Oregon Native Seed Strategy

OREGON NATIVE SEED COLLECTIVE

2025

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Oregon Ecoregion Map

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Introduction

Oregon's economic and cultural prosperity is dependent on healthy lands that support multiple human uses and diverse habitats. Ranking in the top five among all US states in vascular plant diversity, Oregon is home to approximately 3,500 native vascular plant species, with about 14% of these species considered vulnerable or at-risk. This remarkable botanical wealth forms the foundation of nine distinct ecoregions, each harboring unique plant communities that have sustained indigenous cultures since time immemorial. The diversity of Oregon's native flora provides essential ecosystem services, including providing food and food security, wildlife habitat, maintaining water and air quality, sequestering carbon, stabilizing soil and preventing erosion, providing culturally and spiritually significant materials for indigenous peoples, and offering numerous outdoor recreation opportunities for both residents and visitors. Resource-dependent economic activities that rely on healthy lands include logging, livestock grazing, mining, horticulture, and agriculture. Some species of conservation concern, such as the iconic greater sage-grouse (*Centrocercus urophasianus*), coho salmon (*Oncorhynchus kisutch*), and western snowy plover (*Charadrius nivosus nivosus*) are intrinsically dependent on healthy lands with diverse habitats. Unfortunately, many factors are threatening this rich botanical tapestry and the myriad of benefits they provide.

The spread of invasive weeds, altered wildfire regimes, habitat modification (e.g., urbanization and agriculture), and climate change are among the stressors that threaten our native plant communities. While urban development and agricultural conversion have irreversibly transformed significant portions of Oregon's landscape–changes that are largely beyond our immediate control–we do have the capacity to mitigate one of the most pressing threats to our remaining ecosystems: catastrophic wildfires. The years 2012, 2020, and 2024 had devastating wildfire seasons in Oregon resulting in over 1 million acres burned each year (Northwest Interagency Coordination Center). The increasing size and frequency of these uncharacteristic wildfires pose a growing danger, exacerbated by the spread of invasive annual grasses such as cheatgrass (*Bromus tectorum*) and medusahead (*Taeniatherum caput-medusae*), a legacy of fire suppression, and the impacts of climate change such as increased temperatures and more frequent droughts. In many disturbed areas, the native seed bank that historically allowed natural

recovery may be depleted or replaced by invasive species, limiting the ecosystem's capacity for natural regeneration. Where invasive annual grasses thrive, landscapes often do not recover from altered fire regimes without intervention, creating a cycle where fires repeatedly burn the same areas and prevent the re-establishment of desirable native plant communities. These nonnative grass-fueled fires threaten human safety, destroy infrastructure, degrade wildlife and grazing habitat, reduce recreational opportunities, and hurt the economy.

In addition to the devastation caused by wildfires, climate change has additional negative impacts, reducing the range of countless species, and dramatically shrinking available habitat for species at high elevations. It is vital to conserve the genetic diversity of plants where climate change is predicted to cause local extirpations of rare genotypes. Similarly, there is a need to collect and preserve genetic materials from fragments of habitat that may be thriving despite changing climate and associated impacts. These materials will be crucial for future conservation introductions, if necessary.

Thousands of pounds of seed are used in Oregon each year in an effort to revegetate or enhance burned lands and areas that have experienced other forms of human disturbance. Large scale fires require the availability of timber, shrub, grass, and forb seed stocks for restoration of forest habitats and erosion control; post-fire or harvest replanting within a set number of years is a requirement in most areas. However, the seed used is often not ecologically appropriate and only a few of the more than 3,500 native Oregon plants are used, leading to a decrease in overall plant diversity. Generally, intact plant communities in Oregon's ecoregions are too diverse to be adequately represented in restoration, rehabilitation, or mitigation projects. As a result, a cycle of disturbance and re-seeding is rapidly reducing plant diversity and habitat quality. Oregon landscapes need the right seed, in the right place, at the right time for successful restoration, rehabilitation, and mitigation.

Overlaying these challenges is a complex network of federal, tribal, state, and local land jurisdictions, land use laws, industry interests, and other concerned parties. Historically, the identification, collection, propagation, and utilization of native plants has not been well-coordinated or communicated within Oregon, resulting in inefficiencies and unsuccessful attempts to utilize a broad suite of native plants in restoration.

Foundational to the native seed supply is the question of appropriate seed transfer guidelines. While it is common for seed zones to be assumed for a suite of species for a specific geography and habitat, such zones are most appropriately determined on an individual species basis. Empirical seed zones (i.e., informed by species-specific studies) are of great utility in this conversation and should be utilized wherever available to guide seed transfer decisions, but they have been developed for a relatively small number of species in Oregon's flora. In the absence of empirical evidence to guide seed transfer decisions, provisional seed zones (informed by climate data, e.g., Bower et. al 2014) and/or Level III Ecoregions (Thorson et al. 2003) can be used as a starting point. Species-specific knowledge may then be utilized to further develop appropriate seed transfer guidelines. Such guidelines may be affected by many factors, including, but not limited to, plant species' reproductive strategy, seed and propagule dispersal methods, habitat affinity, potential rate of adaptability, population genetic history and structure, and response to environmental stressors. While this Strategy recognizes the importance of seed zones in guiding restoration decisions, it is not intended to prescribe or predetermine specific seed zone approaches. Rather, seed zone considerations should be incorporated into regional decision-making processes, with flexibility for partners to determine appropriate frameworks based on their local contexts, available indigenous knowledge and western scientific data, and management objectives. This allows for adaptive management as new research emerges and conditions change. For this reason, we do not use 'seed zone' language throughout this document. Similarly, where other seed strategies may refer to 'genetically appropriate' native seeds or plant materials as those that are environmentally adapted to a site and suitable for transfer within a seed zone (but for which little or no genetic knowledge of the species may be available), we refer to them here as 'ecologically appropriate'.

This Strategy will be updated every five years. We recognize that new issues may arise as we progress with this work, requiring the Strategy to be revised in its future iterations. Annual reports and regular partner meetings will allow us to track progress on Strategy implementation and respond to lessons learned. Through the execution of this Strategy, we will be better prepared to address new and continuous challenges that threaten the health of Oregon's native plants and the economic services they provide.

2024 Oregon Wildfires

Human Caused Fires
Lightning Fires
Under Invest Undetermined Unknown
Perimeters

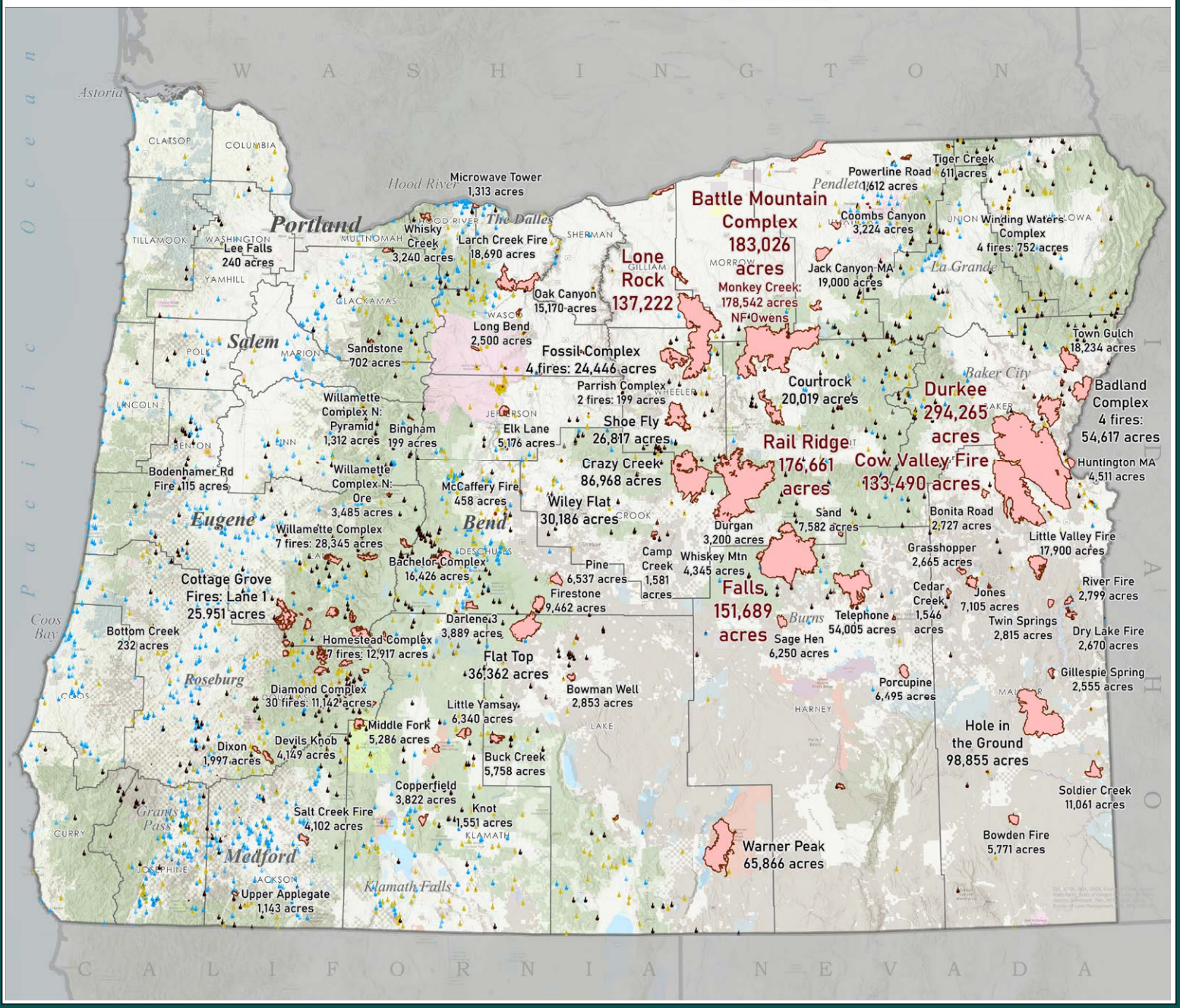
1.93+ Million Acres Burned

6 Megafires (>100K acres)

Oregon's 10-Year Annual Average: 621,044 Acres Burned

Land Management: State, Private, BLM, USFS, NPS, FWS, BIA, Other Fed & Other

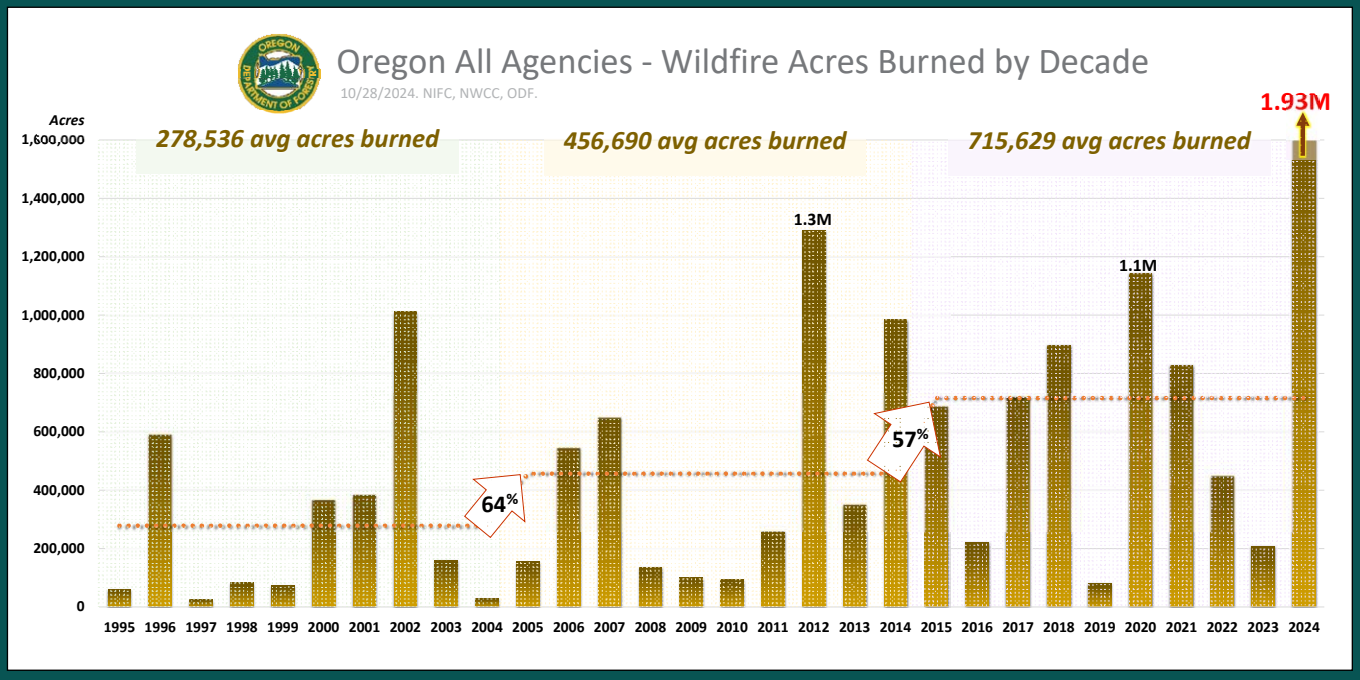
0 30 MI
0 50 KM
TzA @ ODF Fire 01/08/2025



Map of 2024 Oregon wildfires with labels for most large fires. Data from National Interagency Fire Center (NIFC), Northwest Interagency Coordination Center (NWCC), and Oregon Department of Forestry (ODF). Acreages may be subject to change with finalized or updated data.

Special thanks to TzA (ODF) for creating the wildfire figures.

Chart of wildfire acres burned in Oregon from 1995 through 2024. Data from National Interagency Fire Center (NIFC), Northwest Interagency Coordination Center (NWCC), and Oregon Department of Forestry (ODF). Acreages may be subject to change with finalized or updated data.



THE OREGON NATIVE SEED COLLECTIVE

The Oregon Native Seed Strategy (Strategy), prepared by the Oregon Native Seed Collective (ONSC; Figure 1), aims to increase the availability and use of native seed for restoration, rehabilitation, and mitigation projects in Oregon, as well as conserve Oregon's vast botanical biodiversity. The Strategy, largely based on the National Seed Strategy for Rehabilitation and Restoration (PCA 2015), identifies specific activities that address bottlenecks within the native seed system and attempts to clarify and coordinate the value each collaborator can bring toward improving native seed use. By working together, the Strategy integrates the needs of federal, tribal, state, and private seed users with researchers and growers 1) to increase our basic understanding of plant biology and ecology and 2) to collaborate with seed suppliers and expand native seed networks to produce the quantities of native seed needed for large scale revegetation.

The ONSC is a partnership of partnerships, bringing together diverse collaborators to work towards common critical objectives. Similar to the Nevada Seed Strategy (NNSP 2020) and California Native Seed Strategy (CNPS 2023), we believe that outlining our vision, mission, goals, and objectives in this state-specific Strategy will help all partners in Oregon focus on achieving our shared goals and provide a framework for documenting the results of our efforts. Implementing this Strategy will require additional investments in infrastructure, research, decision support tools, education, and communication. In addition, substantial investments are needed to bring restoration, rehabilitation, and mitigation efforts to a scale that matches the pervasive problem of fire, invasive species, and climate change regardless of the techniques used. But most importantly, successful implementation will require the active participation of a diverse set of public, tribal, and private partners. Increased coordination is vital to accelerating the pace and scale of restoration and providing native seed when and where it is needed. The ONSC welcomes the addition of other organizations committed to realizing our Vision and Mission.

LAND ACKNOWLEDGMENT

Indigenous tribes and bands have been with the lands that we inhabit today throughout Oregon and the Northwest since time immemorial and continue to be a vibrant part of Oregon today. We would like to express our respect to the First Peoples of this land, the nine federally recognized tribes of Oregon: Burns Paiute Tribe, Confederated Tribes of Coos, Lower Umpqua & Siuslaw Indians, Confederated Tribes of Grand Ronde, Confederated Tribes of Siletz Indians, Confederated Tribes of the Umatilla Indian Reservation, Confederated Tribes of the Warm Springs Reservation, Coquille Indian Tribe, Cow Creek Band of the Umpqua Tribe of Indians, and The Klamath Tribes. We must recognize and honor the ongoing legal and spiritual relationship between the land, plants, animals, and people indigenous to this place we now call Oregon. The interconnectedness of the people, the land, and the natural environment cannot be overstated; the health of one is necessary for the health of all. We recognize the pre-existing and continued sovereignty of the nine federally recognized tribes who have ties to this place and thank them for continuing to share their indigenous knowledge and perspective on how we might care for one another and the land, so it can take care of us. We commit to engaging in a respectful and successful partnership as stewards of these lands. We will uphold government-to-government relations to advance strong governance outcomes supportive of tribal self-determination and sovereignty.

INCLUSION OF TRIBES

The Oregon Native Seed Collective (ONSC) recognizes that each tribe is a distinct entity, with unique perspectives, values, and history. In September 2023, each federally recognized tribe of Oregon was invited to participate in the working group that eventually became the ONSC. Tribal participation and input are essential to the success of this Strategy by sharing indigenous knowledge, bringing diverse perspectives and ideas to broad topics, and in identifying where and how we can use this Strategy to support tribal sovereignty and self-determination. We acknowledge that building strong relationships with tribes requires time and trust. Non-indigenous leadership within the ONSC commits to learning from and centering indigenous worldviews and traditional ecological knowledge when making decisions about native plant conservation and use. By centering indigenous perspectives and following the lead of tribal partners in matters concerning culturally significant species and practices, we aim to create opportunities for more holistic and culturally informed restoration work. By enacting this Strategy, we will partner with and support tribes at every opportunity, and we hope that each action presented will further our vision to return Oregon lands to diverse, functional, and resilient ecosystems, with ample access to culturally significant species.

Scope

This Strategy is Oregon-specific and engages partners working toward restoration or conservation on federal, tribal, state, local, and private land. Strategy goals and objectives will be reassessed every five years, and actions will affect Oregon habitats and the wildlife and people that depend on them far into the future. The plants of interest are native forbs (wildflowers), shrubs, trees, and graminoids (grasses and grass-like plants) that are used for ecological restoration, post-fire emergency stabilization, range management, mine reclamation, conservation, horticultural (i.e., native landscaping) applications, and tribal priority species (e.g., for fibers, foods, and medicines). This Strategy aims to increase the quantity and quality of seed available for restoration, rehabilitation, and mitigation. Unlike the National Seed Strategy for Rehabilitation and Restoration and other state seed strategies (to date), this Strategy ***does*** address rare and endemic plant species whose biodiversity should be conserved. While we do not discuss rare species restoration or reintroduction, seed collection and conservation banking are key to preventing extirpation and loss of local genetic diversity. Products and collaborations developed through the Strategy will help land managers select appropriate seed to use in public and private ecological restoration efforts at large and small scales.

This Strategy aims to provide all public, tribal, and private land managers the tools they need to increase biodiversity and resiliency in our Oregon landscapes. While the Strategy addresses the development of seed and other plant materials that support restoration goals, it is not intended to serve as restoration guidance. The technical aspects of restoration planning, implementation, and monitoring are beyond the scope of this document. Instead, this Strategy focuses on ensuring that appropriate native plant materials are available when and where they are needed for restoration, rehabilitation, and mitigation projects.

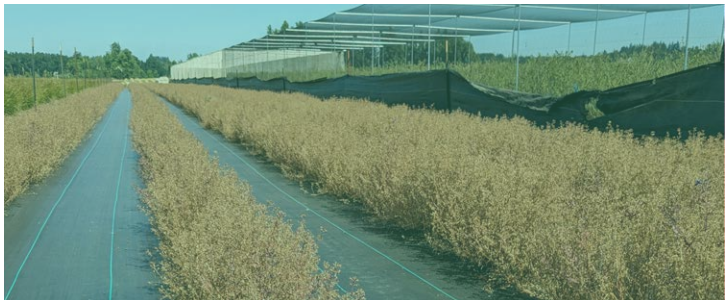
This Strategy does not set agency policy. It recognizes that each entity has its own authorizing legislations or charters, missions, and policies. This Strategy strives to align them as much as possible while supporting science and indigenous knowledge, and valuing the use of native seed and plant materials in land management activities. Oregon is a state diverse in landscapes, land use, and land ownership, thus the aim of the Strategy is to be broadly inclusive while meeting Oregon's unique needs.

The Oregon Native Seed Collective and their partners' agency or organization management endorse this document as the unified approach to increase the availability and use of native seed for restoration, rehabilitation, mitigation, and conservation projects within the state.

Goals of the Oregon Native Seed Strategy

GOAL 1:
Ensure Ecologically Appropriate Native Seed is Available in Oregon for Restoration, Rehabilitation, and Mitigation

GOAL 2:
Facilitate Research to Address Gaps in Native Seed Production and Use



GOAL 3:
Develop and Leverage Resources that Enable Land Managers and Growers to Make Timely and Informed Decisions

GOAL 4:
Develop and Implement a Conservation Seed Banking Program to Enhance Recovery of Priority Sensitive Species

GOAL 5:
Secure Reliable Funding and Develop and Implement Strategies for Internal and External Communications

Background and Development

Over the last 20 years, there has been an increased focus on using native seeds in restoration and revegetation, particularly among the federal land management agencies. The critical shortage of native plant materials available for seeding following the extensive wildfires of 1999 and 2000 led Congress to direct the Bureau of Land Management (BLM) and US Forest Service (USFS) to facilitate the development of a long-term program to provide a stable and economical supply of native seed for restoration and rehabilitation efforts on public lands (USC HR 2000). BLM and USFS responded to this by establishing the Native Plant Materials Development Program and the Native Plant Restoration Program.

The fiscal year 2002 House report on appropriations for the Department of Interior (DOI) and related agencies reiterated Congress' order to "continue to implement the long-term program to manage and supply native plant materials for use in various Federal land management restoration and rehabilitation needs (USC HR 2000)." In April 2002, DOI and US Department of Agriculture (USDA) issued a report to Congress, which called for a commitment to native plant materials research, production, and use that included a recommendation for financial and operational support from DOI and USDA (DOI and USDA 2002). In this report, the DOI and USDA also stated their intent to improve and expand partnerships in cooperation with the private seed industry, develop and enhance science delivery to practitioners, and expand outreach and education to the public.

Since 2002, federal agencies have made significant advances in understanding plant biology, cultivation practices, and seed transfer zone guidance. For example, multiple agencies are collaborating through ecoregional programs to boost native seed and plant materials production for restoration in specific ecoregions. Federal programs such as the BLM Plant Conservation and Restoration Program and Secure Rural Schools Title II Program, the US Fish and Wildlife Service Partners for Fish and Wildlife Program, the Natural Resources Conservation Service Conservation Innovation Grant program, as well as various programs within the USFS and Army Corps of Engineers have been instrumental in enhancing the availability of native plant materials and advancing restoration efforts throughout Oregon. This collaborative approach has led to the establishment of several regional native seed partnerships in Oregon, each focusing on unique ecosystems. The Willamette Valley Native Plant Partnership has increased the availability of genetically diverse native seed available to partners for restoring prairie and oak savanna habitats. The Coastal Native Seed Partnership addresses the need for ecologically appropriate plant materials for the Oregon coast, a growing concern as partners conduct coastal grassland, dune, and estuary restoration. In southern Oregon, the Rogue Native Plant Partnership and the Umpqua Native Plant Partnership coordinate

seed collection, facilitate production, and provide education and resources for the Rogue and Umpqua Basins.

In 2015, the National Seed Strategy for Rehabilitation and Restoration (National Strategy) was developed by the Plant Conservation Alliance (PCA) to provide a framework and a more coordinated approach for rehabilitation and restoration while actively working with the private sector to build a seed industry (PCA 2015). The National Strategy will also help address future challenges so that the United States is better prepared to respond appropriately to large-scale disturbances and stressors that threaten plant communities and ecosystem services they provide on federal, state, local, tribal, and private lands.

The Nevada Seed Strategy, released in 2020, catalyzed conversations among organizations in Oregon about the benefits of a state seed strategy. However, with little time and no funding to dedicate to creating a similar document, no progress was made. In August 2022, the Oregon Department of Agriculture, Institute for Applied Ecology, The Understory Initiative, Oregon State University, Portland State University Rae Selling Berry Seed Bank, US Fish and Wildlife Service, US Forest Service, and Bureau of Land Management submitted an America the Beautiful Challenge proposal to fund the development of an Oregon Seed Strategy. While our proposal was not funded in 2022 or 2023, we felt it was increasingly important to complete a state strategy. In October 2023, the ONSC began holding monthly working group meetings with additional partners from several Oregon tribes, The Nature Conservancy, and other interested groups. Through these meetings, partners better understood the roles and abilities of each agency, and the opportunities that could be created by working together to increase the availability of Oregon native seed.

Through the end of 2023 and 2024, leaders from ONSC organizations met to discuss their vision, goals, and objectives in increasing the availability of native seed in Oregon. The ONSC agreed it was necessary to create an Oregon Native Seed Strategy, using the National Strategy, Nevada Seed Strategy, and California Native Seed Strategy as models. Our meetings provided a forum for partners to discuss the development of a state-specific strategy, to step down the National Strategy in a way that was relevant to the social, economic, and ecological context in Oregon, and add new ideas that reflect our value of conservation and biodiversity. The contents of this Strategy are the results of a coordinated effort involving input from all ONSC partners.

Vision and Mission

VISION: Return Oregon lands to diverse, functional, and resilient ecosystems by using the right seed in the right place at the right time.

MISSION: To ensure the availability of ecologically appropriate seed to conserve and restore diverse native plant communities and sustainable landscapes.

Guiding Values and Principles

Ecosystem Services: Oregon's native plant communities provide ecosystem services that sustain our people, communities, wildlife, and economies.

Habitat for Wildlife: Native plant communities are key to ecosystem integrity and resilience, and they provide essential habitat and food sources for wildlife, including pollinators.

Intrinsic Value of Native Plant Communities: Native plant communities have intrinsic and irreplaceable biotic value that will become increasingly important in the future.

Climate Change Adaptation: Species diversity in native plant communities and the genetic diversity within those species provides greater resilience to our changing climate.

Natural Recruitment as a Tool: The native seed bank that exists in the soil should be utilized as much as possible; not all disturbances or species require active reseeding to restore habitat.

Ecologically Appropriate Seed Sources: Native, ecologically appropriate seed sources are vital for restoration and management and are more likely to be adapted to survive in their unique local abiotic and biotic conditions and provide essential ecosystem services.

Strategic Use of Non-native Species: While native species are preferred, we acknowledge that non-native species may play strategic roles in specific situations such as severe disturbance, mine reclamation, or where invasive species control is paramount. The use of non-native species in these contexts should be carefully considered and planned with the long-term goal of transitioning to native plant communities where feasible.

Biotic Preservation: Native plants contain unique properties and adaptations that support diverse ecosystems. The full benefit of some of these species may not yet be recognized but should be preserved for future generations.

Conservation of Sensitive Species: Conservation collections of seeds, plant tissues, or whole plants support species' survival and reduce the extinction risk of globally and/or regionally sensitive species through off-site preservation of genetic diversity.

Diverse Mixes: An ideal seedling and planting mix contains a diversity of species reflective of the complexity of the habitats they are intended to restore. There is a need to move beyond using a limited number of workhorse species and incorporating less common plant species into seed and plant production planning and restoration.

Intentional and Cooperative Incorporation of Western Scientific and Indigenous Knowledge: Both western botanical, ecological, and genetic scientific expertise and Indigenous Knowledge (IK) play a vital role in providing information to support and guide ecological restoration.

Supporting Sovereignty and Self-determination: Relationships with plants used for food, medicine, and fiber are a central part of Native American cultures, identity, and well-being. Continuing and increasing access to appropriate gathering areas supports ongoing cultural traditions and food sovereignty efforts.

Robust Seed Economies: Building a viable native seed market will increase economic activity in Oregon, while also increasing the diversity and quantity of ecologically appropriate seeds for restoration.

Diverse Partner Involvement: Partnering with a diverse group, including interagency collaboration and the inclusion of tribes, non-federal partners, and growers enhances the quality and effectiveness of this Strategy.

New Opportunities: Strategy Partners support opportunities to:

- Maintain or increase the number of acres of native plant communities that provide ecosystem services;
- Include federal, tribal, state, and local governments; academic institutions; non-profits; and the private sector when addressing seed production and restoration issues;
- Improve the availability of ecologically appropriate seed required to restore healthy native plant communities;
- Develop strategies and tools for conducting more effective seed production and restoration;
- Promote research, science delivery, and education required to meet new restoration challenges imposed by increasing threats; and
- Communicate the value of native plant communities and restoration to interested parties and the public.

Actions to support Goal 1, organized by Objectives. Links between Actions are indicated to show interdependencies and opportunities for coordinated implementation. Participation by coordinating partners in any action is contingent upon available funding, staffing, and other resources.

Goal 1: Ensure Ecologically Appropriate Native Seed is Available in Oregon for Restoration, Rehabilitation, and Mitigation		
Action	Links to Other Actions	Coordinating Partners
Objective 1.1: Collaborate at regional and statewide levels to quantify and meet seed needs across Oregon		
1.1.1 Understand Oregon native seed demand and supply	1.1.2, 1.1.3, 1.3.1, 3.2.4, 3.3.1, 3.3.2	IAE, TNC, TUI
1.1.2 Organize ONSC working groups to address seed supply and demand bottlenecks	1.1.1, 1.1.3, 1.1.4, 1.3.1, 3.1.2	IAE, TUI
1.1.3 Establish and support regional networks to guide species prioritization and seed forecasting	1.1.1, 1.1.2, 1.1.4, 1.3.1, 3.1.1, 3.1.2	IAE, TNC, TUI
1.1.4 Increase personnel capacity to support regional and statewide collaboration	1.1.2, 1.1.3, 1.1.5, 3.1.1	IAE, TUI
1.1.5 Develop lessons learned to share at the state level	1.1.4, 3.1.1, 3.2.1	IAE, TUI
Objective 1.2: Strategically expand seed collection efforts in Oregon		
1.2.1 Develop or compile existing BMPs for regionally prioritized seed collection	1.2.2, 2.1.2, 3.2.1	IAE, TNC
1.2.2 Expand geotagged native seed collection and certification efforts	1.1.1, 1.2.1, 1.2.3, 1.2.4, 2.2.3	IAE, TUI
1.2.3 Develop and maintain an online database for seed tracking and reporting	1.2.2, 3.2.4	IAE, TUI
1.2.4 Improve efficiency of inter-agency and tribal permitting for seed collection	1.2.2, 3.3.2	TNC, TUI
Objective 1.3: Strategically expand seed production efforts		
1.3.1 Identify regional seed production goals and funding needs	1.1.1, 1.1.2, 1.1.3, 1.3.2, 1.3.3, 3.2.4, 3.3.1	IAE, TNC, TUI
1.3.2 Develop a mechanism for subsidizing the cost of native seed-based restoration on under-funded projects	1.1.1, 1.1.3, 1.3.1, 3.3.1, 3.3.2, 5.1.3, 5.1.4	ONSC
1.3.3 Develop grower-support mechanisms and conduct grower outreach	1.3.1, 1.3.4, 3.3.1, 3.3.2	IAE, TNC, TUI
1.3.4 Establish an Oregon Native Seed Program	1.3.3, 3.2.4	IAE
Objective 1.4: Strategically expand seed cleaning and storage capacity		
1.4.1 Conduct an assessment to increase seed cleaning and warehouse capacity	1.4.3	TNC
1.4.2 Expand seed processing capacity through shared seed harvesting and cleaning equipment libraries	1.1.3, 1.3.3, 1.4.3, 3.2.1	IAE, TUI
1.4.3 Expand warehouse capacity and hire inventory management personnel	1.4.1, 3.2.4	IAE, TUI

Actions to support Goal 2, organized by Objectives. Links between Actions are indicated to show interdependencies and opportunities for coordinated implementation. Participation by coordinating partners in any action is contingent upon available funding, staffing, and other resources.

Goal 2: Facilitate Research to Address Gaps in Native Seed Production and Use		
Action	Links to Other Actions	Coordinating Partners
Objective 2.1: Create a research plan and identify knowledge gaps		
2.1.1 Coordinate research priorities and identify synergies	2.1.2, 2.2.1, 2.2.2, 2.2.3, 3.2.1	IAE, TUI
2.1.2 Develop species-specific protocols	1.2.1, 2.1.1, 2.2.1, 3.2.1	IAE, PMC
Objective 2.2: Conduct research to improve seed production and use in restoration, rehabilitation, and mitigation		
2.2.1 Research seed germination, production, processing, and storage	2.1.1, 2.1.2, 3.2.1	IAE, PMC
2.2.2 Study site preparation and planting techniques	2.1.1, 3.1.2, 3.2.1	ONSC
2.2.3 Assess native plant collections and populations for use in restoration, rehabilitation, and mitigation	1.2.2, 2.1.1, 3.1.2, 3.2.1	IAE, PMC, TUI
Objective 2.3: Characterize genetic variation of restoration species to inform seed increase and seed transfer guidance		
Action 2.3.1 Conduct common gardens and genetic analysis for prioritized species	2.2.3, 2.3.2, 3.1.2	ONSC
Action 2.3.2 Develop predictive models of climate change effects on target species and genetic diversity	2.3.1, 3.1.2, 3.2.1	ONSC

Actions to support Goal 3, organized by Objectives. Links between Actions are indicated to show interdependencies and opportunities for coordinated implementation. Participation by coordinating partners in any action is contingent upon available funding, staffing, and other resources.

Goal 3: Develop and Leverage Resources that Enable Land Managers and Growers to Make Timely and Informed Decisions		
Action	Links to Other Actions	Coordinating Partners
Objective 3.1: Develop resources to cultivate ecologically appropriate and inclusive restoration decisions		
3.1.1 Synthesize lessons from successful partnerships	1.1.3, 1.1.4, 1.1.5, 3.2.1, 3.2.2	IAE, ODA, TUI
3.1.2 Develop a framework to inform seed transfer zone decisions	1.1.2, 1.1.3, 2.2.2, 2.2.3, 3.2.1, 3.2.2	IAE, PMC
3.1.3 Develop a decision-making framework for seed production planning	1.1.1, 1.3.1, 3.3.1	IAE, TNC, TUI
Objective 3.2: Compile, update, and develop resources for native seed planning, production, and use		
3.2.1 Develop guides, protocols, and factsheets for the production and use of Oregon native seed	1.1.5, 1.2.1, 2.1.1, 2.1.2, 2.2.2, 2.2.3, 3.1.1, 3.1.2, 3.2.2, 3.2.3	IAE, OF, TNC, TUI
3.2.2 Establish and maintain a resource website	3.1.1, 3.1.2, 3.2.1, 3.2.3, 3.2.4	ONSC
3.2.3 Provide webinars and in-person training	3.2.1, 3.2.2, 5.3.1	IAE, TUI
3.2.4 Develop a seed inventory system for Oregon	1.1.1, 1.2.3, 1.3.1, 1.3.4, 1.4.2, 3.2.2	IAE, TUI
Objective 3.3: Develop pathways to encourage market stability and coordinated procurement		
3.3.1 Innovate contracting methods to stabilize the market	1.1.1, 1.3.1, 1.3.2, 1.3.3, 3.3.2	IAE, TUI
3.3.2 Streamline native seed procurement processes	1.1.1, 1.2.4, 1.3.2, 1.3.3, 3.3.1	ODA, TNC

Actions to support Goal 4, organized by Objectives. Links between Actions are indicated to show interdependencies and opportunities for coordinated implementation. Participation by coordinating partners in any action is contingent upon available funding, staffing, and other resources.

Goal 4: Develop and Implement a Conservation Seed Banking Program to Enhance Recovery of Priority Sensitive Species		
Action	Links to Other Actions	Coordinating Partners
Objective 4.1: Prioritize sensitive species and populations for conservation		
4.1.1 Compile and integrate data on conserved sensitive species	4.1.2, 4.1.3, 4.2.3	BSB, ODA, OF, ORBIC
4.1.2 Develop priority lists for seed conservation	4.1.1, 4.1.3, 4.2.2, 4.2.3	BSB, ODA, OF, ORBIC
4.1.3 Assess seed needs and goals of priority species	4.1.1, 4.1.2, 4.2.1, 4.2.2	BSB, IAE, ODA, OF, ORBIC
Objective 4.2: Expand seed collection for conservation		
4.2.1 Develop BMPs for sensitive species	4.1.1, 4.1.3, 4.2.2	BSB, IAE, ODA, ORBIC, TUI
4.2.2 Expand collection efforts for priority species	4.1.2, 4.1.3, 4.2.1, 4.2.3	BSB, IAE, ODA, ORBIC, TUI
4.2.3 Develop an online database for seed collection tracking and reporting	4.1.1, 4.2.2	BSB, ODA, ORBIC
Objective 4.3: Conduct research to address conservation knowledge gaps		
4.3.1 Expand seed bank capacity and resources	4.2.2, 4.3.2, 4.3.3, 4.4.1	BSB, ODA, ORBIC
4.3.2 Identify and research knowledge gaps	4.1.2, 4.3.1, 4.3.3	BSB, IAE, ODA, ORBIC, PMC, TUI
4.3.3 Conduct seed quality and viability tests	4.3.1, 4.3.2	BSB
Objective 4.4: Maintain living collections of exceptional and rare species		
4.4.1 Preserve exceptional species using alternative methods	4.4.2	BSB, ORBIC
4.4.2 Promote education and outreach with living collections	4.4.1, 5.3.1	BSB, ODA, OF, ORBIC, TUI

Actions to support Goal 5, organized by Objectives. Links between Actions are indicated to show interdependencies and opportunities for coordinated implementation. Participation by coordinating partners in any action is contingent upon available funding, staffing, and other resources.

Goal 5: Secure Reliable Funding and Develop and Implement Strategies for Internal and External Communications		
Action	Links to Other Actions	Coordinating Partners
Objective 5.1: Secure stable, reliable funding for Strategy implementation		
5.1.1 Develop an Oregon Native Seed Strategy Business Plan	5.1.2, 5.1.3, 5.1.4, 5.1.5	IAE, ODA, TUI
5.1.2 Secure funding through federal and state programs	5.1.1, 5.1.3, 5.1.4, 5.1.5	BSB, IAE, ODA, ORBIC, TNC, TUI
5.1.3 Pursue indirect funding through state policy	1.3.2, 5.1.1, 5.1.2, 5.1.4	ONSC
5.1.4 Establish grants and dedicated state resources	1.3.2, 5.1.1, 5.1.2, 5.1.3	ONSC
5.1.5 Pursue non-traditional revenue sources	5.1.1, 5.1.2	BSB, IAE, ORBIC, TNC, TUI
Objective 5.2: Internal coordination and communications: Distribute and implement the Strategy across ONSC agencies and partners		
5.2.1 Ensure staff support for coordination and communication	5.2.2, 5.2.3, 5.3.1	ONSC
5.2.2 Conduct regular ONSC meetings	5.2.1, 5.2.3	ONSC
5.2.3 Report on ONSC progress to leadership	5.2.1, 5.2.2	ONSC
Objective 5.3: External coordination and communications: Conduct education and outreach through the ONSC		
5.3.1 Develop and implement a comprehensive external communications plan	3.2.3, 4.4.2, 5.3.2, 5.3.3	BSB, CTGR, IAE, ODA, ORBIC
5.3.2 Organize a biennial Oregon Native Seed Forum	5.3.1, 5.3.3	CTGR, IAE, ODA, TUI
5.3.3 Organize native seed-focused field visits and tours	5.3.1, 5.3.2	CTGR, IAE, TNC, TUI
Objective 5.4: Report progress, recognize achievements, and revise Strategy		
5.4.1 Establish a reporting mechanism for Strategy progress	5.4.2	IAE, ODA, TUI
5.4.2 Review and revise the Strategy	5.4.1	ONSC

Goal 1: Ensure Ecologically Appropriate Native Seed is Available in Oregon for Restoration, Rehabilitation, and Mitigation

Native plants are a foundational part of our ecosystems. Effective restoration and rehabilitation efforts depend on the availability of ecologically appropriate native plant materials. This requires both a collaboration of regional partnerships across Oregon and comprehensive and integrated seed collection, production, storage, and delivery systems that allow land managers to effectively respond to emergencies and proactively plan restoration projects.

Actions under this goal will assess seed needs and fulfillment capacities, increase coordinated wildland seed collection and seed production, and build upon existing seed partnerships within and among public and private sector entities. Successful implementation of this goal is contingent on securing stable, reliable funding (see Action 5.1.1).

OBJECTIVE 1.1: COLLABORATE AT REGIONAL AND STATEWIDE LEVELS TO QUANTIFY AND MEET SEED NEEDS ACROSS OREGON

The ONSC will collate current and future seed needs based on local expert opinions of tribal partners, ecologists, botanists, restoration practitioners and land managers while also considering other regional or statewide data (including federal data) such as past or predicted wildfire areas, priority wildlife habitat, planned treatments (e.g., fuel breaks), mine reclamation, or transportation needs, or other relevant data. Regional ONSC coordinators (see Action 1.1.4) will curate this information, connecting project, seed needs, and historical seed mix data. The collected information will be shared with growers to support decisions about wildland collection and seed production.

ACTION 1.1.1 UNDERSTAND OREGON NATIVE SEED DEMAND AND SUPPLY

The ONSC will assess regional seed needs, including the current and future projected demand and areas with the greatest need for plant materials. We will identify the desired ecologically and/or culturally appropriate species that are not available in quantities needed to meet current and future demand. This assessment could include 10-year seed demand forecasts, which will help to stabilize the market by allowing growers to forecast and predict desired species for restoration, rehabilitation, and mitigation. Coordinate with neighboring states that share similar ecosystems and plant communities to identify opportunities for collaboration and resource sharing. In the short term, we will use the best available data to help determine future demand based on past purchases of seed and predictions of future needs.

To evaluate seed supply, the ONSC will assess the current and potential capacity of growers to fulfill these regional needs. We will work to understand and fine tune how species are chosen for production of community types in different contexts. Our efforts will identify potential missed opportunities and bottlenecks for restoring ecological function using native seed while prioritizing culturally important plants. Additionally, we will identify if extra or unused seed exists in the state that could be used by other parties.

LINKS TO OTHER ACTIONS: 1.1.2, 1.1.3, 1.3.1, 3.2.4, 3.3.1, 3.3.2

COORDINATING PARTNERS: IAE, TNC, TUI

ACTION 1.1.2 ORGANIZE ONSC WORKING GROUPS AS NEEDED TO DEVELOP AND IMPLEMENT STRATEGIES TO ADDRESS SEED SUPPLY AND DEMAND BOTTLENECKS

Once bottlenecks have been identified, the ONSC will form working groups to guide the development of proposed solutions, minimize duplication of efforts, and maximize opportunities for collaboration and resource sharing.

LINKS TO OTHER ACTIONS: 1.1.1, 1.1.3, 1.1.4, 1.3.1, 3.1.2

COORDINATING PARTNERS: IAE, TUI

ACTION 1.1.3 ESTABLISH AND SUPPORT REGIONAL NATIVE PLANT NETWORKS TO GUIDE SPECIES PRIORITIZATION AND SEED FORECASTING

The ONSC will strengthen existing regional native plant partnerships and establish new ones where gaps exist, aiming to create a comprehensive network covering all of Oregon's ecoregions. For existing partnerships, support will be provided through training, personnel capacity, and resources, while in areas lacking formal partnerships, the ONSC will initiate new networks with local leadership. The process of developing new partnerships will include identifying key collaborators, facilitating meetings, providing a partnership-building roadmap, offering mentorship, and securing initial funding. These regional networks will be responsible for prioritizing species for seed production and use, creating and maintaining priority species lists, and overseeing consistent seed forecasting for their region. Further, regional networks will have the expertise to provide restoration-focused guidance in a regional seed strategy. By fostering this statewide network of regional partnerships, seed prioritization and forecasting efforts will be tailored to local ecological needs while contributing to a coordinated, statewide native seed strategy.

LINKS TO OTHER ACTIONS: 1.1.1, 1.1.2, 1.1.4, 1.3.1, 3.1.1, 3.1.2

COORDINATING PARTNERS: IAE, TNC, TUI

ACTION 1.1.4 INCREASE PERSONNEL CAPACITY TO SUPPORT REGIONAL AND STATEWIDE COLLABORATION

The ONSC will establish (or support an existing) half or full-time coordinator position in each regional network to be well-informed on all phases of plant material development, restoration planning, project implementation, and effectiveness monitoring. Support will be given to regions without an active native seed partnership structure. This action recognizes that restoration of native plant communities requires dedicated specialized staff with diverse skill sets. Partnership coordinators need to be collaborative, skilled at guiding group problem-solving, and able to embrace diverse perspectives.

LINKS TO OTHER ACTIONS: 1.1.2, 1.1.3, 1.1.5, 3.1.1

COORDINATING PARTNERS: IAE, TUI

ACTION 1.1.5 DEVELOP LESSONS LEARNED FOR EACH REGION TO SHARE AT THE STATE LEVEL

The ONSC will gather and analyze information from each region to identify opportunities for collaboration, inform statewide initiatives, and reduce various bottlenecks in seed production and restoration cycles.

LINKS TO OTHER ACTIONS: 1.1.4, 3.1.1, 3.2.1

COORDINATING PARTNERS: IAE, TUI

OBJECTIVE 1.2 STRATEGICALLY EXPAND SEED COLLECTION EFFORTS IN OREGON

This objective expands and coordinates the collection of species identified under Objective 1.1 and will ensure a diversity of native plant materials in Oregon for use now and into the future.

ACTION 1.2.1 DEVELOP OR COMPILE EXISTING BEST MANAGEMENT PRACTICES FOR REGIONALLY PRIORITIZED SEED COLLECTION

Best Management Practices (BMPs) address topics such as permit acquisition, optimal collection locations for different types of seed collection (e.g., Seeds of Success, commercial, research), recommended frequency of operational- or restoration-sized collections, species or locations not appropriate for collection (e.g., due to poor seed set or limited population size), plant phenology and optimal collection time, collection quantity, quality, and tools, as well as proper drying, cleaning, and storage methods. BMPs for culturally significant plants will address cultural practices for seed collection and management and recommendations for consulting with tribes on collections in gathering sites.

LINKS TO OTHER ACTIONS: 1.2.2, 2.1.2, 3.2.1

COORDINATING PARTNERS: IAE, TNC

ACTION 1.2.2 EXPAND GEOTAGGED NATIVE SEED COLLECTION AND CERTIFICATION EFFORTS

The ONSC will establish collection targets based on historical and projected seed demand and species lists (see Objective 1.1), and increase geotagged field collection of native seed across Oregon for use in seed-based projects, seed production, research, and conservation. Propagule collection also extends to native woody species such as Oregon ash (*Fraxinus latifolia*) and Oregon white oak (*Quercus garryana*) that are at risk due to invasive insect pest species, or drought-tolerant species with low regenerative properties such as incense cedar (*Calocedrus decurrens*) that are important for climate change adaptation. The ONSC will train seed collection teams in the Seeds of Success (SOS) program to increase seed collection capacity and research opportunities and support tribes in intra-tribal teaching of cultural practices around seed collection. Collection efforts will be coordinated amongst Oregon's many regional native plant partnerships and the ONSC. When appropriate, ONSC will encourage seed certification through Association of Official Seed Certifying Agencies (AOSCA).

LINKS TO OTHER ACTIONS: 1.1.1, 1.2.1, 1.2.3, 1.2.4, 2.2.3

COORDINATING PARTNERS: IAE, TUI

ACTION 1.2.3 DEVELOP AND MAINTAIN AN ONLINE DATABASE FOR SEED COLLECTION TRACKING AND REPORTING

Mobile apps (e.g., FieldMaps and Survey123) will allow seed collection teams to collect and update seed collection information in real-time, informing collection prioritization and coordination. While existing programs like SOS track BLM collection data, and various non-profits, agencies, and private businesses may also maintain their own records, there is currently no unified system for tracking collection data across all sectors in Oregon. An entity for housing, maintaining, and updating the database will be identified and funded, with annual reports on seed collection efforts generated from this data. The ONSC acknowledges and respects the principles of tribal data sovereignty and will adhere to rules or guidelines established by tribes for data collection, sharing, and use.

LINKS TO OTHER ACTIONS: 1.2.2, 3.2.4

COORDINATING PARTNERS: IAE, TUI

ACTION 1.2.4 IMPROVE THE EFFICIENCY OF INTER-AGENCY AND TRIBAL PERMITTING FOR SEED COLLECTION

Permit approval processes will be streamlined in all agencies to require less effort from land managers and collectors. Factsheets that outline agency contacts and the permitting process will be developed. Any permits granting access to tribal land will honor tribal sovereignty and in no way dictate unrestricted access to tribal resources.

LINKS TO OTHER ACTIONS: 1.2.2, 3.3.2

COORDINATING PARTNERS: TNC, TUI

OBJECTIVE 1.3 STRATEGICALLY EXPAND SEED PRODUCTION EFFORTS

This objective aims to strategically expand seed production efforts for species identified under Objective 1.1, ensuring the availability of native plant resources for Oregon's future needs. Actions in this objective include identifying regional seed production goals, collaborating to secure funding, conducting grower outreach, and establishing an Oregon Native Seed Program.

ACTION 1.3.1 IDENTIFY REGIONAL SEED PRODUCTION GOALS AND COLLABORATE ACROSS THE ONSC TO IDENTIFY FUNDING NEEDS

The ONSC will develop regional seed production goals, informed by the seed supply and demand assessments, forecasted needs, seed scale needs (e.g., transitioning from small scale seed lots to large scale production), and regional species lists from Objective 1.1. This action includes working with agencies to identify seed production funding needs for participating agency/organizational support to carry out this objective.

LINKS TO OTHER ACTIONS: 1.1.1, 1.1.2, 1.1.3, 1.3.2, 1.3.3, 3.2.4, 3.3.1

COORDINATING PARTNERS: IAE, TNC, TUI

ACTION 1.3.2 DEVELOP A MECHANISM FOR SUBSIDIZING THE COST OF ECOLOGICALLY APPROPRIATE NATIVE SEED-BASED RESTORATION ON UNDER-FUNDED PROJECTS

The high cost of native seed is a bottleneck to many restoration projects, especially costs pertaining to initial wild collection, wild collected lot cleaning, and initial infrastructure setup needed to inventory and manage seed at the onset of a region's seed production process. Although the implementation of this strategy will result in cost savings by reducing duplication of effort and increasing efficiency, many species may still be expensive to produce at any scale despite their ecological and cultural importance. Subsidizing the collection and production of these species will lead to more widespread use of diverse seed mixes while recognizing the effort needed to produce these specialist species at restoration scales. Special emphasis will be given to subsidizing access to native seed for tribal-led restoration projects.

LINKS TO OTHER ACTIONS: 1.1.1, 1.1.3, 1.3.1, 3.3.1, 3.3.2, 5.1.3, 5.1.4

COORDINATING PARTNERS: ONSC

ACTION 1.3.3 DEVELOP GROWER-SUPPORT MECHANISMS TO MEET IDENTIFIED SEED DEMAND AND CONDUCT GROWER OUTREACH

Contracting mechanisms will be developed where financial risk and knowledge are shared equitably among land managers and growers, lowering barriers to starting new native seed production efforts (e.g., shared equipment, technical assistance, species selection assistance, and native seed availability). Grower outreach efforts will be conducted to engage more growers, with a focus on supporting Tribal growers and regions with nascent seed networks.

LINKS TO OTHER ACTIONS: 1.3.1, 1.3.4, 3.3.1, 3.3.2

COORDINATING PARTNERS: IAE, TNC, TUI

ACTION 1.3.4 ESTABLISH AN OREGON NATIVE SEED PROGRAM

One half or full-time manager position should be created to oversee Native Seed Program operations and interface with growers. This program will provide a reliable supply of source seed to be used for propagation purposes by growers in Oregon and potentially surrounding states. This will minimize transaction costs associated with growers procuring seed for increase. This program will also enable the supply of certified seed produced via seed increase for projects in Oregon.

LINKS TO OTHER ACTIONS: 1.3.3, 3.2.4

COORDINATING PARTNERS: IAE

OBJECTIVE 1.4 STRATEGICALLY EXPAND SEED CLEANING AND STORAGE CAPACITY

This objective includes an assessment of current storage capacity and gaps, and the development of ways to meet capacity needs. Expansion of existing warehouse capacity, seed cleaning and mixing services, and refrigerated storage is necessary for Oregon to increase in-state seed availability.

ACTION 1.4.1 CONDUCT AN ASSESSMENT TO DETERMINE THE BEST OPTION FOR INCREASING SEED CLEANING AND WAREHOUSE CAPACITY

An assessment of current seed cleaning and warehouse capacity is needed to understand areas/regions that require equipment and warehouse expansion. Seed cleaning assessments would evaluate equipment location, mobility, screens available (i.e., what species can be cleaned), required maintenance, and accessibility. Warehouse assessments would evaluate storage location, type (freezer, walk-in fridge, refrigerated container, etc.), size, capacity, current or potential future problems (e.g., leaks, pests), and accessibility. Ideal locations without current storage options will be assessed as a possible location for future storage needs.

LINKS TO OTHER ACTIONS: 1.4.3

COORDINATING PARTNERS: TNC

ACTION 1.4.2 EXPAND SEED PROCESSING CAPACITY THROUGH CONTINUED DEVELOPMENT AND MAINTENANCE OF SHARED SEED HARVESTING AND CLEANING EQUIPMENT LIBRARIES

The ONSC will help regional networks establish equipment libraries to provide partners with localized access to specialized seed harvesting and cleaning equipment. Regional coordinators will manage equipment loans to partners, oversee maintenance and repairs, provide training on proper equipment use, and track utilization.

LINKS TO OTHER ACTIONS: 1.1.3, 1.3.3, 1.4.3, 3.2.1

COORDINATING PARTNERS: IAE, TUI

ACTION 1.4.3 EXPAND WAREHOUSE CAPACITY THROUGH CONTINUED DEVELOPMENT OF A NETWORK OF LARGE CENTRALIZED AND SMALLER DISTRIBUTED SEED WAREHOUSES AND STORAGE FACILITIES, AND HIRE PERSONNEL TO SUPPORT INVENTORY MANAGEMENT

Additional seed storage facilities will be established to provide sufficient suitable native seed when and where needed. Locations for storage capacity will be prioritized based on strategically beneficial locations and the partners available to achieve long term stability. These facilities will house seed for restoration and research, and provide a reliable source of seed (e.g., uncertified G0, certified G0, certified G1) for Oregon growers. Expanding seed storage capacity aims to stabilize markets for Oregon growers and end users, increase seed shelf-life, and improve economic efficiency. Tribal-owned storage facilities will be prioritized for tribes that consider certain species genetics or local variants to be intellectual property.

LINKS TO OTHER ACTIONS: 1.4.1, 3.2.4

COORDINATING PARTNERS: IAE, TUI

Goal 2: Facilitate Research to Address Gaps in Native Seed Production and Use

Native plant materials are required to restore disturbed landscapes, improve ecosystem function, enhance resilience to climate change, and enable successful land management. However, research gaps associated with native seed production and use limit the availability of ecologically appropriate and affordable plant materials at the scale required to meet restoration, rehabilitation, and mitigation needs. This goal includes identifying and addressing these research gaps.

OBJECTIVE 2.1: CREATE A RESEARCH PLAN AND IDENTIFY KNOWLEDGE GAPS

Increasing the use of native species requires greater knowledge of the requirements for seed production, seedling establishment, and species interactions. This objective seeks to enhance the scientific basis for native seed practices in Oregon's restoration, rehabilitation, and mitigation efforts.

ACTION 2.1.1 COORDINATE RESEARCH PRIORITIES AND IDENTIFY SYNERGIES

Annual meetings will be held to coordinate research priorities and identify synergies. ONSC partners will coordinate research in the same or similar ecosystems in adjacent states to expand ongoing work and minimize duplication. The ONSC will develop protocols, agreements, and policies as needed to facilitate research in the Oregon native seed industry. This will allow for coordinated research across a diversity of partners, species, and habitats.

LINKS TO OTHER ACTIONS: 2.1.2, 2.2.1, 2.2.2, 2.2.3, 3.2.1

COORDINATING PARTNERS: IAE, TUI

ACTION 2.1.2 DEVELOP SPECIES-SPECIFIC PROTOCOLS FOR SEED COLLECTION, PRODUCTION, PROCESSING, AND STORAGE

Native seed production poses unique challenges compared with traditional agricultural crops. Improving species-specific protocols will help growers, seed analysts, and users manage the complexities of producing native seed while maintaining genetic integrity and limiting the spread of pests and pathogens. Species-specific protocols should include information on how to limit pests and pathogens during collection and production, germination methodologies, information on maintaining genetic integrity in production, genetic information relevant to restoration decisions (e.g., ploidy, hybridization concerns), information on site or field preparation and plant establishment, and harvesting, processing, and storage methodologies. An assessment of prioritized species, current research, and production practices will be conducted to identify knowledge gaps for further research.

LINKS TO OTHER ACTIONS: 1.2.1, 2.1.1, 2.2.1, 3.2.1

COORDINATING PARTNERS: IAE, PMC

OBJECTIVE 2.2: CONDUCT RESEARCH TO IMPROVE SEED PRODUCTION AND USE IN RESTORATION, REHABILITATION, AND MITIGATION

This objective focuses on knowledge gaps identified in Objective 2.1. To be effective, research will be long-term, collaborative, and interdisciplinary. Research outcomes will be reported through publications and transmitted to users via tools described in Goal 3.

ACTION 2.2.1 CONDUCT RESEARCH ON SEED GERMINATION, PRODUCTION, PROCESSING, AND STORAGE FOR SPECIES THAT LACK TECHNICAL GUIDELINES

Species knowledge gaps in seed germination, production, processing and storage processes will be identified. Combining research with agricultural technology will help fill these knowledge gaps to develop production practices for Oregon's priority species.

LINKS TO OTHER ACTIONS: 2.1.1, 2.1.2, 3.2.1

COORDINATING PARTNERS: IAE, PMC

ACTION 2.2.2 CONDUCT AND SYNTHESIZE STUDIES ON SITE PREPARATION, SEEDING, AND TRANSPLANTING TO DEVELOP STRATEGIES THAT IMPROVE PLANT ESTABLISHMENT AND COMMUNITY DIVERSITY

Problems that limit successful restoration from seed or transplants need to be identified and prioritized for research activities to overcome these barriers. Broad research topics will include: factors limiting plant establishment, seed technologies, species interactions (among natives and between natives and nonnatives), and strategies for meeting challenging restoration situations such as wildland fire, invasive annual grasses, and over-utilization by livestock. Managers will be encouraged to incorporate experimentation whenever possible to test the effectiveness of different restoration techniques. For example, Emergency Stabilization and Rehabilitation and/or Burned Area Emergency Response plans are ideal for integrating research and leveraging relationships with land managers implementing these projects will be critical.

LINKS TO OTHER ACTIONS: 2.1.1, 3.1.2, 3.2.1

COORDINATING PARTNERS: ONSC

ACTION 2.2.3 ASSESS COLLECTIONS AND POPULATIONS OF TARGET NATIVE SHRUBS, GRASSES, AND FORBS SOURCED FROM OREGON FOR USE IN RESTORATION, REHABILITATION, AND MITIGATION

Species and populations differ in many characteristics often because of local adaptation. Screening trials are needed to identify which seed sources may be best at establishing under realistic field scenarios. Testing may include genetic analysis, laboratory, greenhouse and small-plot field tests. Assessments will ideally observe and document plant performance during all stages of a plant life cycle, will test the most effective methods for establishment, and will include testing new agricultural technology in rangeland restoration settings.

LINKS TO OTHER ACTIONS: 1.2.2, 2.1.1, 3.1.2, 3.2.1

COORDINATING PARTNERS: IAE, PMC, TUI

OBJECTIVE 2.3: CHARACTERIZE GENETIC VARIATION OF RESTORATION SPECIES TO INFORM SEED INCREASE AND SEED TRANSFER GUIDANCE

Seed transfer guidance is the best available science for making decisions about which native seed sources will perform the best at any particular location while minimizing any potential negative genetic or ecological consequences. Seed zones allow land managers to use locally adapted seed sources while developing economies of scale to lower seed costs. Broad seed transfer guidance is lacking for most species commonly found in Oregon and is therefore a priority for research. Actions within this objective will foster the research needed to further refine and develop seed zones, and inform where and how to best use these species in restoration.

ACTION 2.3.1 CONDUCT COMMON GARDENS AND GENETIC ANALYSES FOR PRIORITIZED SPECIES

Common gardens and genetic analyses are complementary efforts that help practitioners understand the patterns of distribution of diversity within a plant species. To complement and expand on existing common garden collaborations, we will identify a series of locations across Oregon's diverse habitats where common gardens can be implemented for multiple target species. A coordinated network would have the benefit of streamlining site preparation and maintenance, permitting and environmental clearance, data collection, and comparability among studies.

LINKS TO OTHER ACTIONS: 2.2.3, 2.3.2, 3.1.2

COORDINATING PARTNERS: ONSC

ACTION 2.3.2 DEVELOP PREDICTIVE MODELS OF CLIMATE CHANGE EFFECTS ON TARGET RESTORATION SPECIES AND GENETIC DIVERSITY USING MID-CENTURY CLIMATE MODELS

Predictive models of climate change effects are used to assess threats to important restoration species and opportunities for targeting, prioritizing, and implementing restoration projects in light of potential changes in species distributions and community composition. Models will identify changes in species distributions and seed zone boundaries that will aid in identifying potential refugia areas, bottlenecks to species' movement, and selection of appropriate populations for inclusion in restoration projects to reduce the risk of future maladaptation.

LINKS TO OTHER ACTIONS: 2.3.1, 3.1.2, 3.2.1

COORDINATING PARTNERS: ONSC

Goal 3: Develop and Leverage Resources that Enable Land Managers and Growers to Make Timely and Informed Decisions

As the native seed industry in Oregon grows, tools that allow for greater interconnectedness between land managers and growers will be necessary to best utilize Oregon-produced native seed. Land managers are often faced with uncertainty when it comes to making restoration decisions and growers face uncertainty about what species to increase. Unified tools and a shared decision framework are needed to help land managers and growers work together to better coordinate native seed demand, supply, and use across Oregon. Furthermore, when coupled with economic support structures that aid the native seed industry, these tools and decision frameworks can increase the availability of ecologically appropriate seed for restoration, rehabilitation, and mitigation work in Oregon.

OBJECTIVE 3.1: DEVELOP RESOURCES TO CULTIVATE ECOLOGICALLY APPROPRIATE AND INCLUSIVE RESTORATION DECISIONS

Improving planning and coordination is vital to increasing the use of ecologically appropriate seed in both emergency (reactive) and planned (proactive) restoration. The ONSC will work to synthesize lessons learned to help clarify the guiding principles and values that underpin restoration steps, including partnership and capacity building, planning and coordination, seed procurement, sourcing, and other relevant decisions for collaboration in each focal region. In addition, decision-making frameworks will be developed by restoration practitioners, growers, botanists, and indigenous people to guide managers through project-specific decisions.

ACTION 3.1.1 SYNTHESIZE AND SHARE LESSONS LEARNED SURROUNDING PARTNERSHIP BUILDING, TRIBAL ENGAGEMENT, GROUP DECISION-MAKING, AND RESOURCE SHARING

As momentum builds on the local level to collaborate on all aspects of the restoration cycle (see Goal 1), the ONSC will review successful Oregon seed partnerships, synthesize lessons learned on topics that reflect overarching themes and values during this process, and make recommendations for how to create successful partnerships in new regions. Continuous reevaluation of the organizational framework at the state and local level (see Objective 1.1) can inform a roadmap for other regions within Oregon (and possibly other states) hoping to address restoration cycle bottlenecks.

LINKS TO OTHER ACTIONS: 1.1.3, 1.1.4, 1.1.5, 3.2.1, 3.2.2

COORDINATING PARTNERS: IAE, ODA, TUI

ACTION 3.1.2 DEVELOP A DECISION-MAKING FRAMEWORK TO INFORM APPROPRIATE SPECIES-SPECIFIC SEED TRANSFER ZONES WHEN APPROACHING RESTORATION, REHABILITATION, OR MITIGATION PROJECTS

This framework will suggest a process for making species-specific seed transfer zone decisions based on the best available information. Current available information to inform such decisions varies greatly by species, and in many cases decisions about seed transfer zones must be made based on limited information. Examples of factors to consider in seed transfer zone decisions include ecoregions; provisional seed zones; empirical seed zones; species distribution, habitat, and biology; climate adaptation and future climate scenarios; and risk tolerance.

LINKS TO OTHER ACTIONS: 1.1.2, 1.1.3, 2.2.2, 2.2.3, 3.2.1, 3.2.2

COORDINATING PARTNERS: IAE, PMC

ACTION 3.1.3 DEVELOP A DECISION-MAKING FRAMEWORK FOR SEED PRODUCTION PLANNING

This framework will help managers evaluate and balance competing factors when planning seed production activities for projects. The framework will address the relative costs and benefits of different production methods (wild collection vs. contracted growing vs. native source seed programs), along with production timelines, infrastructure limitations, storage capacity, and native seed availability. It will incorporate

economic planning factors such as funding cycles, quality assurance requirements, and minimum quantities needed for viable production. The framework will help practitioners assess species-specific production needs against operational realities like regional capacity, failure rates, and genetic considerations. This framework will ultimately help managers match production planning with projected regional demand while optimizing resources and maintaining genetic integrity.

LINKS TO OTHER ACTIONS: 1.1.1, 1.3.1, 3.3.1

COORDINATING PARTNERS: IAE, TNC, TUI

OBJECTIVE 3.2: COMPILE, UPDATE, AND DEVELOP RESOURCES FOR NATIVE SEED PLANNING, PRODUCTION, AND USE, AND CREATE A WEBSITE FOR ACCESSING RESOURCES

To increase the development and use of ecologically appropriate native seed by managers, practitioners, growers, and other collaborators, it will be necessary to compile comprehensive resources and develop an Oregon seed inventory system, a website that provides access to key tools and resources. These resources will compile information and tools on seed sourcing considerations, seed production, and use recommendations of ecologically appropriate and/or culturally significant native seed. This objective will be achieved through partnerships across public and private sector cooperators.

ACTION 3.2.1 IDENTIFY, UPDATE, AND DEVELOP GUIDES, PROTOCOLS, AND FACTSHEETS FOR THE PRODUCTION AND USE OF OREGON NATIVE SEED

The ONSC will identify existing and needed restoration guides, protocols, and factsheets about seed collection, production, and use of native seed. We will curate and update existing materials and create new materials to establish a restoration portfolio accessible to both the ONSC and its partners.

LINKS TO OTHER ACTIONS: 1.1.5, 1.2.1, 2.1.1, 2.1.2, 2.2.2, 2.2.3, 3.1.1, 3.1.2, 3.2.2, 3.2.3

COORDINATING PARTNERS: IAE, OF, TNC, TUI

ACTION 3.2.2 DEVELOP AND MAINTAIN A WEBSITE TO PROVIDE ACCESS TO RESOURCES ABOUT THE COLLECTION, PRODUCTION, AND USE OF NATIVE SEED IN OREGON

The ONSC will develop and maintain a website that provides public access to a wide array of resources, guides, protocols, and factsheets on the collection, production, and application of native seed.

LINKS TO OTHER ACTIONS: 3.1.1, 3.1.2, 3.2.1, 3.2.3, 3.2.4

COORDINATING PARTNERS: ONSC

ACTION 3.2.3 HOLD WEBINARS AND IN-PERSON TRAININGS TO SUPPORT OUTREACH ON BEST PRACTICES IN NATIVE SEED COLLECTION, PRODUCTION, AND USE

The ONSC will hold webinars and trainings for decision-makers, restoration practitioners, growers, and land managers to facilitate the use of existing decision support tools and resources

(made available in Action 3.2.2) to improve the use of native seed in restoration, rehabilitation, and mitigation throughout Oregon. Training and materials specific to seed procurement will outline the steps required to meet federal and state contracting criteria. The training and materials will encourage new entrants into the seed industry, as well as simplify the process for existing growers.

LINKS TO OTHER ACTIONS: 3.2.1, 3.2.2, 5.3.1

COORDINATING PARTNERS: IAE, TUI

ACTION 3.2.4 DEVELOP A SEED INVENTORY SYSTEM FOR OREGON

The ONSC will create a dynamic tool that links multiple databases to develop an Oregon seed inventory system. The seed inventory system will help clarify seed availability and a list of commercial growers and nurseries.

LINKS TO OTHER ACTIONS: 1.1.1, 1.2.3, 1.3.1, 1.3.4, 1.4.2, 3.2.2

COORDINATING PARTNERS: IAE, TUI

OBJECTIVE 3.3: DEVELOP PATHWAYS TO ENCOURAGE MARKET STABILITY AND DEVELOP COORDINATED APPROACHES FOR PROCUREMENT

The native seed market currently operates in a cycle that undermines ecological goals and discourages innovation. High year-to-year variability in seed demand, combined with geographic differences in seed needs, creates significant market uncertainty. When wildfires trigger sudden spikes in demand, available seed supplies are quickly depleted, driving up prices. This unstable market incentivizes growers to focus on "general purpose" seed sources that are marketed as widely adaptable, rather than investing in locally adapted ecotypes or less common species. Meanwhile, managers facing urgent restoration needs must choose from limited available inventory, often settling for these generalist varieties even when they're not ideal for their site. This creates a self-reinforcing cycle: growers who take risks on producing site-specific or specialized native seed sources struggle to find buyers, while the dominance of general-purpose seed in the market masks the true demand for locally adapted materials. Pathways need to be created that stabilize demand, reward ecological specificity in seed production, and better connect growers with the actual needs of land managers. This requires both new market mechanisms and improved communication between growers and users of native seed.

ACTION 3.3.1 IDENTIFY OR DEVELOP CONTRACTING METHODS THAT PROMOTE CERTAINTY AND STABILITY FOR GROWERS AND BUYERS

The ONSC will investigate contracting methods that minimize the problems associated with interannual variability in demand for native seeds and geographic variation in seed use, which create market uncertainty. Contracting methods could include risk-sharing contracts that provide financial incentives from growers to users and longer-term (3-5 year) contracts. Contract innovation for purchasing procedures and active coordination between land managers and growers can mitigate market risk, resulting in better restoration outcomes and a more stable market.

LINKS TO OTHER ACTIONS: 1.1.1, 1.3.1, 1.3.2, 1.3.3, 3.3.2

COORDINATING PARTNERS: IAE, TUI

ACTION 3.3.2 CREATE A STREAMLINED APPROACH FOR PROCURING NATIVE SEED

Coordination is critical for increasing availability, lowering costs, and stabilizing demand for native seed. Under this action, we will identify the mechanisms and tools needed to streamline procurement and communication between partners (e.g., interagency agreements, Good Neighbor Authority agreements) and encourage existing and new growers to meet seed needs through mechanisms such as indefinite delivery/indefinite quantity (IDIQ) contracts and blanket purchase agreements.

LINKS TO OTHER ACTIONS: 1.1.1, 1.2.4, 1.3.2, 1.3.3, 3.3.1

COORDINATING PARTNERS: ODA, TNC

Goal 4: Develop and Implement a Conservation Seed Banking Program to Enhance Recovery of Priority Sensitive Species

Through conservation collections of priority sensitive species, we can preserve the biological diversity of Oregon's unique ecosystems and ensure the prevention of untimely population extinctions. Further, conservation collections provide us the opportunity to learn from historically understudied species (e.g., through viability testing or germination and cultivation studies), jumpstarting future recovery actions. Actions under this goal will assess seed conservation needs for priority sensitive species, increase coordinated conservation collections, and conduct research to address knowledge gaps.

OBJECTIVE 4.1: PRIORITIZE SENSITIVE SPECIES AND POPULATIONS FOR CONSERVATION

Approximately 3,500 native vascular plant species can be found in Oregon, with about 500 species considered vulnerable or sensitive. This objective includes the compilation of data on sensitive species, prioritization of species for conservation and long-term storage, and assessments of priority species' seed needs and goals.

ACTION 4.1.1 COMPILE DATA ON FEDERALLY LISTED, STATE-LISTED, SENSITIVE, AND OREGON ENDEMIC SEED CURRENTLY CONSERVED IN LONG-TERM STORAGE FACILITIES, AND CREATE TOOLS FOR ACCESSING THE DATA

With sensitive plant occurrence data stored across many governments and organizations, and seed stored in numerous facilities, it is essential to compile data to have a comprehensive view of each species. Creating data tools will allow us to access, query, and integrate new data as it is collected. The ONSC acknowledges and respects the principles of tribal data sovereignty and will adhere to rules or guidelines established by tribes for data collection, sharing, and use.

LINKS TO OTHER ACTIONS: 4.1.2, 4.1.3, 4.2.3

COORDINATING PARTNERS: BSB, ODA, OF, ORBIC

ACTION 4.1.2 DEVELOP LISTS OF PRIORITY SENSITIVE PLANT SPECIES FOR SEED CONSERVATION AND LONG-TERM STORAGE

In consultation with botanical experts, conservation biologists, and tribes, the ONSC will develop and prioritize species for seed conservation collection and storage. We will

first identify criteria for prioritizing sensitive species, then review the compiled data and conduct interviews with experts to gather relevant information. This action will result in a comprehensive list of sensitive species that can then be prioritized for conservation collections. The ONSC aims to remove taxonomic bias and will prioritize species based on conservation needs.

LINKS TO OTHER ACTIONS: 4.1.1, 4.1.3, 4.2.2, 4.2.3

COORDINATING PARTNERS: BSB, ODA, OF, ORBIC

ACTION 4.1.3 ASSESS THE SEED NEEDS AND GOALS OF PRIORITY SENSITIVE SPECIES, CONSIDERING BIOLOGICAL VULNERABILITIES AND LIMITATIONS, SPATIAL AND TEMPORAL GAPS IN PLANT MATERIAL COLLECTION, AND CULTURAL SIGNIFICANCE

Each species' seed needs and goals should consider the percent of populations already represented in seed banks and what amount of seed is reasonably representative of each

population. Seed collection needs and goals should consider unique biological limitations (e.g., some species may be known for low seed output, low seed quality, short seed longevity, or may require multiple collections to meet minimum goals), and be collected from across the species' geographic range, with emphasis on populations that may exhibit local adaptations (e.g., those at the range extremes), and ideally have temporal variation (e.g., representation from both wet and drought years). Seeds or tissues from culturally significant plants will be preserved as directed by individual tribes as a link to cultural heritage.

LINKS TO OTHER ACTIONS: 4.1.1, 4.1.2, 4.2.1, 4.2.2

COORDINATING PARTNERS: BSB, IAE, ODA, OF, ORBIC

OBJECTIVE 4.2: EXPAND SEED COLLECTION FOR CONSERVATION

This objective expands and coordinates conservation collections and research of priority sensitive species (identified under Objective 4.1.2) and will ensure the preservation of Oregon species now and into the future.

ACTION 4.2.1 DEVELOP BEST MANAGEMENT PRACTICES FOR SENSITIVE SPECIES SEED COLLECTION IN OREGON

BMPs for sensitive species seed collection, handling, and storage will be developed. BMPs will address topics such as: species' seed needs and goals (identified under Action 4.1.3), collection techniques, collection vessels, cleaning techniques, and storage requirements. BMPs will be reviewed and updated as new or improved methods are identified.

LINKS TO OTHER ACTIONS: 4.1.1, 4.1.3, 4.2.2

COORDINATING PARTNERS: BSB, IAE, ODA, ORBIC, TUI

ACTION 4.2.2 EXPAND SEED COLLECTION EFFORTS FOR PRIORITY SENSITIVE SPECIES POPULATIONS

The ONSC will establish goals and initiate field collection of seed from priority sensitive species for research and long-term storage. This action will include training seed collection teams in the BMP protocols (created under Action 4.2.1) to increase seed collection capacity and research opportunities. Collection efforts will be coordinated between land managing agencies, ODA, and ONSC. Priority species for collection will be identified under Action 4.1.2.

LINKS TO OTHER ACTIONS: 4.1.2, 4.1.3, 4.2.1, 4.2.3

COORDINATING PARTNERS: BSB, IAE, ODA, ORBIC, TUI

ACTION 4.2.3 DEVELOP AN ONLINE DATABASE FOR CONSERVATION SEED COLLECTION TRACKING AND REPORTING

Under this action, the ONSC will integrate with Center for Plant Conservation's (CPC) existing online database used for tracking and reporting conservation seed collections (e.g., California Plant Rescue, Florida Plant Rescue). Digital tools will allow seed collection teams to collect and update seed collection information, enabling real-time tracking to inform collection prioritization and coordination by the ONSC. The online database will be maintained by CPC with password-protected ONSC user access. Annual reports on seed collection efforts will be generated from this data.

LINKS TO OTHER ACTIONS: 4.1.1, 4.2.2

COORDINATING PARTNERS: BSB, ODA, ORBIC

OBJECTIVE 4.3: CONDUCT RESEARCH TO ADDRESS CONSERVATION KNOWLEDGE GAPS

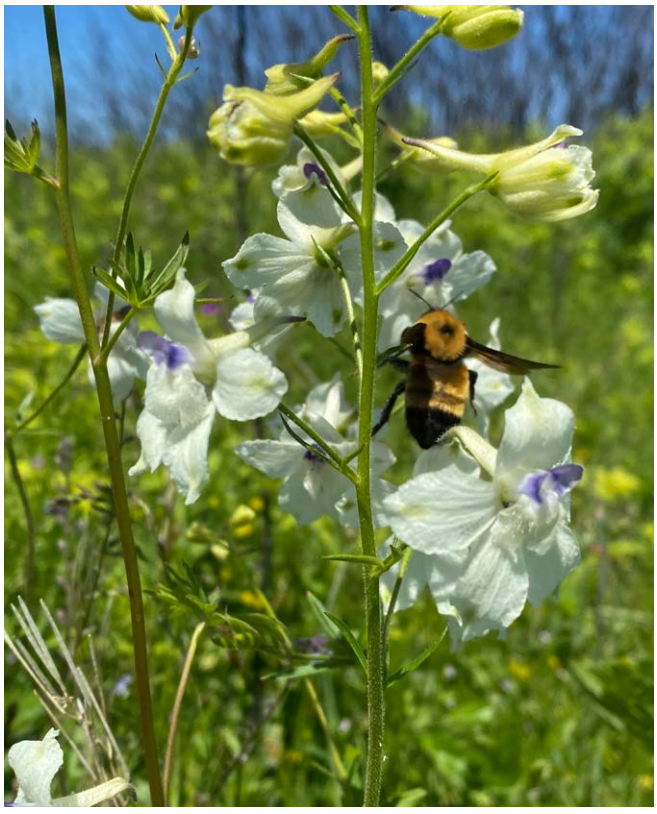
Conserving sensitive species requires knowledge of seed longevity, viability, and production. This research will be long-term, collaborative among all the involved parties, and interdisciplinary. Research outcomes will be reported through publications and transmitted to users via tools described in Goal 3.

ACTION 4.3.1 EXPAND RAE SELLING BERRY SEED BANK CAPACITY AND RESOURCES

Rae Selling Berry Seed Bank requires increased capacity to support conservation collections for all of Oregon's sensitive plant species. Walk-in freezer storage and additional supplies are necessary for Oregon to increase sensitive species seed storage and research capabilities. In addition, a dedicated full-time Director with stable funding is crucial for overseeing incoming seed accession cleaning, processing, testing, and other research. The seed bank would also benefit from a board of directors who can help with a strategic vision and expand funding opportunities.

LINKS TO OTHER ACTIONS: 4.2.2, 4.3.2, 4.3.3, 4.4.1

COORDINATING PARTNERS: BSB, ODA, ORBIC



ACTION 4.3.2 IDENTIFY WHAT KNOWLEDGE GAPS EXIST AND CONDUCT RESEARCH FOR PRIORITY SENSITIVE SPECIES

The ONSC will first determine what baseline information should be known for all priority sensitive species, then review the compiled data from Action 4.1.2 and relevant literature to determine what knowledge gaps exist. For example, species-specific protocols for maintaining seed quality and viability during seed cleaning and long-term storage are needed to ensure that seed reserves are available when needed. Research will be conducted to address knowledge gaps, and research outcomes will be reported through publications, reports, or guides and transmitted to users via tools described in Goal 3.

LINKS TO OTHER ACTIONS: 4.1.2, 4.3.1, 4.3.3

COORDINATING PARTNERS: BSB, IAE, ODA, ORBIC, PMC, TUI

ACTION 4.3.3 CONDUCT SEED QUALITY AND SEED VIABILITY TESTS ON NEW ACCESSIONS

All new accessions should have viability testing before placement in long-term storage. Subsequent viability tests can then be compared to the baseline viability to understand seed viability changes over time, and whether this varies by collection site, visible seed quality, storage, or conditions. Understanding seed viability and longevity will inform how frequently accessions should be replaced with fresh, wild-collected seed or other plant materials.

LINKS TO OTHER ACTIONS: 4.3.1, 4.3.2

COORDINATING PARTNERS: BSB

OBJECTIVE 4.4: MAINTAIN LIVING COLLECTIONS OF EXCEPTIONAL, RARE, AND CULTURALLY SIGNIFICANT SPECIES

Not all species have seed that can be banked with conventional methods. For example, some species have seeds that are unable to withstand desiccation and freezing. Alternatives to traditional seed storage include tissue culture, cryogenic storage, and field genebanks. In this objective, we highlight the need for unorthodox preservation methods for exceptional species (i.e., those that cannot be conserved long-term using conventional seed banking methods) and the opportunity for living collections present for education and outreach.

ACTION 4.4.1 PRESERVE EXCEPTIONAL PLANTS USING ALTERNATIVE METHODS

Tissue culture and cryopreservation are alternative storage methods used for species that produce few seeds or seed that is intolerant to drying and freezing. Adequately storing exceptional species will require specialized expertise, infrastructure, and greater resources than conventional seed storage due to the nature of maintaining live specimens.

LINKS TO OTHER ACTIONS: 4.4.2

COORDINATING PARTNERS: BSB, ORBIC

ACTION 4.4.2 CREATE OPPORTUNITIES FOR EDUCATION AND OUTREACH WITH LIVING COLLECTIONS

Botanic gardens are an easy way for the public to access and learn about Oregon's rare plants. Including educational materials with living collections in botanic gardens will increase general knowledge and appreciation for Oregon's unique plant diversity. Other outreach opportunities to explore include cultivation workshops, classroom presentations, field or greenhouse tours, and Oregon's annual State Fair.

LINKS TO OTHER ACTIONS: 4.4.1, 5.3.1

COORDINATING PARTNERS: BSB, ODA, OF, ORBIC, TUI

Goal 5: Secure Reliable Funding and Develop and Implement Strategies for Internal and External Communications

Successful implementation of this Strategy will require both reliable funding and broad communication and outreach to engage ONSC agencies, partners, and collaborators in the shared goals of the Strategy. While existing funding sources, such as federal grants, enable the ONSC to undertake short-term projects addressing specific Actions, the uncertainty surrounding the timing and amount of grant funds, influenced by congressional budgeting, hinders long-term planning and the attainment of our proposed goals.

ONSC agencies and partners play an important role in achieving the Strategy's goals, with progress fostered as a collaborative effort. Communications will be tailored to key audiences, including federal, tribal, state, and non-governmental agency partners, collaborators, other parties, and the interested public. Each ONSC agency or partner will report progress on Strategy implementation to leadership and other Strategy participants. An emphasis on feedback, evaluation, and improvement of the Strategy will help ensure it remains relevant and responsive to evolving needs. Success stories, lessons learned, and recommendations for improvements will be highlighted in communications products and materials.

OBJECTIVE 5.1: SECURE STABLE, RELIABLE FUNDING FOR STRATEGY IMPLEMENTATION

It is imperative that stable, reliable funding be secured to achieve this Strategy's vision to return Oregon lands to diverse, functional, and resilient ecosystems by using the right seed in the right place at the right time. While the ONSC will continue to pursue existing federal and state programs that already support work outlined in this Strategy, we recognize that the most critical support will come from institutional changes in land management across Oregon. Through state policies that increase awareness and use of native seed, and dedicated state resources, our vision can be achieved.

ACTION 5.1.1 DEVELOP AN OREGON NATIVE SEED STRATEGY BUSINESS PLAN SO REAL COSTS CAN BE ASSOCIATED WITH IMPLEMENTATION

Implementing this Strategy requires investment in infrastructure, research, decision tools, and communication efforts. An Oregon Native Seed Strategy Business Plan would provide estimates for the resources required and associated costs for all the actions described in this Strategy, allowing the ONSC to provide an accurate picture of the Strategy's implementation costs for ONSC leadership and external funders. The Nevada Seed Strategy Business Plan can be used as a model for how to organize and present costs associated with the Strategy.

LINKS TO OTHER ACTIONS: 5.1.2, 5.1.3, 5.1.4, 5.1.5

COORDINATING PARTNERS: IAE, ODA, TUI

ACTION 5.1.2 SECURE FUNDING THROUGH EXISTING FEDERAL AND STATE PROGRAMS

Federal and state programs that support concepts or activities within this Strategy (e.g., partnership building, native plant materials collection, production, and use, research, and conservation) include the Bureau of Land Management (BLM) Oregon/Washington (ORWA) Plant Conservation and Restoration Program, BLM ORWA Threatened and Endangered Species Program, US Fish & Wildlife Service Partners for Wildlife, US Forest Service Stewardship Fund, Oregon Watershed Enhancement Board Grants Program, Oregon

Department of Fish & Wildlife Conservation & Recreation Fund, Oregon State Weed Board, and Oregon House Bill 3409 Natural and Working Lands Fund, among others. The ONSC (or partners within) will continue to secure funding through these programs for Strategy implementation.

LINKS TO OTHER ACTIONS: 5.1.1, 5.1.3, 5.1.4, 5.1.5

COORDINATING PARTNERS: BSB, IAE, ODA, ORBIC, TNC, TUI

ACTION 5.1.3 PURSUE INDIRECT FUNDING THROUGH STATE POLICY

As state and private land managers plan and implement restoration, rehabilitation, or mitigation projects, the use of ecologically appropriate native seed will provide the greatest resiliency to the effects of climate change, catastrophic wildfire, drought, and flooding. Policies that improve knowledge and use of ecologically appropriate native seed on public lands will economically support the native seed supply chain and complement existing state policies (e.g., requiring weed-free forage and certified aggregate).

LINKS TO OTHER ACTIONS: 1.3.2, 5.1.1, 5.1.2, 5.1.4

COORDINATING PARTNERS: ONSC

ACTION 5.1.4 ESTABLISH GRANTS AND DEDICATED STATE RESOURCES

The ONSC will establish new grants and specific state resources for Strategy implementation, with special emphasis on funding Tribes and underserved communities in community-based native seed production and use.

LINKS TO OTHER ACTIONS: 1.3.2, 5.1.1, 5.1.2, 5.1.3

COORDINATING PARTNERS: ONSC

ACTION 5.1.5 PURSUE NON-TRADITIONAL REVENUE SOURCES

Additional revenue sources will be pursued to support Strategy implementation, such as partnerships with private or non-profit entities, citizen donations, or the creation of an endowment.

LINKS TO OTHER ACTIONS: 5.1.1, 5.1.2

COORDINATING PARTNERS: BSB, IAE, ORBIC, TNC, TUI

OBJECTIVE 5.2: INTERNAL COORDINATION AND COMMUNICATIONS: DISTRIBUTE AND IMPLEMENT THE STRATEGY ACROSS ONSC AGENCIES AND PARTNERS

Internal communication within the ONSC will ensure that partners are fully informed about the Strategy and its relevance to their work. Greater awareness of the Strategy within partner agencies will also enhance collaboration and facilitate linkages between the Strategy and related agency initiatives.

ACTION 5.2.1 ENSURE STAFF SUPPORT TO CONTINUE COORDINATION AND COMMUNICATION AMONG ONSC ORGANIZATIONS

Managing the progress and communications of the ONSC needs ongoing support from dedicated staff. ONSC leadership will ensure this level of commitment continues or is increased commensurate with the progress of the ONSC either through the direction of staff time or the commitment of resources to expand capacity.

LINKS TO OTHER ACTIONS: 5.2.2, 5.2.3, 5.3.1

COORDINATING PARTNERS: ONSC

ACTION 5.2.2 CONDUCT REGULAR ONSC MEETINGS

We will continue regular ONSC meetings to facilitate implementation of the Strategy. Meetings will be organized by a designated facilitator within the ONSC, who will establish a date, time, and location for meetings. Meeting agendas will be developed collaboratively with the intent that each ONSC partner has sufficient opportunity to address Strategy progress, ideas, and concerns. Meetings will include discussions of ONSC progress, including successes, challenges, and ideas for improving effectiveness, and also include planning discussions for coordinated research efforts on an annual basis. Additional ONSC partners can be added as needed in response to interest and need.

LINKS TO OTHER ACTIONS: 5.2.1, 5.2.3

COORDINATING PARTNERS: ONSC

ACTION 5.2.3 REPORT ON ONSC PROGRESS TO PARTNER AGENCY AND ORGANIZATION LEADERSHIP

ONSC partners will be responsible for communicating to their respective agency or organization leadership on ONSC progress to ensure that their interests are being met. As staff turnover and changes in funding occur for ONSC partners, they will confer with their leadership to ensure that these changes do not hinder ONSC progress or persistence and/or to designate new representatives for participation with the ONSC. Changes that may affect the ONSC will be addressed at least annually in meetings with ONSC partners and their leadership.

LINKS TO OTHER ACTIONS: 5.2.1, 5.2.2

COORDINATING PARTNERS: ONSC

OBJECTIVE 5.3: EXTERNAL COORDINATION AND COMMUNICATIONS: CONDUCT EDUCATION AND OUTREACH THROUGH THE OREGON NATIVE SEED COLLECTIVE

The ONSC is uniquely suited to communicate with and connect individuals and organizations that have an interest and expertise in expanding the availability and use of native seed. The importance of this Strategy and the significant role of collaboration in meeting the Strategy's goals should be shared with a broad audience and incorporated into partner communications and materials, as appropriate.

ACTION 5.3.1 DEVELOP AND IMPLEMENT A COMPREHENSIVE EXTERNAL COMMUNICATIONS PLAN

The formation of a formal, strategic communications plan will accelerate the dissemination and uptake of key information about native seed and plant materials. Once developed, information will be disseminated through communication tools such as videos, press releases, social media platforms, or other supporting communication materials. Communications will focus on connecting collaborators with information and opportunities, including topics such as: The importance of using native seed, useful fact sheets and tools, funding opportunities, relevant publications, and case-studies of local successes or lessons learned.

Channels for marketing of these materials may include social media, email listservs, regional publications, meetings, and other forums. Additionally, the ONSC will coordinate outreach to individuals and local groups (e.g., local conservation districts and weed management agencies) who express an interest in native seeds and provide educational presentations and meetings upon request.

LINKS TO OTHER ACTIONS: 3.2.3, 4.4.2, 5.3.2, 5.3.3

COORDINATING PARTNERS: BSB, CTGR, IAE, ODA, ORBIC

ACTION 5.3.2 ORGANIZE AND IMPLEMENT A BIENNIAL OREGON NATIVE SEED FORUM

The ONSC will organize a biennial Oregon Native Seed Forum to bring growers, technical experts, and land managers together to discuss native seed production in Oregon. This forum will distribute available resources and tools while increasing awareness and facilitating knowledge transfer among current and potential native seed growers.

LINKS TO OTHER ACTIONS: 5.3.1, 5.3.3

COORDINATING PARTNERS: CTGR, IAE, ODA, TUI

ACTION 5.3.3 ORGANIZE NATIVE SEED-FOCUSED FIELD VISITS AND TOURS

Field tours are particularly effective for communicating successes, challenges, and opportunities to a variety of target audiences. The ONSC will organize field tours for land managers, growers, and other interested parties to production fields, seed storage and cleaning facilities, seeding projects, and seed collection sites, to help build awareness of this collaborative effort and increase the breadth of the partnership.

LINKS TO OTHER ACTIONS: 5.3.1, 5.3.2

COORDINATING PARTNERS: CTGR, IAE, TNC, TUI

OBJECTIVE 5.4: REPORT PROGRESS, RECOGNIZE ACHIEVEMENTS, AND REVISE STRATEGY

Actions under this objective will encourage external and internal communication and feedback and raise the visibility of restoration, rehabilitation, and mitigation efforts that result from actions outlined in the Strategy. Planning for progress, achievements, and revisions to the Strategy will help ensure the goals remain relevant, and that the ONSC is responsive to changes in knowledge, practices, and needs.

ACTION 5.4.1 ESTABLISH A MECHANISM TO REPORT ON THE PROGRESS AND ACHIEVEMENTS OF THE STRATEGY

Under this action, ONSC leadership meetings would provide a feedback mechanism for ONSC partners to report progress and achievements. This could facilitate the production of an annual report to track progress on the Strategy for use and analysis for Action 5.3.2.

LINKS TO OTHER ACTIONS: 5.4.2

COORDINATING PARTNERS: IAE, ODA, TUI

ACTION 5.4.2 REVIEW AND REVISE THE STRATEGY

The Strategy will be reviewed by the ONSC as needed and by ONSC leadership every 5 years. A review of the Strategy will allow for the refinement of existing and development of new goals, objectives, or actions. Strategy editors will be designated within the ONSC.

LINKS TO OTHER ACTIONS: 5.4.1

COORDINATING PARTNERS: ONSC

Existing Resources

BLM Seeds of Success Protocol - The Bureau of Land Management technical protocol for the collection, study, and conservation of seeds from native plant species for Seeds of Success.

Climate Smart Restoration Tool - This tool was developed to provide information on seed collection and transfer of native plants. The Climate Smart Restoration Tool maps current and future seed transfer limits for plant species with or without genetic information using climate data.

Coastal Native Seed Partnership - Organized by Institute for Applied Ecology, this partnership spans the Oregon coast and the southwestern coast of Washington to Willapa Bay and focuses on native seed production for dune, coastal prairie, and wetland ecosystems.

Deschutes Basin Native Plant Seedbank - A collaboration of over 20 partners to increase the availability of genetically local, native seeds for revegetation and restoration within the Deschutes Basin of Oregon.

Great Basin Native Plant Project - Providing knowledge and technology to increase the availability of native plant materials across the Great Basin Desert.

Heritage Seedlings and Liners - A wholesale Oregon propagation nursery that specializes in liners of rare and unusual deciduous plants for garden centers and other wholesale nurseries. Heritage offers source-identified, Willamette Valley, Oregon native seed and plants.

Institute for Applied Ecology - A non-profit with a mission to conserve native species and habitats through restoration, research and education.

Intertribal Nursery Council - A USDA Forest Service-managed, tribally guided, organization for advancing the interests of native peoples involved with plant production in nurseries.

USGS Native Plant Seed Mapping Toolkit - The Seed Selection Tool and Climate Partitioning Tool help meet objectives pertinent to restoration planning and implementation.

Native Seed Production Manual for the Pacific Northwest. 2015. USDA Natural Resources Conservation Service Corvallis Plant Materials Center, 192 pages. This publication contains detailed seed production protocols for more than 70 forbs and graminoids native to the Pacific Northwest. It also includes general descriptions of growing methods and an overview of equipment for seed harvest and processing.

Northwest Interagency Coordination Center - The Geographic Area Coordination Center for the Northwest Region (Oregon and Washington) that serves as the focal point for interagency resource coordination, logistics support, aviation support, and predictive services for all state and federal agencies involved in wildland fire management and suppression in the region.

Oregon Conservation Strategy - An overarching state strategy with a shared set of priorities for addressing Oregon's fish and wildlife conservation needs.

Oregon Department of Agriculture Native Plant Conservation Program - The Native Plant Conservation Program oversees the conservation and management of Oregon's threatened and endangered plant species.

OregonFlora - Based in the Department of Botany and Plant Pathology at Oregon State University, OregonFlora is working to complete The Flora of Oregon. OregonFlora's comprehensive guide addresses the ~4,900 vascular plant species, subspecies, and varieties (including natives, nonnatives, hybrids, and other taxa) of Oregon that grow in the wild without cultivation.

OSU East Cascades Native Plant Hub - The Plant Hub provides a center of gravity for all stewards of sagebrush steppe landscapes. The Hub develops site-adapted plant materials, specializes in success evaluation and effectiveness monitoring, and serves as an information clearinghouse and coordinator among partners.

OSU Malheur Experiment Station - A cooperator with the Great Basin Native Plant Project, the Station seeks to provide information for the successful production of native wildflower seed for restoration efforts in the great basin.

PCA National Seed Strategy for Rehabilitation and Restoration - The National Seed Strategy helps guide ecological restoration across large landscapes of the United States, especially lands damaged by rangeland fires, invasive species, severe storms and drought.

Prioritizing Restoration of Sagebrush Ecosystems Tool (PReSET) - A USGS-facilitation decision-support tool for sagebrush ecosystem conservation and restoration actions.

PSU and OSU Oregon Biodiversity Information Center (ORBIC) - Part of the Institute for Natural Resources, based at Portland State University and Oregon State University, ORBIC's key function is to maintain, develop, and distribute biodiversity information in Oregon and is the state's natural heritage program.

PSU Rae Selling Berry Seed Bank and Plant Conservation Program (BSB) - The Seed Bank is dedicated to the conservation and restoration of Pacific Northwest native plants, with an emphasis on the rare and threatened plants of Oregon.

Reforestation, Nurseries, and Genetic Resources Native Plant Network Propagation Protocol Database - This resource contains a public database of native plant propagation protocols. The scope covers plants native to North America and the Pacific Islands, and many species from Oregon are represented. Professionals with experience growing native plants can become registered propagators and contribute to the database.

Restoration Handbook for Sagebrush Steppe Ecosystems - A handbook that aids wildlife and habitat managers in developing strategies to prioritize where and how to invest in sagebrush steppe ecosystem restoration efforts.

Rogue Native Plant Partnership - Organized by The Understory Initiative, the Rogue Native Plant Partnership (RNPP) serves 40+ partner organizations in the Rogue Valley Watershed including public, Tribal, State, and Federal agencies with a mission to facilitate diverse ecosystems in tandem with a more robust native plant economy in the Rogue Basin.

Seedlot Selection Tool - The Seedlot Selection Tool (SST) is a GIS mapping program designed to help forest managers match seedlots with planting sites based on climatic information. The climates of the planting sites can be chosen to represent current climates, or future climates based on selected climate change scenarios.

The Understory Initiative - A non-profit with a mission to facilitate the restoration and conservation of native species habitat through partnership and community engagement.

Tillamook Estuaries Partnership Native Plant Nursery - The nursery grows up to 120,000 native plants at any one time. Plants are grown from seeds collected along Oregon's North Coast, making them locally adapted to thrive in Oregon's coastal ecosystems.

The Seed Information Database (SID) - is a compilation of seed biological trait data, with records derived from measurements and observations on seed collections held in Royal Botanic Garden Kew's Millennium Seed Bank and from other unpublished and published sources, hosted by the Society for Ecological Restoration.

The Woody Plant Seed Manual - A comprehensive handbook on the seeds of trees and shrubs produced by the USDA Forest Service.

Umpqua Native Plant Partnership - Organized by The Understory Initiative, the Umpqua Native Plant Partnership (UNPP) serves 17 partner organizations in the Umpqua Valley Basin including public, Tribal, State, and Federal agencies with a mission of collaboration and partnership: Building a native plant materials program in the Umpqua Basin.

University of Washington Pacific Northwest Plant Propagation Protocol Database - This database includes propagation protocols generated by students studying native plants at the University of Washington. Quality and content vary across protocols and should be confirmed by the user.

USDA NRCS Corvallis Plant Materials Center - The Corvallis PMC's primary mission is to develop new technology in plant propagation and establishment, seed production, revegetation, and restoration, and to develop new native plant sources for use in wetlands, uplands, and riparian areas.

USDA PLANTS Database - Provides standardized information about the vascular plants, mosses, liverworts, hornworts, and lichens of the United States and its territories. It includes names, plant symbols, checklists, distributional data, species abstracts, characteristics, images, crop information, automated tools, web links, and references

USFS Bend Seed Extractory - A facility based in Bend, Oregon, that provides a variety of services to public agencies across the United States. They extract, process, test, package, and store seed for more than 3,000 different species.

USFS Seed Zone Webmap - A digital tool that allows users to acquire data on seed zones that is useful in gene conservation, native plant restoration, and plant material development. Seed zone data is categorized as provisional, climate-matched, and empirical.

USGS Land Treatment Exploration Tool - A tool designed to assist land managers with the rangeland restoration and/or rehabilitation planning process.

Western Forbs - The online book, ***Western Forbs: Biology, Ecology, and Use in Restoration***, synthesizes all existing research and practical experience gained over the last 20 years. Species information, lookup tables, field guides, and resources are available.

Willamette Valley Native Plant Partnership - Organized by Institute for Applied Ecology, this partnership spans the Willamette Valley and focuses on native seed production for prairie and oak savannah habitats with an emphasis on increasing the genetic diversity of produced seed.

Literature Cited

Bower, A.D., J.B. St. Clair, and V. Erickson. 2014. Generalized provisional seed zones for native plants. Ecological Applications. 24: 913-919.

[CNPS] California Native Plant Society. 2023. California Native Seed Strategy for Ecological Restoration. 48 pp. https://cnps.org/biodiversity-initiatives/california-seed-strategy.

[CPC] Center For Plant Conservation. 2018. Best plant conservation practices to support species survival in the wild. https://saveplants.org/wp-content/uploads/2020/12/CPC-Best-Practices-5.22.2019.pdf.

[DOI and USDA] US Department of the Interior and US Department of Agriculture. 2002. Report to the Congress: Interagency program to supply and manage native plant materials for restoration and rehabilitation on federal lands. US Department of the Interior and US Department of Agriculture, Washington, D.C. 17 pp.

[NASEM] National Academies of Sciences, Engineering, and Medicine. 2023. An assessment of native seed needs and the capacity for their supply: Final report. Washington, DC: The National Academies Press. https://doi.org/10.17226/26618.

[NNSP] Nevada Native Seed Partnership. 2020. Nevada Seed Strategy. 48 pp. http://www.partnershipinthesage.com/nevada-seed-strategy.

[PCA] Plant Conservation Alliance. 2015. National Seed Strategy for Rehabilitation and Restoration 2015-2020. Washington, D.C., US Department of the Interior, Bureau of Land Management. 50 pp. https://www.blm.gov/sites/default/files/docs/2020-12/NationalSeedStrategy_2015-2020.pdf.

Thorson, T.D., S.A. Bryce, D.A. Lammers, A.J. Woods, J.M. Omernik, J. Kagan, D.E. Pater, and J.A. Comstock. 2003. Ecoregions of Oregon. (2 sided color poster with map, descriptive text, summary tables, and photographs). US Geological Survey, Reston, VA. Scale 1:1,500,000.

[USC HR] US Congress. House of Representatives. 2000. Report from the House of Representatives 106-914. Washington, DC. http://www.gpo.gov/.

Glossary

This glossary describes terms referenced in the Oregon Native Seed Strategy. These terms are defined with the intent of providing clarity for their use in this Strategy. These terms may have been previously described by Federal agencies or professional societies or in scientific literature; however, the terms may have been modified to meet the purposes of this document. Sources include: CPC 2018, NASEM 2023, NNSP 2020, PCA 2015, and citations therein.

Adapt (Adaptability): To become fitted to one's environment and its pressures, as a result of natural selection.

Annual: A plant that completes its life cycle in one growing season.

Best Management Practices (BMPs): Utilizing the best available methods to achieve a desired project outcome.

Collaborator: Individuals, organizations, and intergovernmental partners who are involved in or contribute valuable knowledge to and support for implementing the actions outlined in this Strategy, or who may be directly or indirectly impacted by the actions of the Strategy. Those who have an interest in the Strategy's outcome.

Conservation: The preservation and protection of natural landscapes.

Conservation Collection: An ex-situ (offsite) collection of seeds, plant tissues, or whole plants that supports species' survival and reduces the extinction risk of globally and/or regionally rare species.

Coordinating Partner: An ONSC agency or organization that takes primary responsibility for implementing funded Actions within the Strategy, including managing timelines, coordinating with other partners, and ensuring progress toward completion of assigned tasks. The Coordinating Partner serves as the main point of contact for their designated Actions while working collaboratively with other ONSC partners. Participation by coordinating partners in any action is contingent upon available funding, staffing, and other resources.

Cultivar (Plant Variety): Cultivated subdivision of a selected plant species which is distinct, uniform, and stable.

Demand: The total amount of seed desired by the market, whether available or not.

Ecologically Appropriate Plant Materials: Native seeds or plant materials that are adapted to local environmental conditions, maintain genetic diversity representative of local populations, and support ecosystem functions within their intended habitat. This includes consideration of climate adaptation, soil preferences, species interactions, and the capacity to establish self-sustaining populations that contribute to ecosystem resilience.

Ecoregion: Areas of general similarity in ecosystems and in the type, quality, and quantity of environmental resources. They are designed to serve as a spatial framework for the research, assessment, management, and monitoring of ecosystems and ecosystem components.

Ecosystem: The biota (plants, animals, microorganisms) within a given area, the abiotic environment that sustains it, and their interactions.

Ecosystem services: The benefits people and wildlife obtain from ecosystems. These include provisioning services such as food, water, timber, pollination, and fiber; regulating services such as the regulation of climate, floods, disease, wastes, and water quality; cultural services such as recreation, aesthetic enjoyment, identity, and spiritual fulfillment; and supporting services such as soil formation, photosynthesis, and nutrient cycling.

Empirical Seed Zone: Empirical seed zones are developed for individual species based on climate variables and a species' variation across their distribution through the following steps: (1) Researchers collect seed from diverse geographic and climatic areas of the targeted region; (2) Researchers evaluate plantings from collected seeds in common gardens for production, genetics, morphology, phenology, and physiological traits; (3) Researchers develop regression models that link variation across the landscape with collection location environments to delineate seed zones for the collected species.

Exceptional Plants: Plants that cannot be conserved long-term using conventional seed banking methods.

Ex Situ Conservation: The technique of conserving all levels of biological diversity outside their natural habitats through such means as botanical gardens, zoos, or seed banks.

Field Genebank: Plants grown in the ground for the purpose of conserving genes. In botanical gardens, display collections of trees, shrubs, herbs can be considered field genebanks.

Genetic Diversity: The amount of genotypic variability within a population or a species.

Genetically Appropriate Plant Materials: Native seeds or plant materials environmentally adapted to their intended site based on empirical seed zones (where available) or provisional seed zones combined with ecoregions. Unlike 'ecologically appropriate', this term specifically refers to documented genetic adaptations of plant populations to environmental conditions, rather than general habitat suitability.

Genetics: The study of plant genes, heredity and genetic variation between species.

Geotagged: The process of attaching precise geographic coordinates (latitude and longitude) and relevant location data to a seed collection that remains linked to that collection throughout propagation and production. This location information helps track the origin of seed sources and ensures that genetic and geographic source information is maintained throughout the native seed supply chain.

Germplasm: Living plant tissue from which new plants can be established (ie. seed, leaf, stem, pollen).

Germination: events beginning with water uptake by a seed and ending with the beginning of elongation of the embryonic axis through the surrounding structures.

Habitat: The dwelling place of an organism or community that provides the requisite conditions for its life processes.

Indigenous Knowledge (IK): Place-based knowledge derived from direct observations, interaction with the environment, and ethical values that have been passed down by indigenous peoples from generation to generation since time immemorial. When included as part of a mutually beneficial relationship with Native communities, IK can expand Western understanding of species and habitats, and can provide long-term understanding of ecological changes over time.

Invasive Plant: A plant that is both nonnative and able to establish on many sites, grow quickly, and spread to the point of disrupting plant communities or ecosystems.

Locally Adapted Plant: A plant that performs better in a particular environment than other individuals of the same species and is more likely to establish and persist.

Mitigation: Actions taken to minimize the adverse effects of proposed or ongoing actions that injure plants or ecosystems.

Native Plant: Indigenous terrestrial and aquatic plant species that have evolved and occur naturally in a particular region, ecosystem, or habitat.

Native Plant Communities: Recurring assemblages of native plant species associated with local substrates and natural dynamic processes. Their composition varies in space and time in response to changes in climate and species dispersal.

Nonnative (exotic): Alien, foreign, nonindigenous, or exotic plant species that have been introduced by humans to a location(s) outside its native or natural range.

Plant Ecology: The study of how plants function and interact with their environment.

Plant Establishment: The ability for a plant to emerge from seed and mature into a healthy, sustainable organism.

Plant Phenology: Study involving the effects that seasonality and climate has on plants, including germination, emergence, flowering, dieback, etc.

Population: A specific set of individuals of a species within a defined geographic area.

Priority Species: Species that are prioritized for collection, research, and/or increase due to demand, habitat needs, fire history, and other factors. Priority species include both workhorse species and historically underutilized species that may be less common in restoration, but are equally important in restoring biodiversity within ecosystems.

Propagation: The process by which plants are grown into new plants through the use of seeds, cuttings, divisions, or other sources.

Protocol: A standardized method containing detailed steps.

Provisional Seed Zone: Provisional seed zones are based on climate data and used for species for which empirical seed zones have not been developed. Provisional seed zones in combination with established ecoregions can be used to guide seed transfer. (See also empirical seed zone in the glossary).

Rehabilitation: Emphasizes the reparation of ecosystem processes, productivity, and services, whereas the goals of restoration also include the re-establishment of the preexisting biotic integrity in terms of species composition and community structure.

Resilience: The degree to which an ecosystem or species can regain structural and/or functional attributes after it has suffered harm from stress or disturbance.

Revegetation: Restoring plant cover to a damaged or degraded area.

Restoration: The process of assisting the recovery of an ecosystem that has been degraded, damaged, or destroyed.

Seed Bank: A facility that collects, processes, stores, and maintains native seed under controlled environmental conditions to preserve genetic diversity and ensure availability for future restoration, research, and conservation needs. This can include both short-term storage for restoration projects and long-term conservation collections of rare or sensitive species.

Seed Cleaning: The process through which a seed collection/crop is processed to ensure a higher level of purity.

Seed Collection Permit: An official document issued to an applicant intending on collecting seed from public or private lands.

Seed Increase: The production of seed with the intent to yield a higher amount than what was originally available.

Seed Mix: A mixture of seed from various species that can be applied to the landscape for restoration, rehabilitation, or mitigation.

Seed Reserve: A national network of storage facilities for seed that can be used by land managers for seed-related projects.

Seed Transfer Guidelines: Recommendations for protecting adaptations of wild populations by restricting seed transfer only to areas where they will grow, reproduce successfully, and produce no adverse genetic effects.

Seed Zone: A mapped area with fixed boundaries in which seeds or plant materials can be transferred for the best chance of success. There are two types of seed zones - provisional and empirical. (See also provisional seed zone and empirical seed zone in the glossary).

Sensitive Species: A native species requiring special management due to unique biological or habitat requirements that make it more susceptible to natural or anthropogenic threats. Sensitive species include all federal and state threatened and endangered plants, BLM and USFS sensitive species, among others.

Supply: Total amount of seed available on the open market.

Viability (viable): The percent of seed that is capable of germination and developing into a mature plant under suitable conditions.

Workhorse Species: Species that are abundant across a wide range of ecological settings, establish quickly, and produce high ground cover on disturbed sites.

Acronyms and Other Abbreviations

Name	Acronym
Association of Official Seed Certifying Agencies	AOSCA
Best Management Practices	BMPs
Bureau of Land Management (DOI)	BLM
Center for Plant Conservation	CPC
Confederated Tribes of Grand Ronde	CTGR
Department of the Interior	DOI
Indefinite Delivery, Indefinite Quantity	IDIQ
Indigenous Knowledge	IK
Institute for Applied Ecology	IAE
National Environmental Policy Act	NEPA
Oregon Department of Administrative Services	DAS
Oregon Department of Agriculture	ODA
Oregon Department of Forestry	ODF
OregonFlora	OF
Oregon Native Seed Collective	ONSC
Portland State University and Oregon State University Oregon Biodiversity Information Center	ORBIC
Oregon State University	OSU
Plant Conservation Alliance	PCA
Portland State University Rae Selling Berry Seed Bank	BSB
Seeds of Success	SOS
The Nature Conservancy	TNC
The Understory Initiative	TUI
USDA Corvallis Plant Materials Center	PMC
US Department of Agriculture	USDA
US Fish & Wildlife Service (DOI)	USFWS
US Forest Service (USDA)	USFS

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