

NATIONAL SEED STRATEGY



for Rehabilitation
and Restoration



PROGRESS REPORT
FISCAL YEAR 2021



The Plant Conservation Alliance (PCA) is a collaboration of public and private partners who share the same goal: to protect native plants by ensuring that native plant communities and their habitat are maintained, enhanced, and restored. The PCA Federal Committee, now chaired by the U.S. Fish & Wildlife Service, developed the “National Seed Strategy for Rehabilitation and Restoration” in cooperation with federal and non-federal partners.

This publication is dedicated to all the hardworking botanists, ecologists, farmers, and community members who are on the frontline of protecting, conserving, and restoring native plant communities throughout the United States.

For more information on the Plant Conservation Alliance and its members and activities, please visit www.blm.gov/pca.

Copies of this publication may be obtained online at www.blm.gov/seedstrategy.
First published 15 October 2022. This version published online 18 January 2023.

Suggested citation:

Plant Conservation Alliance (PCA). 2022. National Seed Strategy Progress Report, Fiscal Year 2021. Washington, DC: U.S. Department of the Interior, Bureau of Land Management, 20 pp.

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FRONT COVER

Top: A group plans fieldwork for recovery from the Rebel fire. The work included collecting native seeds, contracting with a private grower to increase the seed, and then seeding multiple sites in a series of experiments. Photo: Owen Baughman, The Nature Conservancy, used with permission.

Upper Left: Crewmember of the Friends of Nevada Wilderness seed collection and fire restoration project collects seed for post-fire recovery. Credit: Chris Cutshaw, used with permission.

Lower Left: A Bureau of Land Management crew plants honey mesquite (*Prosopis glandulosa*) to aid in post-fire recover. Credit: Mary Norton, BLM

Upper Right: Harvesting curlycup gumweed (*Grindelia squarrosa*) at the NRCS Idaho Plant Materials Center. Credit: Derek Tilley, USDA-NRCS

Lower Right: Road-side restoration project in Yellowstone National Park. Credit: Sam Reid, NPS

INTRODUCTION

The National Seed Strategy for Rehabilitation and Restoration (National Seed Strategy) was developed in 2015 to increase the diversity and quantity of native seed and other plant materials (hereafter referred to as native seed) available for ecosystem restoration projects¹. The Seed Strategy outlines actions aimed at four main goals: address native plant materials needs, conduct research, develop restoration tools, and improve coordination. This Fiscal Year 2021 (FY21) report is third in a series of progress reports that meets Goal 4 of the National Seed Strategy, on Internal and External Communications, and specifically Objective 4.3 to gauge progress on a regular basis. In addition to recognizing achievements, progress reporting ensures forward movement toward the common goal of increasing the supply of plant restoration species by identifying areas of need and future directions amid competing priorities of dynamic ecological conditions.

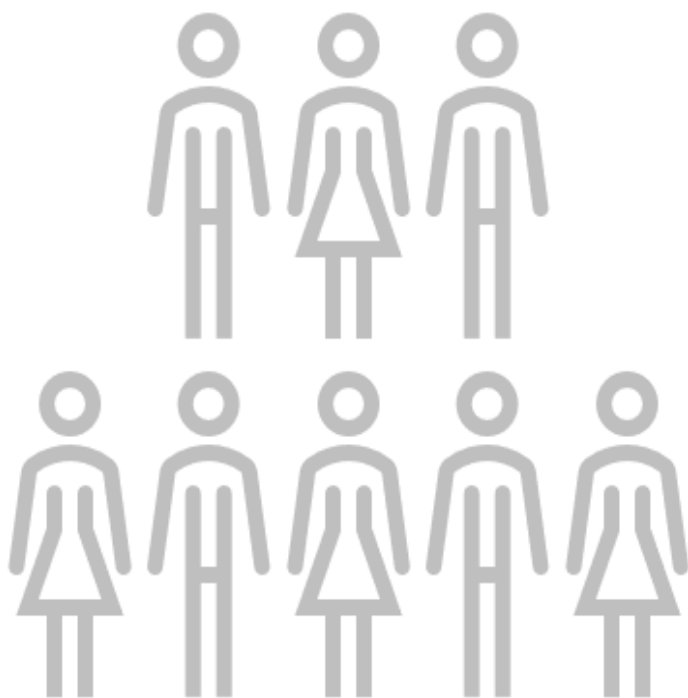


Photos. SEED COLLECTION. (Left) Snake's Head (*Malcothrix coulteri*) captured by a Seeds of Success crew in California. (Right) Seeds of Success crew collects Seashore Lupine (*Lupinus litteralis*) in Oregon (Right). Credit: BLM SOS

¹ Plant Conservation Alliance (PCA). 2015. National Seed Strategy for Rehabilitation and Restoration. Accessed online 08/16/22: <https://www.blm.gov/seedstrategy>

PROGRESS MADE - Fiscal Year 2021

During October 1, 2020, and September 30, 2021 (FY21), 17 federal agencies and their partners contributed to 163 projects that implemented various actions of all four goals of the National Seed Strategy² (See Figure 2). Among the achievements of these projects are the collection of 1,434 native species, agricultural production of 1,118 native species, research on 692 species, and 91,208 pounds of native seed produced. Socio-economic outcomes included supporting 118 farmers, creation of 20 new facilities, adding 153 jobs to the federal workforce, creating 138 new non-federal jobs, and restoring 30,466 acres (See Figure 3).



Federal Agencies

- Agricultural Research Service
- Army Corp of Engineers
- Bureau of Indian Affairs
- Bureau of Land Management
- Bureau of Reclamation
- Department of Defense
- Federal Highway Administration
- National Aeronautics and Space Administration
- National Fish and Wildlife Foundation
- National Park Service
- Natural Resources Conservation Service
- Smithsonian Institution
- U. S. Department of Energy
- U.S. Botanic Garden
- U.S. Fish and Wildlife Service
- U.S. Forest Service
- U.S. Geological Survey

Figure 1. COLLABORATION. The National Seed Strategy requires broad collaboration across the federal government, tribes, states, and may other partners. Listed above are the federal agencies who participated in projects submitted for this FY21 federal report.

² These represent only a sample of the work being done by the federal government in coordination with nonfederal partners to increase the supply of locally adapted native plants for restoration.

Where is progress being made?

GOAL 1		Native Seed Needs & Availability	106 projects
GOAL 2		Research: Genetics to Restoration Outcomes	76 projects
GOAL 3		Tools & Training for Land Managers	71 projects
GOAL 4		Communications & Outreach	50 projects

Figure 2. MEETING GOALS FOR INCREASING SEED, RESEARCH, TRAINING, AND COMMUNICATION. Projects submitted in the FY21 data call showed how progress is being made on all four goals of the National Seed Strategy.



Photo. SEED COLLECTION. A Seeds of Success crewmember collects arrowleaf balsamroot (*Balsamorhiza sagittata*) in California. Credit: BLM SOS

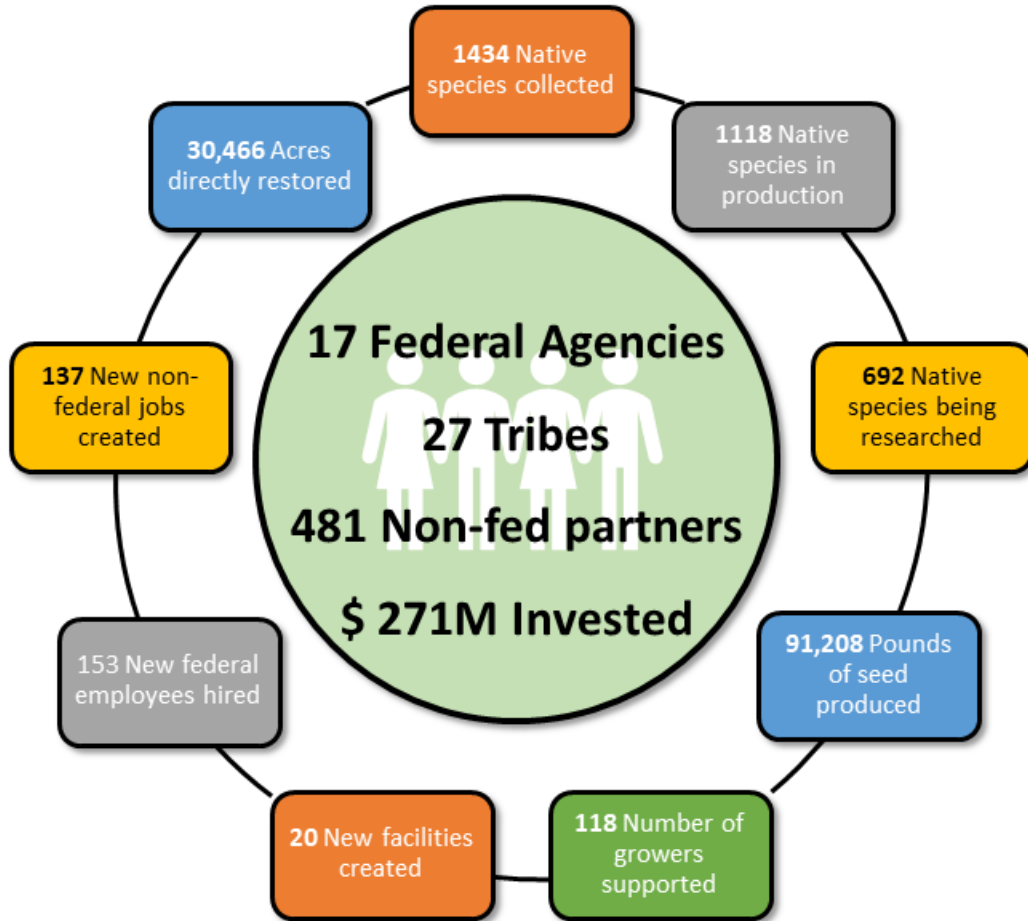


Figure 3. BUILDING A RESTORATION ECONOMY. The projects submitted to this FY21 report show the amount of work being done across the U.S., Tribal Nations, and U.S. Territories to increase the understanding, supply, and use of native seed for restoration and rehabilitation. Much of this work brings jobs to rural places and underserved communities. This includes creating over 290 federal and non-federal jobs in this small sample of projects alone with \$271M invested.



Photo. REMOVING INVASIVES FOR WILDLIFE. A proud crew poses after removing invasive species at the Dedication Point Restoration Project. After this removal, the project included planting hundreds of native shrubs and flowers to support wildlife in Idaho. Credit: Ann Marie Raymondi, BLM



Figure 4. THE NATIVE SEED DEVELOPMENT PROCESS describes the steps necessary for taking wild-collected seed and preparing it for use in ecosystem restoration projects³. Most of the projects submitted in the 2021 report included on-the-ground restoration of native plant communities and restoration research.

³ McCormick, M.L., Carr, A.N., Massatti, R., Winkler, D.E., De Angelis, P. and Olwell, P. (2021), How to increase the supply of native seed to improve restoration success: the US native seed development process. *Restor Ecol*, 29: e13499. <https://doi.org/10.1111/rec.13499>

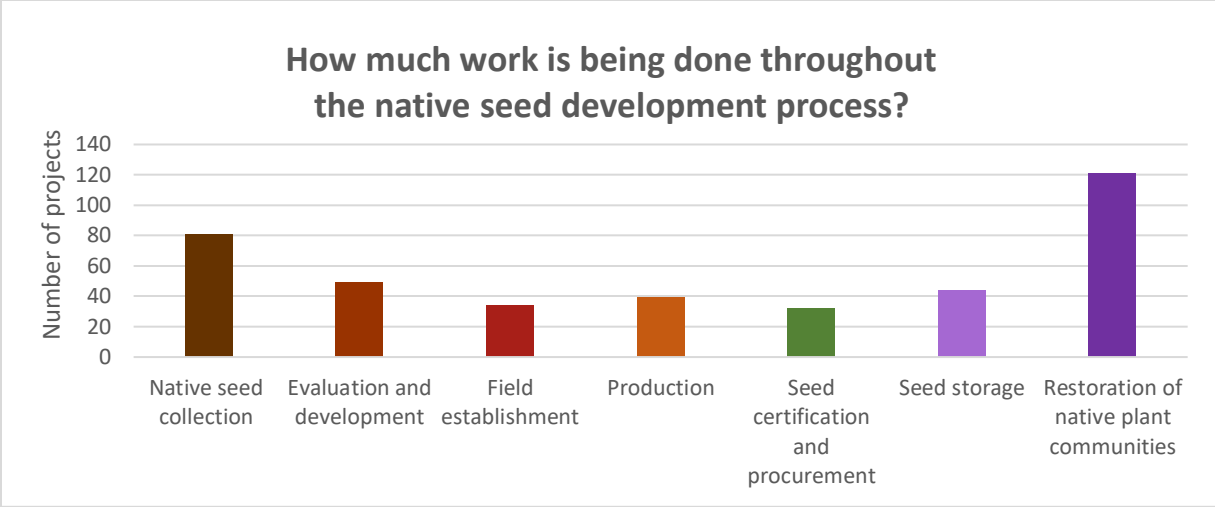


Figure 5. WORKING TOWARDS IMPROVING RESTORATION. Projects address all the steps in the native seed development process. On-the-ground restoration was the step in the process with the most work being done.

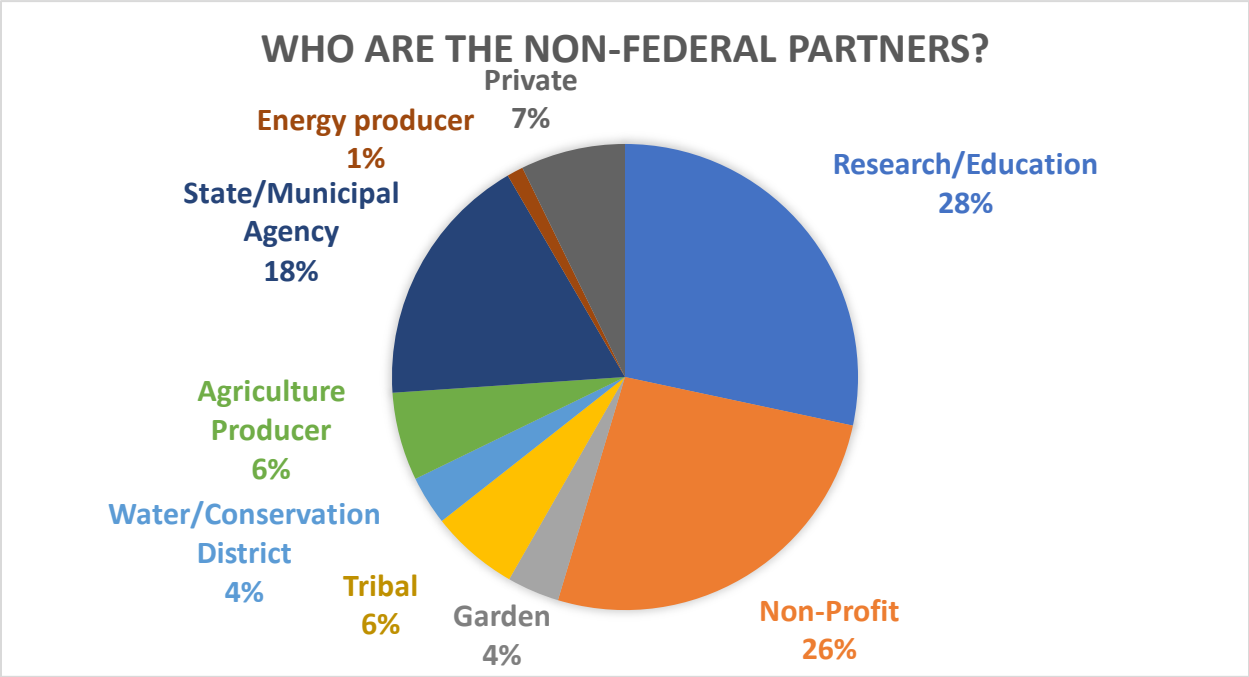


Figure 6. DIVERSE PARTNERS ARE FOUNDATIONAL TO INCREASING THE NATIVE SEED SUPPLY. Project partners in FY21 show how work is highly collaborative, utilizes a range of expertise and audiences working together to steward the land. These groups included academic, research, and educational institutions; non-profit organizations; gardens, zoos, and arboreta; tribal nations and tribal organizations; soil and water conservation districts that include county-level networks supporting cross-sector natural resource management needs; the agricultural sector; state and municipal agencies; the energy sector such as powerline, solar, and oil and gas; and other private companies.

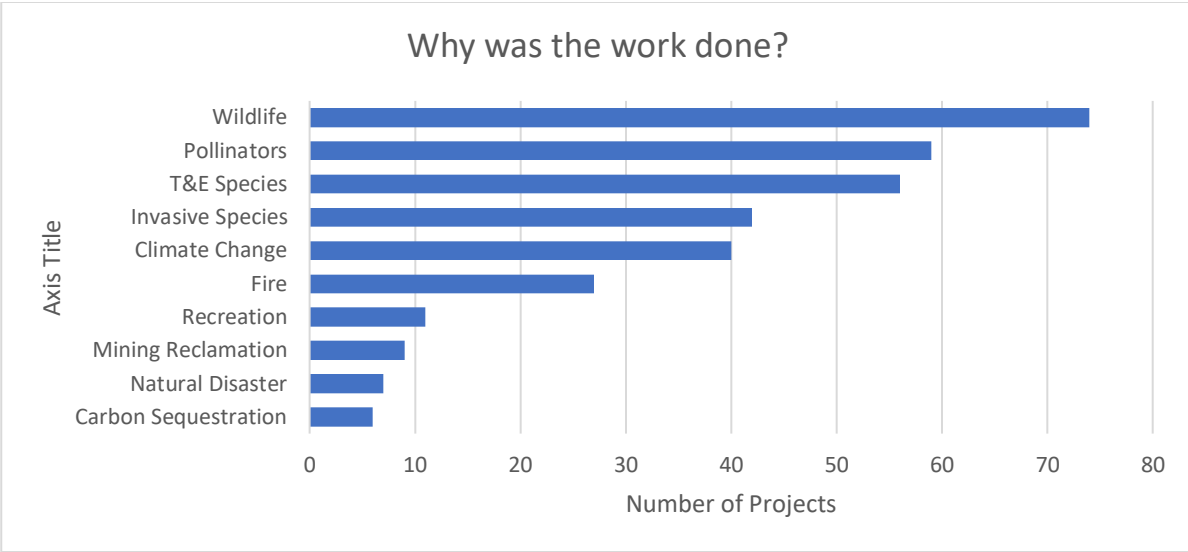


Figure 7. MULTIPLE OBJECTIVES. The National Seed Strategy promotes work done for diverse reasons with far-reaching societal benefits. In 2021, projects helped to combat climate change and the effects of climate change, increase social justice and equity, and support wildlife. Project goals are diverse and included: improving habitat or corridors for native species; counteracting the spread of invasive species; disaster preparedness or recovery; management for land use impacts; and as nature-based solutions to climate change.



Photo. SEEDS FOR RECLAMATION. Researchers with USGS test methods to improve oil and gas reclamation in Utah, this includes experimenting with various seed mixes of native species. Credit: Rebecca Mann, USGS

Where are NSS projects?

- Bureau of Land Management Lands
- Department of Defense Lands
- In an office or research facility
- National Forest Lands
- National Parks Lands
- Private
- Tribal Lands or with Tribal Partners
- US Fish and Wildlife Refuge

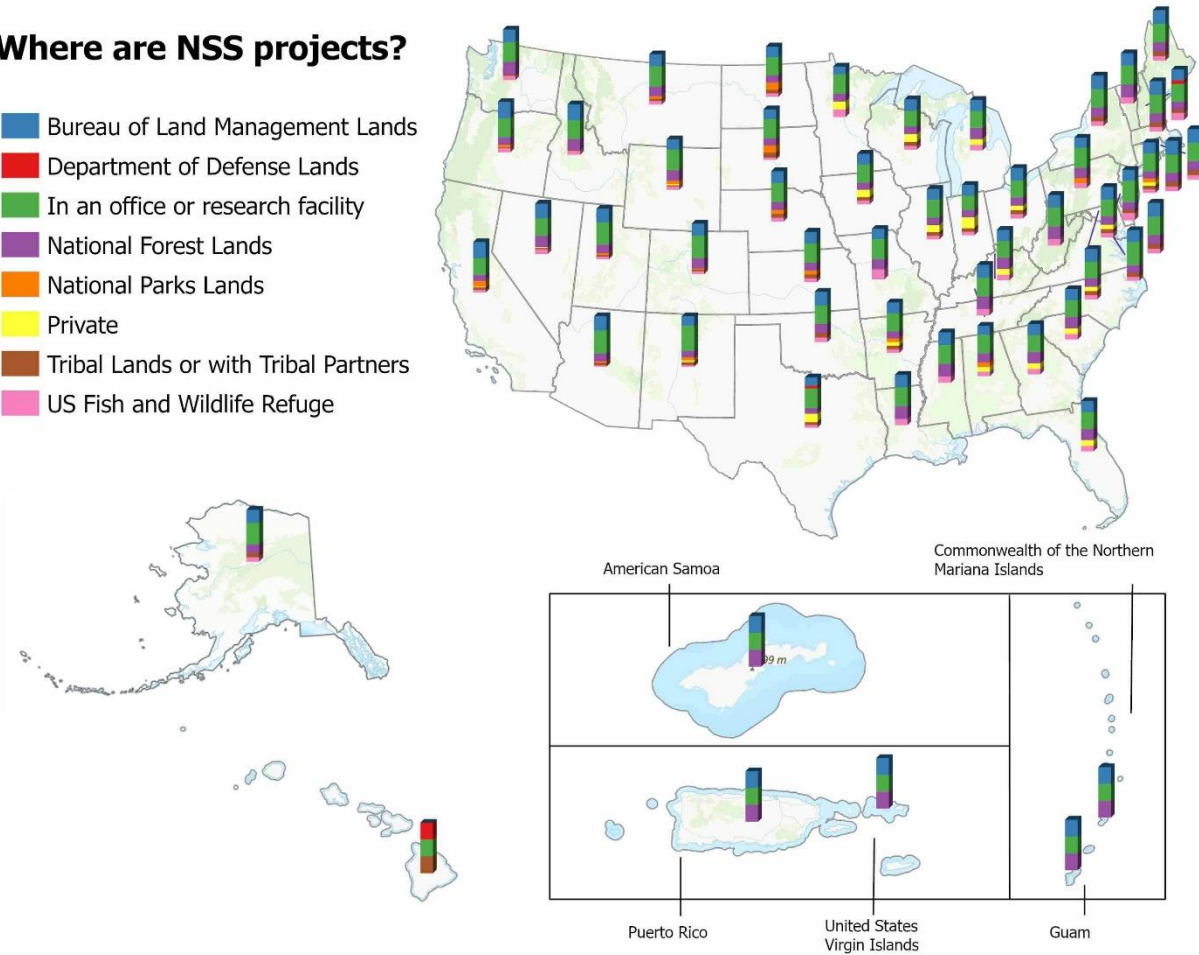


Figure 8. WHERE DID THE WORK TAKE PLACE? The projects occurred on public, private, and tribal lands across the country. Most of the work occurred on lands managed by the BLM (43%), Forest Service (22%), NPS (19%), FWS (11%), and others on tribal lands (4%) and Department of Defense military bases (2%).



Photo. BUILDING CULTURAL, ECOLOGICAL, AND ECONOMIC RESILIENCE. Jesse Mike of the Navajo Department of Natural Heritage's Diné Native Plant Program teaches Diné farmers how to grow native seed for restoration. Credit: Molly McCormick, USGS

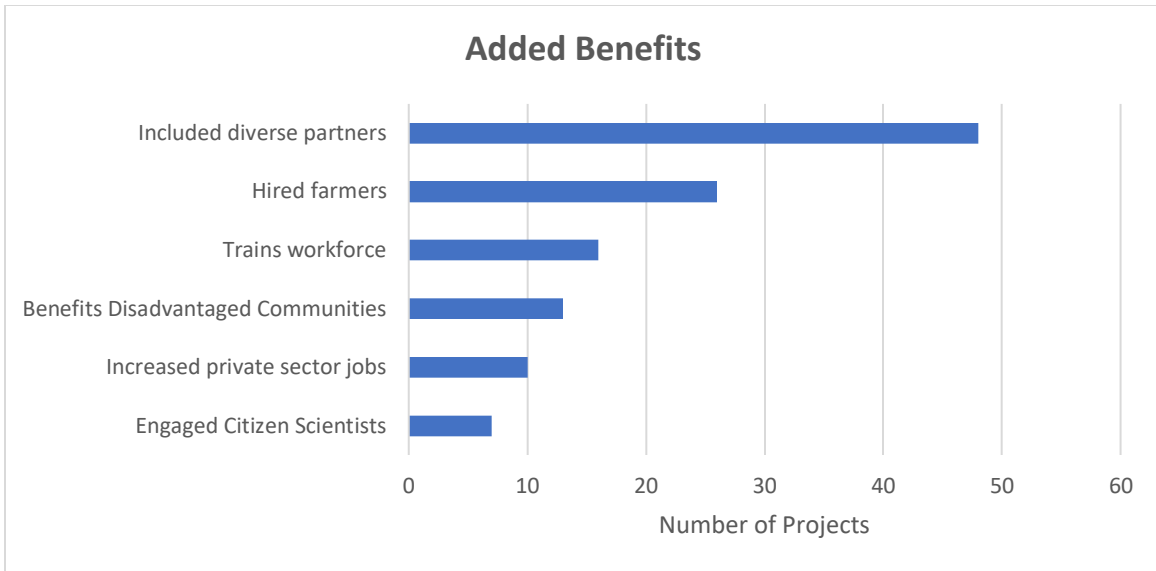


Figure 9. INCREASING SEED ALSO INCREASES SOCIAL JUSTICE AND INVESTMENT IN RURAL ECONOMIES. The projects brought many societal benefits. These included engaging with diverse partners, such as rural farmers, benefiting disadvantaged and underserved communities, providing important workforce training in biology, including increasing jobs in the private sector, and engaging with citizen science volunteers.

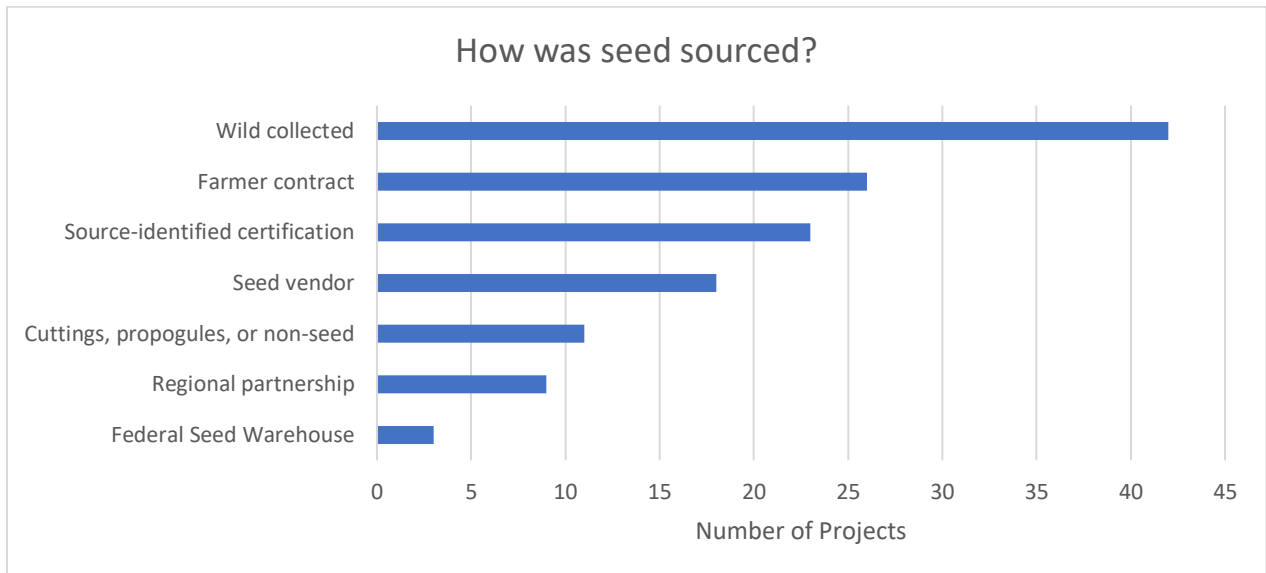


Figure 10. SEEDS COME FROM MANY PLACES. In 2021, it was reported that over 30,400 acres were restored. For those projects that conducted restoration, seed for the projects was sourced from a variety of places. This included wild collecting the seed for direct use (47%), something that is often done with sagebrush; contracting directly with a farmer who increases wild collected seed (29%); purchasing from a commercial seed vendor (20%), obtaining non-seed materials such as cuttings and

propagules (12%), utilizing a regional partnership who may have their own growers in-network (10%), and purchasing from the BLM seed warehouse system (3%).

ACQUISITION

Acquisition of seed is a key part of the native seed materials development process. Long planning horizons of 5-10 years for new species, and the diverse set of ecoregions of federal land and seed producers offer challenges to the process. Two examples of acquisition tools used by federal agencies to procure seed are Indefinite Delivery, Indefinite Quantity (IDIQ) Contracts and Blanket Purchase Agreements (BPA).

Indefinite Delivery, Indefinite Quantity Contracts

Awarded in 2018, the BLM's Native Grass and Forb Seed Increase IDIQ Contracts offer native seed production services and are organized by Seed Transfer Zone (STZ). Wildland seed collections alone cannot meet BLM, and other federal agencies' demand for native seed. Demand continues to grow in response to climate-driven events like wildfires, droughts, and severe storms. The Seed Production IDIQ Contracts are an important tool to increase native seed needed by BLM and other federal agencies. The Seed Production IDIQs are structured to incentivize production of quality native seed. The IDIQs represent federal support of rural communities and the commercial native seed market.

In 2021, BLM ordered 27,435 pounds of locally adapted native seed through the Seed Production IDIQ Contracts, bringing the total ordered since 2018 to 94,260 pounds. 2021 seed orders included 34 species (lumped across seed transfer zones [STZ]) and 75 species and STZ combinations.

BLM contributed \$3.1 million to the Seed Production IDIQ Working Capital Fund (WCF) in 2021 to fund seed production seed orders. Seed acquired through IDIQ orders is purchased from the BLM National Seed Warehouse by BLM field offices, other DOI bureaus and tribes. The proceeds of seed sales are returned to the WCF, making it a self-sustaining funding mechanism. The first 4,000 pounds of grower-increased native seed arrived at the BLM National Seed Warehouse in January 2022, and more is scheduled to arrive through 2025.

For more information, contact BLM Contracting Officer, Ian Steinheimer: isteinheimer@blm.gov

Blanket Purchasing Agreement

A Blanket Purchasing Agreement (BPA) can provide for a broad array of restoration/revegetation services, including native seed and straw production, seed/cutting collection, cone collection, plant propagation, hydroseeding, hand seeding, out-planting, inventory, monitoring, invasive plant treatment, road decommissioning, and more.

The Pacific Northwest Region (Region 6) of the Forest Service had used Indefinite Delivery Indefinite Quantity (IDIQ) contracts for many years but switched to a BPA in 2017. BPAs are very similar to IDIQs, but offer several important advantages, including no up-front obligations, higher dollar limits, 10-year shelf-life, new vendors can be added over the course of the contract, and others. BPA's have served Region 06 well over the years in providing a relatively fast and easy mechanism for accessing vetted contractors and quickly obligating funds as they become available.

The parent BPA contains specifications for native seed production, such as seed quality standards and isolation distance between fields of the same species. Subsequent BPAs all require Statements of Work,

with maps and descriptions of the project location, as well as specifications and standards for the work to be competed and performed. Over the duration of the 10-year BPA, individual calls with statements of work and quantities ordered can be issued and competed among vendors in the award pool. Only the pre-approved vendors in the pool will be allowed to submit quotes on a BPA call but are not required to offer on all orders.

Other Forest Service regions and Service First federal agencies may utilize the BPA contract developed by Region 6 of the Forest Service, working through their local Acquisition Management Staff. The Northern Region of the Forest Service (Region 1) utilizes the Region 6 contract for seed increase; other agencies managing lands in Oregon and Washington use it for various types of work. BPAs targeted to different regions or geographic areas would be more likely to attract local vendors.

Specific examples of the 10-year Region 6 Restoration Services BPA include seed/cone collection, seed/seedling production, seeding/planting, and a wide array of other restoration-related services. More information can be found on the [Forest Service internal web site](#) or can be made available to others upon request by contacting Vicky Erickson: vicky.erickson@usda.gov.



Photo. SEED LAB. The USDA-USFS' National Seed Lab in Georgia serves as a strategic resource for forest ecosystem seed science and technology. Credit: www.fs.usda.gov/nsl

PROJECT HIGHLIGHTS

We selected a few projects that exemplify the type of work being done to meet the goals of the National Seed Strategy in FY21. This includes Seeds of Success that provides nation-wide coordination of seed collection crews, a multi-state effort to protect sensitive species and reduce fire risk in the Great

Basin Desert, an innovative program that provides work-force training and improves quality of life in prisons, a state-wide effort to combat the effects of extinction, and a wildlife corridor project that increases habitat over an interstate to allow for safe travel for animals and people.

Seeds of Success

Seeds of Success (SOS) is the national wildland native seed collection project led by the Bureau of Land Management (BLM) in partnership with the USFS Bend Seed Extractory, ARS, USFWS, and many non-federal partners. In FY21, 48 Seeds of Success (SOS) crews made 472 SOS collections across the United States. The number of seed collections for FY21 is lower than the historic average number of native seed collections (approximately 1,000) because of continuing difficulties due to the Covid pandemic and extreme drought in the western U.S. Teams collected 299 unique taxa in FY21, which is included in the SOS National Collection of over 5,800 unique taxa to date. SOS supports the next generation of botanists, ecologists, and land stewards and in FY21, approximately 53 contractors were hired for seed collection. FY21 also marked the first and second year of the partnership between BLM Montana, the

Society for Ecological Restoration, and the Fort Belknap Indian Community that combines Seeds of Success protocols and Traditional Ecological Knowledge to inform native seed collection and prairie restoration on Tribal Lands. October 2020 also kicked off the start of a cooperative agreement between the U.S. Fish and Wildlife Service's (USFWS) Partners for Fish and Wildlife Program and the Southeastern Grasslands Initiative (SGI), with contributed funding from the BLM, to develop a Seeds of Success-Southeast program. A leadership team was hired in FY21 and is currently working with the national SOS office to grow seed collection and seed infrastructure across a 10-state region, spanning from Virginia and South Carolina on the east to Arkansas and Louisiana on the west. Finally, in FY21, SOS was selected as a Biden Administration Justice40 covered program, meaning it falls within the scope of the Justice40 initiative because it invests in disadvantaged communities and provides benefits in the areas of climate change and training and workforce development. As a covered program, SOS will be required to develop a community stakeholder engagement plan and to report data pending further guidance from the Administration.



Photo. SEEDS OF SUCCESS. A seed collection team scouts for seed in Montana as part of a collaboration between the BLM, the Society for Ecological Restoration, and the Fort Belknap Indian Community. Credit: Cristina Eisenberg

Great Basin Native Plant Program

In the Great Basin Desert, a region spanning five Western United States, a collaborative multi-decade program is underway to improve the availability of native plant materials and to provide the knowledge and technology required for their use in restoring diverse native plant communities. More than 20 federal, state, and private cooperators are involved in this program with notable progress made in FY21. During this fiscal year, the program scouted 398 new populations of native plant species and made 70 operational seed collections (over 40 pounds of wildland-harvested native seed) across 5 BLM field offices. Additionally, from 2017 to 2021, the BLM, USFWS, and the USFS collected 587 wildland collections of critical forb species from across the Columbia, Snake, and Great Basins. As of Fall 2021, the USFS Rocky Mountain Research Station (RMRS) had installed seven forb common gardens in four states

across the Great Basin. RMRS specifically selected sites that represent a gradient in environmental characteristics related to moisture and temperature. During this year, seven additional cultivation guides were prepared as part of the Forb Seed Manual led by the Great Basin Fire Science Exchange and USFS Rocky Mountain Research Station.

Access the Forb Seed Manual: <https://greatbasinfirescience.org/western-forbs-restoration/>



Photo. RESEARCH IS A CRITICAL COMPONENT. One of seven common garden experiments testing various populations of species important for restoration in the Great Basin Desert. Shown here is *Erigeron pumilus*. Photo: Sarah Barga, USDA-USFS

Sagebrush in Prisons

The Sagebrush in Prisons Project is a collaboration between the BLM and the Institute for Applied Ecology partnering with state prisons to provide educational training for inmates and engaging them in the process of growing sagebrush seedlings for habitat restoration. The Sagebrush in Prisons Project had its most productive year to date in 2021. Crews across 10 prisons in California, Nevada, Oregon, Washington, and Idaho grew 571,252 sagebrush seedlings for planting on BLM lands, bringing the total number of sagebrush plants produced by the project to 3,103,769 seedlings.

The Institute for Applied Ecology interviewed incarcerated crew members in 2021 to find out what the Sagebrush in Prisons Project means to them. The following are a sampling of quotes from crew members at Lovelock Correctional Center in Nevada:

“The Sagebrush Program has positively impacted my life in many ways. It has taught me how the sage grouse depends on sagebrush. Also, how climate change is affecting them because of the wildfires. Our job growing these plants is helping Nevada tremendously.”

“Sagebrush has given me the opportunity to learn about nature and horticulture on a hands-on level and the ability to work in a team setting to accomplish a common goal.”

“The sagebrush starts as a seed, then through water and tending grows into a bush!! So is the process of being a sagebrush worker; the work along with the fellowship of the rest of the team promotes growth of the individual alongside his fellow team members.”

“I am very thankful to join the sagebrush program. It teaches me to care for plants and work with others. I hope that we can continue doing good not only for us, but also for our state and its wildlife. And that we can pass this experience to those who are interested in volunteering in the future. We can never lose helping our state’s wildlife.”

“The simple fact that I am able to tell my family of the positive impact and the possible future job opportunities of this program means A LOT.”



Photo. SAGEBRUSH IN PRISONS. A group of Sagebrush in Prisons crew members with flats of sagebrush at the Idaho State Correctional Center. Photo: Institute for Applied Ecology

US Army Natural Resources Program on O’ahu

“The Hawaiian Islands are the most geographically isolated group of islands on Earth. They are also home to more than 500 federally listed threatened and endangered species and countless cultural and archaeological resources. A number of these unique resources can be found on U.S. Army installations and training areas. From plants and birds, to snails, bats and insects, the Army’s natural resource programs on O’ahu and Hawai’i Island manage more than 120 threatened and endangered species.

[-US Army Garrison Hawai’i Ecosystem Management Program Bulletin, 2019](#)

To protect O’ahu’s 154 threatened and endangered species, the US Army Natural Resources Program established cooperative relationships with land managers and landowners on O’ahu and the neighbor islands to successfully promote ecosystem protection partnerships. As part of habitat improvement and conservation efforts, the large collaborative working group collects and produces locally adapted native seed to support ongoing habitat restoration in coastal areas and dry, mesic, and wet forest to improve habitat conditions and restore species impacted by historic disturbance. The U.S. Army’s seed bank on O’ahu, the only one in the Department of Defense system, curates seed collections of over 270 plant

species. The program has over 140 species in horticulture production and are researching seed production protocols and creating decision-support tools for an additional 20 species. On O’ahu 103 threatened and endangered species have been outplanted in reintroduction efforts and 585 of the 1375 species in the Hawaiian flora have been outplanted in restoration efforts statewide. Even with these efforts, the group says their habitat restoration efforts would have benefited from more species-diverse seed mixes and is still short on source-identified, genetically diverse seed. This work has aspirational goals that include natural disaster recovery, fire rehabilitation, invasive species mitigation, supporting wildlife and pollinators, and improving climate change resilience. Societal benefits include employing, developing, and training workforce, increasing private sector jobs, benefiting disadvantaged and underserved communities, and engaging citizen scientists.

Find out more: <https://laukahi.org/>

I-90 Snoqualmie Pass Project

In Washington state, federal agencies, state agencies, non-profits, and academic institutions are partnering to keep wildlife safe and provide high quality habitat with locally sourced seed. Interstate 90 is a major human and commerce throughway, and partners identified an important wildlife connectivity zone for large roving carnivores, low mobility species and aquatic habitats at the Cascade Crest. To protect the animals and improve habitat, fifteen miles of roadside and many bridges were designed to increase ecological connectivity, including 3 fully vegetated overcrossings and approximately 20 undercrossings planted with native vegetation. To date, approximately 100 acres of revegetation was completed with the use of native, locally adapted seed and other plant materials. Project cost for 10 years’ worth of seed collection, native plantings, and staff is estimated at \$10 million dollars. The project is not only keeping large animals safe, but providing habitat for pollinators, reducing invasive species, building resilience to climate change, strengthening collaborations in the region, and providing jobs and workforce training. So far, the project has included collecting 40 species, placing 20 of these species into agricultural productions, engaging six native plant commercial and Forest Service nurseries, and producing over 10,000 pounds of seed at a local native seed producer.

Find out more:

Short Movie: [Connecting Wildlife Habitat Under and Over I-90 - YouTube](#)

Webinar: [USFS Native Plant Restoration at the I-90 Connectivity Project - YouTube](#)

Short Movie: [I-90 Snoqualmie Pass East: Critter Crossings in the Cascades - YouTube](#)

CONCLUSION – National Seed Strategy offers Nature-Based Solutions

Nature-based solutions, such as those that make up the National Seed Strategy, are environmental actions that protect and promote adaptation and resilience in ecosystems. In FY21, much work was accomplished to meet the National Seed Strategy mission of ensuring the availability of genetically appropriate seed to restore viable and productive plant communities and sustainable ecosystems⁴. Recently, initiatives and legislation relevant to the National Seed Strategy were created by the Biden-Harris Administration and the 117th Congress to promote nature-based solutions. These important

⁴ Plant Conservation Alliance (PCA). 2015. National Seed Strategy for Rehabilitation and Restoration. Accessed online 08/16/22: <https://www.blm.gov/seedstrategy>

milestones occurred in both FY21 and FY22, and we want to acknowledge them here as they collectively chart the near-term future for both the need and development of native plant seed.

America the Beautiful Initiative

The America the Beautiful Initiative (AtB) began in May 2021, and outlined, “a vision for how the United States can work collaboratively to conserve and restore the lands, waters, and wildlife that support and sustain the nation⁵.” Synergy between AtB and the National Seed Strategy leverages our collective work to meet the goals of both. Many of the six priority areas of AtB will require native seed, these include: creating more parks and safe outdoor opportunities in nature-deprived communities; supporting Tribally led conservation and restoration priorities; expanding collaborative conservation of fish and wildlife habitats and corridors; increasing access for outdoor recreation; incentivizing and rewarding the voluntary conservation efforts of fishers, ranchers, farmers, and forest owners; and creating jobs by investing in restoration and resilience projects and initiatives, including the Civilian Climate Corps.

Bipartisan Infrastructure Law

In November of 2021, Congress passed the Infrastructure Investment and Jobs Act, commonly called the Bipartisan Infrastructure Law (BIL), which provided \$200,000,000 in support of the National Seed Strategy over the next 5 years (\$70,000,000 to DOI and \$130,000,00 to USDA)⁶. Native plants are a critical component to all ecosystem restoration, which is why Plant Conservation Alliance federal agencies are striving to coordinate strategically across the Department of Interior, the USDA, Department of Defense, Tribal Nations, states, and with other partners.

The need to increase our native seed supply continues and is even more critical for climate change response and building resilient habitats, farms, and open spaces. We need broad participation to implement the National Seed Strategy, and ensure we get **the right seed, in the right place, at the right time**.

Acknowledgements

We would like to thank the federal agencies who participate in the Plant Conservation Alliance (PCA) who took the time to help with this progress report by submitting projects. Many thanks to the progress reporting team who led the data collection and reporting effort: Molly McCormick (USGS), Patricia DeAngelis (USFWS), Peggy Olwell (BLM), Anna Lindquist (BLM contractor), Alexandra Croydon (USGS contractor), Kristy Snyder (BLM contractor), and Elizabeth Krone (USFWS contractor). Thanks to Alison Agneray (BLM) and Sarah Kulpa (USFWS) for help with the section on the Great Basin Native Plant Program. Thanks to Tim Chambers for his help with the section on US Army Natural Resources Program on Oahu section. Thanks to Helen Lau for her help with the section on I-90 Snoqualmie Pass Project. Finally, thanks to all the federal, tribal, and non-federal partners who work tirelessly to implement the National Seed Strategy on the way towards restoring degraded lands and mitigating the effects of climate change. Funding for writing this report came from the BLM Plant Conservation and Restoration Program, and USGS Southwest Biological Science Center’s Restoration Assessment and Monitoring Program for the Southwest within the USGS Ecosystems Mission Area. Any use of trade, product, or firm names in this paper is for descriptive purposes only and does not imply endorsement by the US Government.

⁵ The White House. 06 May2021. *Biden-Harris Administration Outlines “America the Beautiful” Initiative*, Washington, DC. Accessed online 9/20/21 [Biden-Harris Administration Outlines “America the Beautiful” Initiative - The White House](#). Press release.

⁶ Public Law 117-58. *Infrastructure Investment and Jobs Act*, 117th Congress, Nov 15, 2021 [PUBL058.PS \(congress.gov\)](#)



Photo. RIVERS ALSO NEED NATIVE SEED. Upper Mississippi River Restoration Environmental Management Program of US Army Corps of Engineer. Credit: [Rock Island District \(army.mil\)](https://www.army.mil/)

Supplemental Material

NSS FY21 Project Publications

- Anthony, C., Germino, M.J. 2022. Predictive models of selective cattle use of large, burned landscapes: primacy of topography, proximity to water, and unexplained variation in semiarid sagebrush-steppe. *Rangeland Ecol Mgmt.* Accepted.
- Applestein, C., Germino, M.J. 2022. How do accuracy and model agreement vary with versioning, scale, and landscape heterogeneity for satellite-derived vegetation maps in sagebrush steppe? *Ecological Indicators* 139, 108935. <https://www.usgs.gov/publications/how-do-accuracy-and-model-agreement-vary-versioning-scale-and-landscape-heterogeneity>
- Ashton, I.W., Symstad, A.J., et al. 2020. A new decision support tool for collaborative adaptive vegetation management in northern Great Plains national parks. *Parks Stewardship Forum* in press.
- Birnbaum, S. 2020. Monitoring Packard's Milkvetch (*Astragalus Packardiae*) In Southwestern Idaho, 2019 Results. Report provided to the Bureau of Land Management and the US Fish and Wildlife Service.
- Cummings, L. 2021. Kalaeokauna'oa (Kahuku Point)--The case study of the coastline extending from Turtle Bay to the northernmost tip of the island of O'ahu. *ArcGIS StoryMaps*. <https://storymaps.arcgis.com/stories/8d9d49110d684a8699d6b2868820c13d>
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Project Websites

List of websites and resources included in the submitted projects for FY21.

- [Ackerson Meadow Restoration - Yosemite National Park \(U.S. National Park Service\) \(nps.gov\)](#)
- [Army Natural Resource Program on Oahu \(hawaii.edu\)](#)
- [Birds of Prey NCA Partnership](#)
- [Clay Phacelia Recovery \(usda.gov\)](#)
- [Collecting seeds to restore prairie grasslands— High Country News](#)
- [Collection | Bureau of Land Management \(blm.gov\)](#)
- [Economic Implications of Sagebrush Treatment and Restoration Practices Across the Great Basin and Wyoming | USGS](#)
- [Forest Service \(usda.gov\) – Caldor Fire Tribal Native Plant Restoration Project](#)
- [Garden Lounge 1 | NMNH Virtual Tour \(si.edu\)](#)
- [Genetics for Western Restoration and Conservation \(GWRC\) | U.S. Geological Survey \(usgs.gov\)](#)
- [Great Lakes Restoration Initiative | Great Lakes Restoration Initiative \(glri.us\)](#)
- [GRIN \(ars-grin.gov\)](#)
- [Home | EcoRestore Portal \(arizona.edu\)](#)
- [Idaho | Bureau of Land Management \(blm.gov\)](#)
- [IDIQ handout \(front\) \(blm.gov\)](#)
- [Informing Seed Transfer Guidelines and Native Plant Materials Development | U.S. Geological Survey \(usgs.gov\)](#)
- [Kalaeokauna'oa \(Kahuku Point\) – North Shore Community Land Trust \(northshoreland.org\)](#)
- [Laukahi – Implementing the Hawai'i Strategy for Plant Conservation.](#)
- [Microsoft Word - PLHI USFWS Seg 24 final \(oregon.gov\) CCNWR DPR - Final Approved 2014.pdf \(army.mil\)](#)
- [Minnesota Prairie Conservation Plan | Minnesota DNR \(state.mn.us\)](#)
- [National Seed Strategy | Bureau of Land Management \(blm.gov\)](#)
- [Native Plant Seed Mapping Toolkit](#)

[Native Seed Forum \(nv.gov\)](#)
[Nevada Native Seed Partnership — Partners in the Sage](#)
[New Approaches for Restoring Colorado Plateau Grasslands | U.S. Geological Survey \(usgs.gov\)](#)
[Pine Hill Preserve Home](#)
[Plant Conservation & Restoration Program | Bureau of Land Management \(blm.gov\)](#)
[PolliNation DC · iNaturalist](#)
[Prairie Reconstruction Initiative \(google.com\)](#)
[Projects - King Range Alliance](#)
[RAMPS: Restoration Assessment & Monitoring Program for the Southwest | U.S. Geological Survey \(usgs.gov\)](#)
[RestoreNet: Distributed Field Trial Network for Dryland Restoration | U.S. Geological Survey \(usgs.gov\)](#)
[Rock Island District > Missions \(army.mil\)](#)
[Sagebrush in Prisons Project - Institute for Applied Ecology](#)
[ServCat - Unpublished Report - \(Code: 144278\) \(fws.gov\)](#)
[Southwest Energy Development and Drought \(SWEDD\) | U.S. Geological Survey \(usgs.gov\)](#)
[Sustainability in Prisons Project](#)
[The Garden Lounge | Smithsonian National Museum of Natural History \(si.edu\)](#)
[The Great Basin Native Plant Project \(greatbasinnpp.org\)](#)
[The Native Plant Nursery — The Santa Monica Mountains Fund \(samofund.org\)](#)
[The Seed Consortium: Partners in Prairie Restoration - YouTube](#)
[Tuolumne Meadows Campground in Yosemite National Park To Be Repaired and Improved through GAOA Funding \(U.S. National Park Service\) \(nps.gov\)](#)
[Tuolumne River Plan - Yosemite National Park \(U.S. National Park Service\) \(nps.gov\)](#)
[TXPMC | NRCS Plant Materials Program \(usda.gov\)](#)
[Walker Basin Conservancy](#)
[Western Bumblebee and Native Pollinator Research | U.S. Geological Survey \(usgs.gov\)](#)
[Western Forbs: Biology, Ecology, and Use in Restoration | Great Basin Fire Science Exchange](#)
[What Do Greenhouse Volunteers Do at Cabrillo National Monument? - Cabrillo National Monument \(U.S. National Park Service\) - Cabrillo Field Notes \(nps.gov\)](#)
[Willamette Valley Native Plant Partnership - Institute for Applied Ecology](#)



Photos. FROM SHORES TO THE INTERIOR.

Left: Habitat of the seaside woolly sunflower in California (*Eriophyllum stoechadifolium*). Credit: BLM SOS

Upper Right: Engelmann's hedgehog cactus (*Echinocereus engelmannii*) Credit: BLM SOS

Lower Right: Harvesting curlycup gumweed (*Grindelia squarrosa*) Credit: Mary Wolf, USDA-NRCS