas, and species and populations that are best for current restoration scenarios. "This is accomplished through experimentation that varies from the status quo, and the results have been surprising", she said.

“We have found multiple lines of evidence that small plants survive better when doing restoration in disturbed environments. This was not what I expected, and it’s not necessarily what the world expects, because it’s very easy to think that bigger is always better”. Leger said. “We are also emphasizing using natural populations as restoration sources, rather than doing any selection or improvement that might reduce variation. Natural populations can be highly variable. Change is constant, and natural populations need to be able to evolve in response to that change; genetic variation is key for allowing populations to adapt and persist over the long-term”.

“We could have all the seed technology we want, but if the seed is not available, it’s doesn’t matter. It’s not just about having seed, it’s about increasing the likelihood that each one will be successful”, Badik said. “We are looking for smarter, more efficient and innovative solutions to our restoration problems. We are exploring different ways we haven’t been thinking about before”.

Now that the NNSP has a strategy and vision in place, the next steps will be doing more outreach, connecting with communities on the importance of native seeds, and raising awareness of the importance of investing in them in Nevada. This includes participating in the Nevada Native Seed Forum, an annual meeting first hosted by NDA in 2017, that connects growers with other native seed stakeholders.

“Our goals for the partnership are to help growers ensure Nevada will have the right seeds available at the right time to address the needs of restoration, reclamation, and rehabilitation”, said Meghan Brown, Plant Industry Deputy Division Administrator for NDA. “The NNSP supports the NDA’s mission to protect, preserve and promote Nevada agriculture by providing farmers with opportunities for diversification of production, providing the possibility of successful restoration and rehabilitation after wildfire for livestock operators, and creating important partnerships across the state”.

This year, after surveying attendees and other stakeholders, the NNSP will host the Nevada Native Seed Forum virtually in short sessions spread out over the course of two days, March 16-17. The forum will focus on sharing the stories of growers, how they go into the native seed business, and began selling. The benefit of a virtual forum means Nevada growers will get to hear from producers who have been successfully selling native seed in their states.

“In the long term, if we are successful, we will end up with a flourishing native seed market, including Nevada growers increasing plants sourced from Nevada, and managers putting them out on the landscape where they are most likely to establish and persist,” Leger said. “Establishing plants in the desert is a major challenge, but we have to try”.



Oregon sunshine—*Eriophyllum lanatum*. Photo by Anne Halford, BLM Owyhee Field Office.

Restoration Practitioner Profile



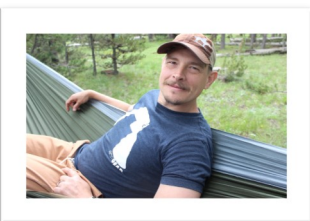
Dr. Newingham is a Research Ecologist with the USDA-Agricultural Research Service in Reno, NV. She attained her BS degree in Biological Sciences from the University of Nebraska, Lincoln and PhD in Organismal Biology and Ecology from the University of Montana. She was the director and an instructor for the GS-401 Wildland Fire Program out of University of Nevada, Las Vegas, which provided education to federal wildland fire managers. Additionally, she was an Associate Professor at the University of Idaho. She currently teaches in two

Bureau of Land Management courses: Restoration of Sagebrush Ecosystems and Interpreting Indicators of Rangeland Health. She has contributed to arid land and restoration ecology related research, education, and training in both academic and governmental settings. Her research focuses on linking plant and soil processes in the context of community and ecosystem ecology, fire, restoration, and climate change.



Saylor Creek Seeding 2011. Photo by Anne Halford. Postfire Drill-Seeding of Great Basin Plants: Effects of Contrasting Drills on Seeded and Nonseeded Species. Jeffrey E. Ott, Robert D. Cox, Nancy L. Shaw, Beth A. Newingham, Amy C. Ganguli, Mike Pellant, Bruce A. Roundy, Dennis L. Eggett.

https://www.fs.fed.us/rm/pubs_journals/2016/rmrs_2016_ott_j002.pdf



SER GB Student Committee Update

Trevor Sowards, Society for Ecological Restoration, BYU
Society for Ecological Restoration - Student Association,
President

The SER Student & Emerging Professionals (SEP) Committee just had their first meeting yesterday (1/27) and have a follow-up meeting for those who were unable to attend. The committee is focusing on topics covering the SER Virtual World Conference in June, improving networking systems for SEP demographics within SER, and the development of a mentorship program.



Western Forbs: Biology, Ecology, and Use in Restoration

Corey Gucker, Great Basin Fire Science Exchange, University of Nevada, Reno

Many new species have been added to the Western Forbs: Biology, Ecology, and Use in Restoration online book, designed to aid seed collectors, seed growers, nurserymen, landowners, and land managers working to increase the supply and use of native forbs in restoration. The book now includes 27 species for which existing research and practical experience are reviewed and synthesized.

This book provides background and practical information to guide a species' ultimate use in restoration as we walk through portions of completed chapters:



Parsnipflower buckwheat (*Eriogonum heracleoides*) grows as a low, spreading clump in dry, rocky soils. A single plant excavated from a dry southeastern Washington prairie produced lateral roots extending 13.5 feet, suggesting this species is a good candidate for soil stabilization.



Gray's lomatium (*Lomatium grayi*) is a mid- to late-seral species with a large taproot. The plant pictured above is 3 years old. Aboveground growth is slow as plants devote initial resources and energy into taproot development. This species is relatively long-lived and recovers quickly following disturbances. While this species doesn't provide rapid soil cover once established, it should provide longevity and resilience to the restoration site.



Photo: Robert Gorman

Fernleaf biscuitroot (*L. dissectum*) provides crucial early season forage for livestock and wildlife and is a host plant for swallowtail butterflies. It would be useful in restoration plantings for pollinators and wildlife. However, it should be used in conjunction with mid- and late-season blooming forbs.



Limestone hawkbeard (*Crepis intermedia*) seed is generally ripe once the dusky white pappus is visible in the seed head. The amount of non-viable seed collected increases dramatically when seed is harvested before the pappus is visible. Indeterminate seed set and the high probability of insect-damaged seeds makes planning, monitoring, and inspection important in wildland seed collecting.



Arrowleaf balsamroot (*Balsamorhiza sagittata*) seed is large, smooth, and lacks appendages, which makes seed cleaning simple. Unfilled seeds are easily separated from filled seeds using gravity, wind, or flotation cleaning techniques. Seed requires cold stratification for germination. In the field, fall seeding is used to overcome seed dormancy.



Sulphur-flower buckwheat (*E. umbellatum*) established well in seed production plots that were dormant seeded in the fall or winter at shallow depths (0.25 in). Plants produced seed by their second or third year, and plants can survive and produce seed for up to 20 years. Good establishment and survival of sulphur-flower buckwheat were reported in several wildland restoration projects.



<https://greatbasinfirescience.org/western-forbs-restoration/>



Helianthella uniflora—oneflower Helianthella —Weiser, ID. Photo by Anne Halford

Tribute to Jerry Erstrom

Berta Youtie, Eastern Oregon Stewardship Services Corp, Prineville OR



Jerry in his globemallow fields.

If you ever met Jerry Erstrom you would remember him. You would remember his great smile and his enthusiasm. Many of us considered Jerry a good friend. What stood out to me about Jerry was his willingness to try new ways of solving problems. He would reach out to others, sincerely requesting appraisal of his creative ideas. He was generous with his time and energy. But Jerry wasn't just a dreamer, he was a

doer. He was interested in everything that improved natural resources and helped the people of Malheur County and beyond.

Jerry worked for the Vale District of the Bureau of Land Management (BLM) for over thirty years, first in fire and then as the noxious weed coordinator and post-fire rehabilitation seed procurement person. Tim Butler, long-time leader of the Oregon Department of Agriculture's (ODA) Noxious Weed Control Program had this to say about Jerry's work at BLM:

Jerry was the catalyst for much of the cooperative nature of weed control around Eastern Oregon. As a farmer, he knew the value of weed control first hand. He helped sculpt the BLM's statewide Weed Management Program and was the Weed Lead for the Vale District BLM for many years. He forged programmatic relationships with counties and other agencies and entities. He led the BLM to create the Tri-County Cooperative Weed Management Area (one of the very first CWMA's to be formed) and Wallowa Resources' Weed Program. What he sowed grew well and thrived and continues working today.

Jerry grew up the son of a farmer in the Willow Creek Area of Malheur County and never strayed far away. When he retired in 2003 he went back to farming. In addition to growing local crops such as onions, potatoes, alfalfa and wheat, he took on the challenge of growing native plants for seed. Seed that the BLM needed for restoring lands after the big fires that had turned the country into the "Big Ugly" of annual grasses - cheat-grass and medusahead rye. Almost fifteen years ago I was working for Nancy Shaw and the USFS Native Plant Project. We were collecting wild native seed and needed growers to sow, harvest, and increase it. Jerry was game. He grew flax, scarlet globemallow, penstemon, yarrow, and other species. Challenges were encountered, and not all projects



Jerry's yarrow production fields. Photo by Nancy Shaw

worked out as planned, but it was exciting for us to see these species growing as a crop and Jerry even made a little profit. You could drive by on Oregon Highway 26 in the Willow Creek Area and see fields of blue or red. *Must be Erstrom's.*

He would also go forth and plant other native crops if he felt he could find a market. Recently he even planted a field of Wyoming big sagebrush. Wonder what the neighbors thought. "Oh, crazy old Erstrom at it again"! Occasionally he would hire a crew of folks to help us collect seed in the wild and he continued to hobble together an old seed plant to clean and process seed he had grown or collected. He was so passionate about providing a diversity of native seeds to assist in restoring the sagebrush steppe.

Jerry also worked hard to ensure that local farmers had the tools they needed to succeed. He participated in the Malheur Co. Weed Advisory Board, the Oregon State Weed Board and chaired the Malheur Watershed Council and Lower Willow Creek Working Group. He made more than one trip to Washington DC with ODA to lobby on the Hill for noxious weed programs throughout the West. He also helped obtain funds for a large water piping project that won a World Irrigation and Drainage prize in 2013.

The project put nearly 10,000 acres of irrigated land into more efficient piping, reducing erosion, nutrient and bacteria loss from the soil. Jerry would collaborate with everyone. He nearly started a county insurrection when he suggested that farmers and environmentalist work together to fight genetically modified creeping bentgrass. Jerry joined the bandwagon to hold Scott's Miracle Grow and Monsanto accountable to help the farmers control the "Round Up Ready" bentgrass that escaped from research fields and was becoming a problem weed in Malheur Co. and elsewhere. It has since invaded irrigation ditches, agricultural fields and natural areas across Eastern and Central Oregon.

I am sure I am missing many other important projects that advanced to fruition due to Jerry's intensive concern, immense knowledge, and incredible energy. Jerry Erstrom died at 73 on January 16th at Saint Luke's in Nampa, Idaho, due to Covid-19. We will all miss him.



Jerry with Berta Youtie and Nancy Shaw—Photo by Matt Fisk



One of Jerry's production fields of blue flax—Photo by Nancy Shaw



Jerry in his field of globe-mallow—Photo by Nancy Shaw

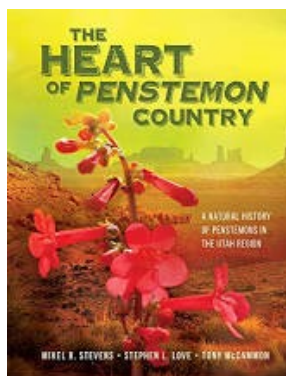
Book and Article Reviews

The Heart of Penstemon Country

M.R. Stevens, S.L. Love and T. McCammon.
2020. Sweetgrass Books, Helena, MT. ISBN:

978-1-59152-261-4. \$65.00

by Dorothy Tuthill, American Penstemon Society. Reprinted from the Penstemaniac Newsletter Volume 14 No. 2 October 2020.



This lovely volume will lead you deep into the heart of Penstemon country: Utah, the state with the most *Penstemon* species (76). Twenty-two of those species are found only in Utah—this book represents your best opportunity to meet these rare beauties. The remaining 54 species reside in one or more states besides Utah, but few have been described as thoroughly as you will find here. The depth of information presented is phenomenal (the nearly 500 references are a hint). For each species you will find: A history of the taxon and its name; comparisons to similar species; a description of the species' range and a map of distribution within Utah; information on habitat and bloom time; morphological descriptions, both technical and general; a review of its conservation status; and information on cultivation. And photos! More than 500 sharp, colorful photos are included in the book, encompassing habitat, plants, and flower close-ups. The photos are nearly enough to make a penstemaniac swoon.

In addition to the species descriptions, preceding chapters cover the human stories—discovery and ethnobotany—and taxonomy (also a human story, of course), plus close-ups of floral features. A dichotomous key will enable you to put a name on your Utah penstemon puzzle, and a nicely illustrated glossary at the back will help you with the botanical vocabulary. I should maybe mention that this is not a field guide—at 9 x 12 inches, 394 pages, and more than 5½ pounds, it is better kept in the car than the backpack. But you definitely will want to keep it close during your Utah explorations! It will look fabulous on your coffee table, too.



Blue penstemon - *Penstemon cyaneus* (PECY3), BLM Seeds of Success Smug Mug Photo

Upcoming Events, Webinars and Articles

The Nature Conservancy is excited to invite you to participate in a **Seed Enhancement Technologies Webinar Series**.

The webinar series will address the challenges and advances in restoration, with a particular focus on the role of seed enhancement technologies across the drylands of North America and Australia. We hope to facilitate new collaborations and promote knowledge sharing for continued research and development in this space.

The series will include both short presentations and discussion. We are excited to have a great list of speakers. A draft program is attached.

Please let us know if you can attend by [registering through this link](#) by **February 12th**.

The series will be made up of five 2-h sessions held from March-May 2021. To accommodate time differences, the sessions will be held from 3-5 pm Pacific/ 7-9 am Perth.

Day 1 | Restoration across drylands: Introduction and overview of efforts, tools, and modes of thinking

Thur, March 11th (US) | Fri, March 12th (AUS)

Day 2 | Seed technologies: coating and flash flaming

Thur, March 25th (US) | Fri, March 26th (AUS)

Day 3 | Seed technologies: Pellets, pods, pucks, and seed balls

Thur, April 8th (US) | Fri, April 9th (AUS)

Day 4 | Seed handling and deployment

Thur, April 22nd (US) | Fri, April 23rd (AUS)

Day 5 | Building partnerships to solve complex restoration problems & general discussion

Thur, May 6th (US) | Fri, April 7th (AUS)

Participation is free and we hope you can join us for the entire series. However, we realize that your time may be limited. If you have ideas on how we can better accommodate wider participation and inclusion, please let us know.

Olga Kildisheva, Lauren Svejcar, and Todd Erickson



PLEASE VISIT [SER2021.ORG](https://www.ser2021.org) FOR THE MOST CURRENT INFORMATION ON THE CONFERENCE**

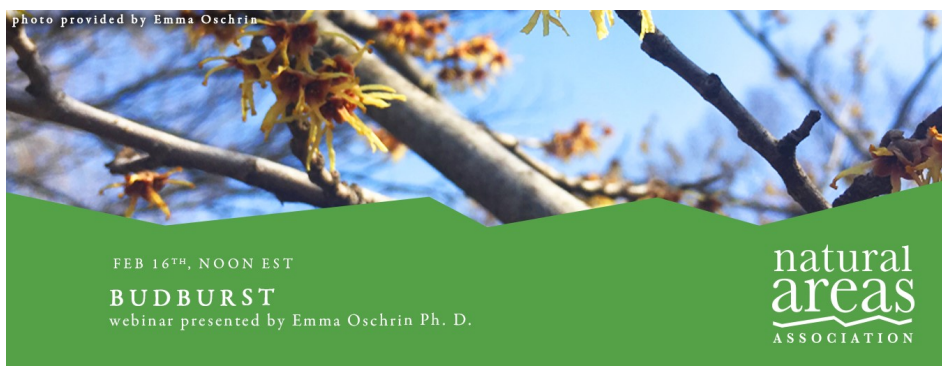


International Network for Seed Based Restoration (INSR)

Check this out!

Small mammals influence plant community structure around the world by preferentially consuming seeds of certain sizes.

<https://www.fs.usda.gov/rmrs/science-spotlights/small-mammal-seed-predation-structures-plant-communities-around-world>



<https://www.naturalareas.org/webinars.php>



Land Manager-Focused Winter Webinar Series

We hope you can join us for land-manager focused webinars. The format for these one hour sessions will be concise presentations followed by Q&A and discussion.

<https://www.fs.usda.gov/rmrs/events/>

The Society for Range Management (SRM) virtual Annual Meeting—New Frontiers will take place: February 15-18, 2021—Registration is now open.

<http://annualmeeting2021.rangelands.org/>



BLM Shoshone Field Office—Seeds of Success Smug Mug photo