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

Welcome
Olga Kildisheva[1]
[1]The Nature Conservancy, Bend, OR, USA

Introduction to the workshop
Lauren Svejcar[1] and Todd Erickson[2,3]
[1]US Department of Agriculture, Agricultural Research Service, Burns, OR, USA
[2]School of Biological Sciences, The University of Western Australia, Perth, Australia
[3]Kings Park Science, Botanic Gardens and Parks Authority, Department of Biodiversity, Conservation, and Attractions, Perth, Australia

Global Arid Zone Project: opportunities for evaluating seed-based restoration success
Nancy Shackelford[1,2], Gustavo Paterno[3], Daniel Winkler[4], Lauren Svejcar[5], Todd Erickson[6,7], Katharine Suding[2]
[1]University of Victoria, Victoria, Canada
[2]University of Colorado at Boulder, Boulder, CO, USA
[3]Göttingen University, Göttingen, Germany
[4]US Geological Survey, Moab, UT, USA
[5]US Department of Agriculture, Burns, OR, USA
[6]University of Western Australia, Perth, Australia
[7]Kings Park Science, Botanic Gardens and Parks Authority, Department of Biodiversity, Conservation, and Attractions, Perth, Australia

RestoreNet: an emerging dryland restoration network to increase revegetation success
Seth M. Munson[1], Bradley J. Butterfield[2], Hannah L. Farrell[1], Caroline A. Havrilla[3], Katherine M. Laushman[1], Molly L. McCormick[1], Kathleen R. Balazs[2], Elise S. Gornish[4], Akasha M. Faist[5], Loralee Larios[6], Michael C. Duniway[7], Sasha C. Reed[7]
[1]US Geological Survey, Flagstaff, AZ, USA
[2]Northern Arizona University, Flagstaff, AZ, USA
[3]Department of Forest and Rangeland Stewardship, Colorado State University, Fort Collins, CO, USA
[4]University of Arizona, Tucson, AZ, USA
[5]Department of Animal and Range Sciences, New Mexico State University, Las Cruces, NM, USA
[6]University of California, Riverside, CA, USA
[7]US Geological Survey, Moab, UT, USA

Insights into the spatiotemporal variability of restoration seeding barriers in the Great Basin
Stella Copeland[1], John Bradford[2], Stuart Hardegree[3], Daniel Schlaepfer[4,5], Kevin Badik[6]
[1]US Department of Agriculture, Agricultural Research Service, Burns, OR, USA
[2]US Geological Survey, Flagstaff, AZ, USA
[3]US Department of Agriculture, Agricultural Research Service, Boise, ID USA
[4]US Geological Survey, Flagstaff, AZ, USA
[5]School of Forestry and Environmental Studies, Yale University, New Haven, CT, USA
[6]The Nature Conservancy, Reno, NV, USA

Break-out discussion

How the timing of environmental stress influences seed and seedling survival in the Great Basin

Jeremy James[1], Matt Rinella[2], Roger Sheley[3]
[1]California Polytechnic State University, San Luis Obispo, CA, USA
[2]US Department of Agriculture, Fort Keogh LARRL, Miles City, MT, USA
[3]US Department of Agriculture, Agricultural Research Service, Burns, OR, USA

Using a precision restoration framework to identify barriers to restoration in complex rangeland landscapes

Chad S. Boyd[1], Stella M. Copeland[1], Owen W. Baughman[3], Kirk W. Davies[1], Jay Kerby[3,4], Olga A. Kildisheva[5], Tony Svejcar[2], Lauren Svejcar[1]
[1]US Department of Agriculture, Agricultural Research Service, Burns, OR, USA
[2]Oregon State University, Burns, OR, USA
[3]The Nature Conservancy, Burns, OR, USA
[4]Self-employed, New Zealand
[5]The Nature Conservancy, Bend, OR, USA

Balancing competition and facilitation in restoration practices

Lauren Porensky[1] and Elizabeth Leger[2]
[1]US Department of Agriculture, Agricultural Research Service, Fort Collins, CO, USA
[2]University of Nevada, Reno, Reno, NV, USA

Discussion and Q&A

Day 2 | *Seed technologies: coating and flash flaming*

Introduction and webinar recap

Olga Kildisheva[1]
[1]The Nature Conservancy, Bend, OR, USA

A snapshot introduction to seed enhancement technologies: an Australian perspective

Todd Erickson[1,2], Monte Masarei[1], Andrew L. Guzzomi[1], Elvan Ling[1], Alison L Ritchie[1,2], Bianca Berto[1,2], Vanessa Brown[1,2], Matthew D. Madsen[3], Jeremy J. James[4], Scott R. Abella[5], Miriam Muñoz-Rojas[6], David J Merritt[1,2]
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[2]Kings Park Science, Botanic Gardens and Parks Authority, Department of Biodiversity, Conservation, and Attractions, Perth, Australia
[3]Brigham Young University, Provo, UT, USA
[4]California Polytechnic State University, San Luis Obispo, CA, USA
[5]University of Nevada, Las Vegas, AZ, USA
[6]University of New South Wales, Sydney, Australia

Uses and application of seed coating, priming and flaming in native forage grasses

Bianca Berto[1], Alison L Ritchie[1,2], Todd E Erickson[1,2]
[1]The University of Western Australia, Perth, Australia
[2]Kings Park Science, Botanic Gardens and Parks Authority, Department of Biodiversity, Conservation, and Attractions, Perth, Australia

Indigenous bacteria and cyanobacteria as seed bio-primers in dryland restoration

Miriam Muñoz-Rojas[1]
[1]University of New South Wales, Sydney, Australia

Break-out discussion

Activated carbon coating as a possible alternative to pelleting for herbicide protection of native seed: Early lab results, current challenges, and next steps.
Owen Baughman[1], Roxanne Rios[2], Olga Kildisheva[1]
[1]The Nature Conservancy, Burns, OR, USA
[2]USDA Agricultural Research Service, Eastern Oregon Agricultural Research Center, USA
[3]The Nature Conservancy, Bend, OR, USA

Use of fungicide seed coatings to improve restoration efforts where sown seeds have long soil incubation times
Matthew Madsen[1], Travis Sowards[1], Benjamin Hoose[1]
[1]Brigham Young University, Provo, UT, USA

Discussion and Q&A

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

Introduction and webinar recap
Olga Kildisheva[1]
[1]The Nature Conservancy, Bend, OR, USA

Using activated carbon seed technologies and pre-emergent herbicides to restore perennials in annual grass invaded rangelands
Kirk W. Davies[1] and Danielle Clenet[2]
[1]US Department of Agriculture, Agricultural Research Service, Burns, OR, USA
[2]US Department of Interior, Bureau of Land Management, Santa Barbara, CA, USA

Refining extruded pellets to improve herbicide protection and seedling emergence
Vanessa Brown[1,2], Alison Ritchie[1,2], Todd Erickson[1,2], and Richard Hobbs[2]
[1]The University of Western Australia, Perth, Australia
[2]Kings Park Science, Botanic Gardens and Parks Authority, Department of Biodiversity, Conservation, and Attractions, Perth, Australia

Developing extruded seed pellets to overcome hydrophobicity and emergence barriers
Alison Ritchie[1,2], Jason Stevens[1,2], Todd Erickson[1,2]
[1]The University of Western Australia, Perth, Australia
[2]Kings Park Science, Botanic Gardens and Parks Authority, Department of Biodiversity, Conservation, and Attractions, Perth, Australia

Seedballs to the wall: confronting restoration challenges on arid lands
Elise Gornish[1] and DJ Eastburn[2]
[1]University of Arizona, Tucson, AZ, USA
[2]University of California-Davis, Davis, CA, USA

Break

Pucks: Engineering biophysical solutions for aerial seeding in conifer and native plant systems after disturbance
Matthew Aghai[1] and Tiffani Manteuffel-Ross[1]
[1]DroneSeed, Seattle, WA, USA

Improving sagebrush establishment with root enhancing seed technologies
Magdalena Eshleman[1], Chris Donovan[1], Corinna Riginos[1]
[1]The Nature Conservancy, Lander, WY, USA

From pasta to pellets: challenges and lessons learned from scaling up production of a promising seed technology
Jessica Griffen[1], Roxanne Rios[2], Owen Baughman[1]
[1]The Nature Conservancy, Burns, OR, USA
[2]US Department of Agriculture, Agricultural Research Service, Burns, OR, USA
[3]The Nature Conservancy, Baker City, OR, USA

Discussion and Q&A

Day 4 | *Seed handling and deployment*

Introduction and webinar recap
Olga Kildisheva[1]
[1]The Nature Conservancy, Bend, OR, USA

Creating seed mixes at the community level: seed source can explain as much performance variability as species
Alison C. Agneray[1], Matthew L. Forister[1], Thomas L. Parchman[1], Elizabeth A. Leger[1]
[1]University of Nevada Reno, USA

Sourcing and maintaining high quality seed reserves for ecological restoration
David Merritt[1,2], Emma Dalziell[1], Todd Erickson[1,2]
[1]Kings Park Science, Botanic Gardens and Parks Authority, Department of Biodiversity, Conservation, and Attractions, Perth, Australia
[2]The University of Western Australia, Perth, Australia

Seed traits can influence ant predation rates
Trace E Martyn[1]
[1]University of Arizona, Tucson, AZ, USA

Break

Engineering restoration for the future
Monte Masarei[1,2], Todd. E Erickson[1,2], David J Merritt[1,2], Andrew L Guzzomi[1]
[1]The University of Western Australia, Perth, Australia
[2]Kings Park Science, Botanic Gardens and Parks Authority, Department of Biodiversity, Conservation, and Attractions, Perth, Australia

DroneSeed: Scalable solutions for rapid response survey and precision seeding in post-disturbance environments
Matthew Aghai[1]
[1]DroneSeed, Seattle, WA, USA

Low-tech equipment for arid land seeding
Tony Svejcar[1]
[1]Oregon State University, Burs, OR, USA

Discussion and Q&A

Day 5 | *Building partnerships to solve complex restoration problems & Webinar series next steps*

Introduction and webinar recap
Olga Kildisheva[1]
[1]The Nature Conservancy, Bend, OR, USA

The journey of Kings Park Science and its partners in developing restoration solutions in Western Australia
Jason Stevens[1,2]
[1]The University of Western Australia, Perth, Australia
[2]Kings Park Science, Botanic Gardens and Parks Authority, Department of Biodiversity, Conservation, and Attractions, Perth, Australia

Stakeholder engagement for rangeland restoration: the Nevada Native Seed Partnership
Liz Munn[1], Sarah Kulpa[2], Meghan Brown[3], Brittany Trimble[4]
[1]The Nature Conservancy, Reno, NV, USA
[2]US Fish and Wildlife Service, Reno, NV, USA
[3]Nevada Department of Agriculture, Elko, NV, USA
[4]Nevada Department of Wildlife, Spring Creek, NV, USA

Solving complex restoration problems: TNC's Sagebrush Sea Program
Matthew Cahill[1]
[1]The Nature Conservancy, Bend, OR, USA

Interactive group discussion: webinar synthesis and next steps

Closing remarks