TECHNICAL PROTOCOL FOR THE COLLECTION, STUDY, AND CONSERVATION OF SEEDS FROM NATIVE PLANT SPECIES FOR SEEDS OF SUCCESS

Bureau of Land Management
National Parks Service
U.S. Fish and Wildlife Service

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1. Introduction

This protocol outlines the procedures for seed collections as part of the Seeds of Success (SOS) program, a national native seed collection program led by the Bureau of Land Management (BLM) in collaboration with the National Park Service (NPS), U.S. Fish and Wildlife Service (USFWS), the USDA Agricultural Research Service (USDA-ARS), Tribal Nations, and other non-federal partners.

The purpose of the SOS program is to establish a national collection of high-quality, accurately identified, and well-documented seeds from native plant species. These seed collections support the development of native plant materials for ecosystem restoration, research, and germplasm conservation. Each seed collection should represent the genetic diversity of the sampled population.

The national collection serves as the foundation for increasing the availability of native plant materials, which are essential for restoring resilient ecosystems and for off-site (ex-situ) conservation efforts.

1a. Program History and Partnerships

The SOS program began in 2000 through a partnership with the BLM and the Royal Botanic Gardens, Kew's Millennium Seed Bank through a cooperative agreement. The Millenium seed bank's goal to get native plant seeds from around the world into long term conservation, with the BLM coordinating US partner contributions.

In June 2008, a Memorandum of Understanding (MOU) was signed by the BLM, Chicago Botanic Garden, Lady Bird Johnson Wildflower Center, Native Plant Trust (formerly the New England Wildflower Society), New York City Department of Parks and Recreation, North Carolina Botanical Garden, and the Zoological Society of San Diego. The 2008 MOU formally recognized SOS as a US national native seed collection program, coordinated by the BLM.

Phase 1 of the Millennium Seed Bank (MSB) Project was completed in 2010, marking a decade of progress. The nature of the SOS program shifted, as funding from Kew was no longer provided to U.S. partners. Rather than sending seed collections to Kew, SOS continued its strategy of making multiple collections of restoration species to compile genetically representative seeds from across the species' range. **Today, the program focuses on making between 10 to 20 collections per species within each ecoregion or seed transfer zone.**

In August 2023, the SOS program expanded further when the National Park Service and U.S. Fish and Wildlife Service signed an interagency MOU with the BLM to collaborate on national seed collections. This MOU codified the cooperation among these federal agencies and provided a framework to enhance SOS funding and coordination for collecting and conserving seeds to restore native plant communities across Department of the Interior (DOI) lands. The BLM continues to host the National Coordinating Office, which manages overall program data,

infrastructure, training, and program guidance. Each agency oversees its own SOS teams and designs collection strategies tailored to its specific restoration objectives. At the same time, agencies work collaboratively across different regions to share insights and resources enhancing the effectiveness of their conservation efforts.

1b. Membership

Today, the program is led by the BLM in collaboration with NPS and USFWS. These agencies work with other federal organizations, Tribal Nations, and non-federal groups to handle scouting, seed collections, cleaning, testing, storage, data management, and herbarium voucher processing.

SOS partners form a network of experienced seed collectors, restoration experts, botanists, and researchers. To date, over 3,000 people have been trained in SOS collection protocols. Federal agencies, Tribal Nations, state or municipal governments, botanical gardens, and non-profit organizations can inquire about future partnerships by contacting the SOS National Curator (Appendix A). Partnering with organizations ensures sustainable collaborations and access to support networks, ensuring the production of high-quality seed collections.

1c. Program Goals

A key goal among all SOS participating agencies is to increase access to reliable, cost-effective supply of native plant materials for restoration and rehabilitation. SOS the first step in the Native Plant Materials Development Process (NPMDP), which focuses on increasing the quality and quantity of native plant materials available for restoring and maintaining resilient ecosystems.

The Native Plant Materials Development Process

SOS's role in this effort is collecting wildland native seeds for research & development, germplasm conservation and are used for seed production. The seeds used in production efforts will eventually end up back on the landscape through various ecosystem restoration efforts. Because the SOS program strives to collect 10 to 20 collections per species within each ecoregion or seed transfer zone, we can better the capture genetic diversity needed to develop of suitable ecotypes for restoration.

2. Getting Started

2a. SOS Data Policy

Everyone participating in the SOS program must sign a SOS Data Confidentiality Agreement before being given access to any data by using the SOS Data Confidentiality Agreement Form (https://forms.office.com/g/r5SmF9uxVh). The National Coordinating Office will maintain a record of all those who have signed the agreement and a copy of this confidentiality agreement will be emailed to signees for their records. The confidentiality agreement is also available as Appendix B in the protocol.

SOS data is highly sensitive and is shared only with authorized program participants who need it to support seed collection activities. Access is granted on a **need-to-know** basis to agency staff, external partners, collectors, supervisors, and quality control personnel. The National Coordinating Office ensures secure data management and implements several safeguards.

The term "SOS data**"** refers to information collected, stored, or maintained as part of the Seeds of Success program, including but not limited to data on species, geographic coordinates, maps, directions, site names, trail names, county location, nearby towns/cities, species names (both scientific and common), associated species, collection numbers, seed inventories, testing results, and any other information related to scouting, collecting, or monitoring activities within the scope of the program. This data may include both electronic copies (e.g., digital files, databases) and physical copies (e.g., paper forms, physical logs) and is subject to strict guidelines regarding its maintenance, access, sharing, and disclosure.

SOS Data Use and Sharing Guidelines

Following these guidelines ensures the responsible management and confidentiality of SOS data.

1. **General Rule on Data Sharing:**

   No SOS data (including geographic coordinates, maps, directions, site names, trail names, county location, nearby towns/cities, species name [scientific or common], associated species, and collection numbers) may be discussed, disclosed, released, reproduced, or otherwise provided to any third party without prior, written consent from the SOS National Coordinating Office with the exception of non-sensitive end of season data as outlined in section 3 below. *All other requests for data sharing should go to the BLM SOS National Curator*.

2. **Data Security and Confidentiality Requirements:**

   To ensure the protection and integrity of SOS data, all individuals involved with the program must adhere to strict guidelines regarding data maintenance, access, and sharing.

A. *Data Maintenance:*
All SOS data (both electronic copies and physical data sheets) must be stored in a secure location. A secure location is one that is not publicly accessible and can only be accessed by individuals directly involved with the SOS program. SOS data should not be stored on personal devices.

B. *Data Sharing and Access:*

i. SOS data must not be shared or made accessible to unauthorized individuals.

ii. GeoPlatform and Data Portal login information will remain confidential and must not be shared.

iii. SOS data should not be posted on public-facing websites or otherwise disclosed in a manner that could compromise confidentiality.

iv. After gaining written permission from the SOS National Coordinating Office, any reports, maps, or visuals produced with SOS data must have a 10-mile buffer around the collection or scouting site.

C. *Photo and Public Content Restrictions:*

i. Do not post photos or information that show recognizable landmarks, formations, or specific coordinates related to SOS data on social media platforms, iNaturalist, websites, personal blogs, or newsletters without prior, written consent from the BLM SOS National Curator.

ii. Collectors are required to disable/delete location data from all SOS-related photos.

3. **Additional Data Sharing Guidelines for Current Season Collection Teams**

A. *Reporting Current Season Data*

Active SOS teams may need to share their team's current season collection and scouting activities to fulfill obligations for permits, activity reports, or other necessary reporting purposes.

i. <u>Current season data requests</u>

a. SOS data is not to be exported from the GeoPlatform. Teams must submit a data sharing request through the GeoPlatform Data Request form in their data management site.

b. Requests will be reviewed and approved by the corresponding SOS Agency Coordinator.

c. Sensitive data will be provided if approved by the SOS Agency Coordinator and National Coordinating Office

ii. Reportable data

Active collecting teams may report the following types of data from **their** current season's collections, as long as it complies with all other data security guidelines:

a. Species, state, county, or any collated numbers (e.g., scouting visits, collection visits, total plants sampled, estimated PLS collected, etc.).

iii. Additional permission needed for reporting sensitive data

Justification for sharing sensitive data must be included in the initial data sharing request. The following can only be shared after prior, written consent has been obtained from the SOS National Office:

a. Specific location data, including coordinates
b. After gaining written permission from the SOS National Coordinating Office, any reports, maps, or visuals produced with SOS data must have a 10-mile buffer around the collection or scouting site.

2b. Getting Started for the Season - Communication

Effective communication is critical for the success of SOS collections. The BLM oversees the National Coordinating Office, which manages program data, infrastructure, training, and policies. Each agency is responsible for designating a coordinator who handles inquiries and manages their own SOS teams (right).

Interagency Coordination.

Questions about logistics, training, or support should be directed to your agency's coordinator (Appendix A). Coordinators communicate regularly with the National Coordinating Office and other agencies to ensure everyone has the necessary information and support. Appendix H lists the 2025 teams and their corresponding coordinators.

SOS facilitates communication through its website, email list, and monthly Collector's Call:

- **Website:** Visit the SOS website (www.blm.gov/sos) for collection guidance, training materials, contact information, and other resources.

- **"Getting Started" section on the SOS website** (www.blm.gov/sos)**:** All current season participants should follow the steps in the Getting Started section to register for 2025

communications, the monthly collector call, to get data collection access if needed, and sign up for a training.

- **Email List:** Subscribe to the SOS email list for program-related discussions by visiting the Seeds of Success email list (https://lists.plantconservation.org/mailman/listinfo/sos_lists.plantconservation.org) or emailing sos-request@lists.plantconservation.org with "SUBSCRIBE" in the body of the message. After sending this message, you will receive an email that requires a confirmation response. After confirming your subscription, you will receive instructions on how to use the list. If you are having trouble, contact the SOS National Curator.

- **Monthly Collector's Call:** SOS holds a Microsoft Teams meeting on the first Tuesday of every month for all active partners and acts as a forum to discuss issues, ask questions, and share updates. ***At least one representative from each collecting team is required to attend***. To receive a meeting invitation, fill out the 2025 registration form found on the SOS getting started page. Reminders, cancellations, and meeting notes will be posted to the SOS listserv and uploaded to the GeoPlatform Help Documents.

  Calls are conducted via Microsoft Teams, but there is also a dial-in option available for teams that are in the field.

  Collector's Call Schedule:

  - 12:00 PM – Eastern Time
  - 11:00 AM – Central Time
  - 10:00 AM – Mountain Time
  - 9:00 AM – Pacific Time
  - 8:00 AM – Alaska Time

2c. Getting Started for the Season - Training

Proper training is essential to ensure that seed collectors follow the SOS protocol, minimize harm to plant populations during collections, and collect good data. Visit the SOS website's "Getting Started" section for the most up to date training schedule. ***Contact your Agency Coordinator if you cannot find a training session that meets your team's needs.***

All those involved with SOS must participate in a training course provided by the National Office each season. External partners hired by the BLM, NPS, and USFWS must ensure their teams receive the SOS Technical Protocol training and any additional training required under the terms of their contract or agreement.

Several training opportunities are available each year for SOS collection teams:

- **BLM National Training Center, In-person**: An in-person training course is offered each spring for BLM, NPS, and USFWS employees and partners. There is no course fee, however participants are expected to cover their own travel expenses.

- **Additional in-person trainings**: Occasionally additional in-person trainings are offered throughout the collection season. All available in person trainings will be posted on the training registration form.

- **Live Virtual Trainings**: Free virtual training sessions are available throughout the collection season for BLM, NPS, USFWS, and seed collection partners. These sessions cover the same core content as the BLM in-person course but do not include the hands-on, field component. Teams are encouraged to pursue in-person training specific to their regions.

Training Preparation

Before attending a training, collectors must fill out the annual registration form found on the Getting Started Page of the SOS website, and if collecting / editing / reviewing collection data for the year register for a GeoPlatform account following the directions on the registration form. It can take up to a week to get account approval, so collectors should plan accordingly and ensure they have enough time to get their accounts working before attending a training.

2d. Seasonal Workflow

Although seed collection timing depends on phenology, all SOS teams follow a general workflow (below). Each agency has minor workflow variations (Table 1). The SOS Operations Manual (found in the GeoPlatform help documents) contains a detailed guide on SOS roles, responsibilities, and example workflows.

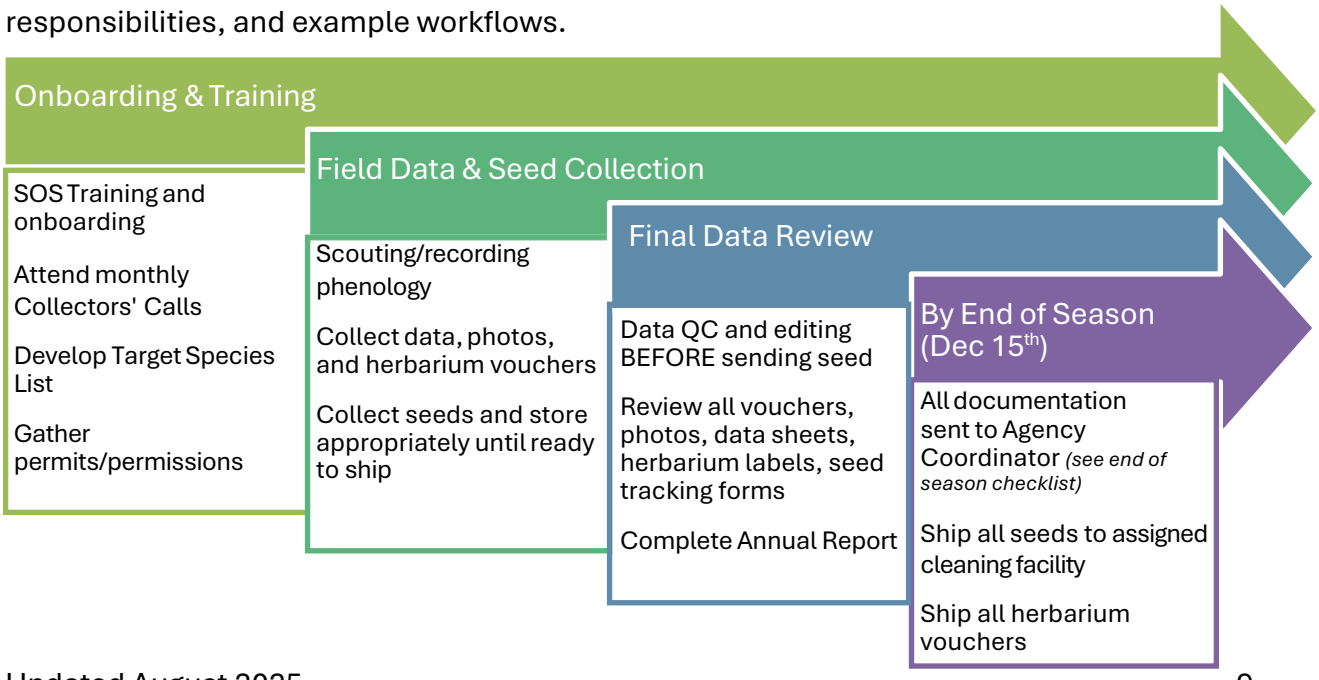


Table 1. Workflow differences for each agency

Activity	BLM	USFWS	NPS	DOI/Interagency
Monthly Collectors Calls (Section 2)	Attend general meeting, then BLM breakout session	Attend general meeting, then FWS breakout session	Attend general meeting, then NPS breakout session	Attend general meeting, then breakout session that corresponds to assigned Agency Coordinator
Herbarium Vouchers (Section 10)	Use BLM label template	Use USFWS label template.	Use NPS label template but do not send Smithsonian voucher copies. Keep labels with specimens until further notice*	Use the BLM label template, submit all collections EXCEPT from NPS managed lands*
Treating Seeds (Section 13)	Use Hotshot No-Pest strips	Use Hotshot No-Pest strips	Use Terro Garbage Guard (EPA #5481-348-149), follow additional IPM instructions in Section 13	Follow NPS protocol if seed is being treated at a park. If treated on other lands, use either treatment protocol.
Seed Cleaning Facility (Section 14)	Teams will be assigned to a specific seed cleaning facility. Contact your Agency Coordinator to ensure you are sending seeds to the correct location.			

**For 2025, NPS agency teams and DOI teams (when collecting on NPS managed land) should collect vouchers, make herbarium labels, and draft transmittal letters, but NOT send vouchers to the Smithsonian. Contact Katie VinZant, NPS SOS Agency Coordinator, for further information on temporary voucher storage. See Identification and Herbarium Specimens (Section 10) for more information.*

2e. End of Season Reporting and Data Management Requirements

SOS teams must finalize scouting and collection data and submit all required materials to their Agency Coordinator by **December 15th**. Relevant materials include photos, data forms, permits, and an annual report. The annual report should summarize collections, challenges, highlights, and recommendations for improvement. The annual report template can be found on the SOS website and an example annual report is in the appendix (Appendix E). Teams may also submit

additional comments to their Agency Coordinator throughout the year. Failure to submit complete and timely end-of-season data may affect an organization's eligibility to host SOS crews in the future. **An end-of-season checklist is available in Appendix M and on the SOS website.**

SOS teams and team organizers must review these key data management requirements:

a. **Finalize and review all data reporting before seasonal staff leave and seeds are shipped, and NO LATER THAN December 15th.** See section 14a for more information about the data finalization process.

b. Collections may not start until all prior-season reporting is complete.

c. Ensure all elements of a collection (data, photos, vouchers, and permits) are at least 95% complete. Missing components have a one-year grace period; repeated issues will result in a one-year suspension for collections at the site.

d. Retain copies of records, photos, and annual reports at participating field offices/parks/refuges/etc.

e. Notify the SOS National Office immediately if species identifications or location data change after shipping the seeds or vouchers. If these changes occur and the seeds or vouchers are still in possession, update all associated records (data forms, photos, vouchers) before sending the materials (Section 10b).

f. Teams using digital data tools must use the data management dashboard on GeoPlatform to check for errors and incomplete information.

g. Teams using paper data sheets and the SOS portal must confirm that collections are SOS before entering data into the SOS portal. Notify the National Curator immediately of any errors in collection numbers or species identification.

3. Target Species

Teams must submit a target species list to their Agency Coordinator by April 30th each year. Target species lists help track seed collection efforts, assess cleaning needs, and identify gaps. A target species list template is available on the SOS website.

How are target species selected?

The SOS program focuses on collecting common native workhorse species appropriate for restoration, stabilization, and rehabilitation projects. SOS seeds are used for a variety of projects such as emergency fire rehabilitation, wildlife and pollinator habitat restoration,

threatened and endangered species habitat support, roadside revegetation, and waterway stabilization. Collections also focus on areas vulnerable to changing weather patterns or extreme weather events such as hurricanes, floods, droughts, and wildfire. A well thought out target species list includes target species as well as more specific information like target seed transfer zones (https://research.fs.usda.gov/pnw/products/dataandtools/interactivemaps/seed-zone-webmap) or other important ecological variables like elevation or level 3 or 4 ecoregion (https://www.epa.gov/eco-research/ecoregions).

Collection teams should work with their State and Ecoregional Botanists or other Science leads to create regional restoration target lists. Historic collection data can also be used to help compile a target species list, and teams can contact their Agency Coordinator to gain access to this data. If revisiting historic collection sites is part of target species planning, teams must follow proper SOS recollection protocols (Section 7d).

A 2021 spatial gap analysis of BLM priority taxa revealed that more collections are needed for every target species to meet SOS's goal of 10 to 20 collections per ecoregion or seed transfer zone. It is recommended that teams develop their target species lists with this goal in mind.

3a. Species Specific Weight Limits

While the SOS program will accept collections of any orthodox native species without a threatened or endangered status (Section 4), there are several genera that can be challenging to process and have limits on how much can be gathered per collection. The following genera and species are limited to 5 or 10 lbs of raw (uncleaned) weight per collection. Please be aware if these are on your target list for the season. If you have a question or concern about these limits, contact your Agency Coordinator. **Contact your Agency Coordinator and Sarah Hill ahead of time if planning to have *any* collections close to or over 50 LBS.**

Limited to 5 lbs uncleaned weight	***Limited to 10 lbs uncleaned weight***
Achnatherum – all species except: • *A. hymenoides (no limit)* • *A. lemmonii (no limit)* • *A. speciosum (no limit)*	Juniperus – all species
Aristida – all species	Prosopsis glandulosa
Bothriochloa - all species	
Bouteloua - all species	
Chilopsis linearis	
Gutierrezia - all species	
Hesperostipa – all species	
Muhlenbergia – all species	
Schizachyrium - all species	

4. Species Excluded from SOS

The SOS program excludes the following species from seed collection:

- Native plant species listed as Threatened, Endangered, Candidate or Proposed under the *Endangered Species Act*.
- Species ranked as G1 or G2 by a State Heritage Program.
- Species ranked as S1 or S2 by a State Heritage Program in the states that they are classified as such.
- Species classified as a BLM State Director Sensitive Species (ranked G3 or S3) by a State Heritage Program and included in the Center for Plant Conservation (saveplants.org) (CPC) network collection (Appendix I). BLM Field Office Botanists must coordinate with their regional CPC Garden to avoid unintentional collections by both groups.
- Species listed in Appendix I of the Convention on International Trade in Endangered Species (CITES).
- Non-native species to the U.S.
- Agricultural or food crop species.
- All species in the genus *Quercus*.
- Cultivars or populations from established vegetation treatment sites.
- Known recalcitrant seeds (e.g., seeds that cannot tolerate dry, frozen conditions, https://saveplants.org/best-practices/difference-between-orthodox-intermediate-and-recalcitrant-%20seed). The Seed Information Database (ser-sid.org) is a great resource to check if target species are recalcitrant.
- Intermediate or sub-orthodox seeds, such as those from the genera *Salix, Populus,* or *Ulmus*.

5. Storage and Distribution

Seed collections undergo cleaning, testing, and processing at various facilities. Since 2003, the USDA-FS Bend Seed Extractory has served as the primary cleaning facility for the lower 48. In 2023 and 2024 new cleaning and storage partnerships was established with the USDA-FS Dorena Genetics Resource Center, the USDA-FS National Seed Laboratory and the University of Nevada, Reno. In Alaska, the Alaska Plant Materials Center in Palmer manages these processes. New SOS programs in Hawaii and Puerto Rico are developing their own seed cleaning and storage facilities, which will follow the same standards and procedures.

After cleaning and processing, collections are divided into two portions: **long-term storage** and **short-term storage** (Table 2). Long term and working collection storage needs are managed by the USDA Agricultural Research Service (USDA-ARS), while short-term storage needs are addressed by the cleaning facilities.

Table 2. Seeds of Success storage definitions

Long-term Storage Portion	The first 3,000 seeds from any SOS collection are stored in long-term storage conditions for research and conservation purposes with USDA-ARS. 2,000 seeds are designated as a "working" collection available through GRIN-Global. 1,000 seeds for "long-term" storage are conserved as a genetic resource by The National Laboratory for Genetic Resources Preservation.	3,000 PLS (Pure Live Seed)
Short-term Storage Portion	All leftover seed after the long-term storage portion is sent to USDA-ARS are available for native plant materials development projects. Seeds are kept in short-term storage conditions by the cleaning facility until requested. The agency/office responsible for coordinating the collection has the first right to the seed. Other SOS partners may use the seed by contacting the SOS National Curator and getting permission to use the seed by the original coordinating agency/office.	PLS depends on initial collection size

The first 3,000 seeds of a collection are reserved for long-term storage. The long-term storage portion is subdivided and sent to two USDA-ARS facilities: The Plant Germplasm Introduction Testing and Research Unit (PGITRU) in Pullman, Washington, and the National Laboratory for Genetic Resources Preservation (NLGRP) in Fort Collins, Colorado. The remaining seeds of the SOS collection are made available for native plant materials development projects and are referred to as the short-term storage portion; these seeds are kept at a designated cleaning facility. For more information on how to request seeds for projects, please refer to Section 14f.

PGITRU in Pullman serves as the processing center for SOS accessions entering the National Plant Germplasm System (NPGS). PGITRU has formed partnerships with the BLM, the Kew Millennium Seed Bank, and other members of the Plant Conservation Alliance for the collection and conservation of native plant species in the United States.

PGITRU receives a portion of seeds from each SOS collection. From 2005 to 2021, PGITRU received 10,000 seeds split between a working collection long-term storage. In 2022, the standard number of seeds allocated for the USDA-ARS partnership was adjusted to 3,000 seeds for standard and operational SOS collections and 1,000 seeds for recollections. As of 2023, all collections, regardless of type, will allocate 3,000 seeds for long-term storage.

PGITRU enters collection data into the NPGS and maintains a working collection of 2,000 seeds for distribution to researchers involved in projects related to native plant materials development through GRIN-Global (https://npgsweb.ars-grin.gov/gringlobal/distribution). Additionally, PGITRU keeps a small backup for long-term storage at 4°C. PGITRU sends 1,000 seeds to the NLGRP in Fort Collins for long-term storage at -20°C, along with research related to seed storage and long-term preservation (see Table 3).

Table 3. Seeds of Success germplasm proportioning for long-term storage

SOS Long-term Storage Portion	Ratio to Long-term Storage at NLGRP (Fort Collins) -20°C	Ratio to working collection for PGITRU & GRIN-Global (Pullman) 4°C
< 3,000 seeds	1/3	2/3
> 3,000 seeds	The first 3,000 seeds will be partitioned as in the row above. The remaining balance is then available for native plant materials development projects (short-term storage portion).	

6. Permission to Collect

All SOS seed collections require permission to ensure compliance with land use regulations. Careful planning ensures that teams are only collecting in designated, approved areas where permission has been granted.

6a. Collecting on BLM Lands

SOS collections on BLM managed lands are allowed without any additional permits or permissions, but collectors must consult with your local BLM Field Office to confirm specific guidelines and ensure compliance with local policies. A free use permit may be issued to SOS collectors in specific BLM areas, or the local contact may decide no permits are needed for collection. Regardless of if a permit is issued or not, collectors should always have some written documentation (such as an email from the local BLM contact) on them proving they are SOS collectors and are allowed to collect seed and voucher specimens.

Collecting seeds on BLM-managed public lands is categorized as a Categorical Exclusion (CX) under the National Environmental Policy Act (NEPA). The Department of Interior (DOI) 516 Manual serves as the official guidance for determining the level of mandatory NEPA review.

BLM's CX list is found in the DOI NEPA manual under 516 DM 11, Section 11.9 (effective as of December 10, 2020). There are five exclusions within the Forestry program section. The fifth exclusion pertains to seed collection, specifically stated as follows: *(5) Disposal of small amounts of miscellaneous vegetation products outside established harvest areas, such as Christmas trees, wildlings, floral products (ferns, boughs, etc.), cones, seeds, and personal use firewood*. This exclusion applies to small amounts of vegetation products, including seeds. Thus, SOS collectors do not need additional paperwork for seed collection on BLM lands, including Wilderness Areas.

BLM can also authorize volunteer groups to collect SOS seeds on BLM managed lands. However, team leads must appear as the collector on data forms to comply with DOI privacy standards when individuals are collecting in a personal capacity.

6b. Collecting on NPS, USFWS, and other Non-BLM Lands

Collections on private, state, or other non-BLM federal lands (e.g., NPS, USFWS, USDA Forest Service, Department of Defense) require landowner permission. Teams must document permission on the field data form of the associated collection and ***retain written authorization*** at their agency office.

If the landowner does not provide a collecting permit, teams can use the Authorization Letter for SOS Collecting template available on the SOS website.

All teams must submit all non-BLM collection permits to your Agency Coordinator during end-of-season reporting.

7. Assessing Populations for Collection

It is essential that a knowledgeable botanist guides the collection team and is actively involved in identifying the most appropriate populations for sampling. The selection of target populations will be the responsibility of the lead botanists or plant ecologists from the BLM ecoregional, state, or field offices, along with ecology and restoration specialists from NPS, and science leads from USFWS. There are three distinct types of SOS collections, as outlined in Table 4:

Table 4. Seeds of Success collection definitions

Collection	Definition	Estimated PLS
Standard SOS Collection	Any collection under 80,000 estimated PLS.	3,000 - 80,000 PLS (Ideally 10,000+ PLS)
Operational SOS Collection	Over 80,000 estimated PLS (weight can vary). The purpose of these collections is for restoration, particularly for increasing through a seed increase grow out.	80,000 + PLS
SOS Recollection	A seed collection made from a population that has previously been collected from following the SOS Protocol.	3,000+ PLS

Ideal seed collections include seeds collected from **more than 100 plants** (though 50 is the absolute minimum number of individuals) with **over 10,000 viable seeds,** taken from **no more than 20% of the total seed in a population**. The minimum collection size is 3,000 PLS, with all the material designated for long-term storage. Larger collections (10,000+ viable seeds) are preferred because this size allows for:

- Sufficient seed for germination and viability testing.

- Substantial seed available for restoration and native plant material development projects.
- Seed available for educational and/or scientific purposes.
- Seed that is conserved as a long-term safeguard against loss of the wild population.

7a. What is a 'population'?

Without genetic testing, it is challenging to determine where one distinct plant population ends, and another begins. The general SOS definition of a population is "plants within a 1km radius and a 200m elevation range, which have adapted to the same environmental conditions through time (aspect, associated species, soils, disturbance, etc.)." Population extents and the area that was collected in should be well documented on data sheets and clear to future collectors who may revisit the site. Collectors should use their best judgment and seek guidance from local botanists and ecologists when determining a population boundary. Geographic features such as roads, ridges, or rivers can inhibit the gene flow between populations and can be useful indicators for separate populations. Similarly, strong differences in aspect, soil, precipitation, or associated species can influence specific population adaptations and should be assessed when determining the extent of a single collection. For long, continuous stands such as a prairie, a distance of at least one kilometer (approximately 0.62 miles) should separate collection sites to consider the groups as separate populations.

It may be helpful to think of a 'population' as a collection site, rather than a true genetically unique assembly of plants. SOS seeds are used for a variety of purposes, including extensive research, and any seeds collected as one 'population' must have corresponding environmental data that is accurate to the collection site. If seeds from multiple sites were combined, but each site had differences in environmental data, it could be difficult for researchers to draw useful conclusions about site specific adaptations, or population trends across a species' range.

7b. Preliminary Site Visits / Scouting

Preliminary site visits are necessary for assessing plant populations, confirming species identification by collecting herbarium voucher specimens (Section 10), taking photos, estimating potential seed production, and planning collecting dates. Historical SOS data can also assist in predicting when a species is ready for collection in a particular region. When suitable populations are found, and the quality and quantity of seeds are adequate, it may be possible to collect several different species from the same site. If you find a non-target species population at the same location, consult with your local botanist or project lead about making an opportunistic collection of the species is of interest.

Before collecting seeds, consider the following:

a. Ensure that the population is wild and not from planted or cultivated sources.

Example: If collecting in a burned area, do not collect seeds from native species that were part of a seed mix used for post-fire restoration efforts in that area. Native species that were not seeded at that site may be collected.

b. DO NOT collect from small populations with fewer than 50 individuals. Proceed with caution for populations expected to produce fewer than 10,000 viable seeds.

c. Seed development can vary both within and among populations of the same species. Conduct cut tests to monitor seed maturity and to assess insect damage and the presence of empty seeds before collection.

d. You can revisit a site to collect multiple times throughout the season to enhance the genetic diversity of the samples.

7c. The SOS Digital Scouting Form

Collectors should enter scouting information including population phenology, potential collection size, locality information, and other data they wish to capture at the time of the visit on the SOS Digital Scouting Form via a mobile device *(Section 11)*. Consult the "All Digital Data Guides" help document for workflows and instructions on how to use the scouting form, and the "SOS Forms Walkthrough" for an example of how to fill out the scouting form.

7d. Recollecting from Previous Populations

While SOS encourages identifying new populations for seed collection, recollecting from previously collected sites may be necessary for large-scale restoration operations. A knowledgeable botanist should assess the population's health and suitability before any recollection is made. Factors to consider include population health, potential decline, or the impact of adverse conditions like drought over previous years.

Recollection must follow all components of the SOS protocol as outlined in this document:

- Training, Communication, Workflow, and Annual Reporting (*Section 2*)
- Permission to Collect (*Section 6*)
- Assessing Populations for Collection (*Section 7*)
- Sampling Strategy (only collecting 20% of available seed) (*Section 8*)
- Identification and Herbarium Specimens (*Section 10*)
- Data Collection (*Section 11*)
- Photos (*Section 12*)
- Post-Collection Seed Care (*Section 13*)

When recollecting, the following process must be followed:

1. **Allow adequate rest between collections:** Ideally allow a three-year population rest period in-between collections. Recollecting two years in a row is permissible under certain conditions, such as needing bulk seed for production or if favorable precipitation and seed yields are present. Do not recollect a population for more than two consecutive years.

   Example: If you collect in 2025 but not in 2026, ideally you would wait to recollect in 2029. If you collect in 2025 and 2026, you must wait three full years until 2030 for the next collection.

2. **Document New and Historic Seed Collection Reference Number:** Assign a new SOS Collection Reference Number for each recollection (see Section 11b for formatting and numbering). When selecting the hyperlink, the Recollection field will autofill "Yes" and the "Original Seed Reference Number" field will displayer the original seed collection number. If using paper data sheets, you will link the recollection to the original SOS collection in the data form by selecting *Yes* in the "Recollection" field and record the original seed reference number in the "Original Seed Reference Number" field.

3. **Document In Field Notes:** Begin the "Field Notes" section with "RECOLLECTION."

4. **Document In Annual Report:** List both the original and new reference numbers in the annual report.

   Example: NM930-86/NM930-555

8. Sampling Strategy to Maximize Capturing Accurate Population Genetics

How many plants should I collect?

Collectors should target populations with over 50 seed bearing plants to ensure sufficient genetic diversity. Ideally, populations would be from many, many more than 50 individuals. To capture a broad representation of genetic variability, teams must maximize the number of alleles (gene variants) in their seed collections. Research by Brown and Marshall (1995) suggests that to obtain 95% of the alleles occurring at frequencies above 0.05 in a population, teams should sample:

a. 30 randomly selected individuals from a fully outbreeding sexual species, or

b. 59 randomly selected individuals from a self-fertilizing species

Because the reproductive biology of many native target species has not been studied, larger sample sizes may be necessary to capture rarer alleles.

Sampling Strategy

Implementing the 20% rule

A collection should be no more than 20% of total seeds in a population across the growing season and consist of no more than 20% of the ripe seeds in a single day.

There are two main strategies for collecting a small portion of seed each collection day: Taking up to 20% of ripe seed from each plant or taking all the ripe seed from every 5th plant you come across. Taking up to 20% of ripe seed from each plant is a good strategy to reduce collector bias and ensure the entire range of genetics present in a population are represented in a collection. Collecting seeds from every fifth plant is a good approach for clonal or rhizomatous species as collecting from widely spaced intervals increases the likelihood of capturing genetically distinct individuals. If collecting everything from every 5th plant, collectors should be careful not to artificially select certain traits, for example by harvesting only from large plants or plants with high seed production. A good way to avoid bias with this technique is to start with one plant, then count the next 1-2-3-4-5 plants you encounter, and collect from the 5th plant regardless of how it looks.

Revisiting a population throughout the season

Collectors are encouraged to return to a population multiple times throughout the seed dispersal period to enhance the genetic diversity of the samples as long as they do not go over the 20% collection threshold. Seeds collected from the same population during a single growing season are considered a single collection. Seeds from each visit to the same population that year will be assigned the same Seed Collection Reference Number, and each collection date will be recorded on the data sheet. See the glossary (Appendix K) for more information on formatting collection dates, and the "All Digital Data Guides" document for the data collection workflow for collecting on multiple days.

9. Seed Collection Process

All SOS seed collections must follow the SOS process outlined in Table 5. If collecting non-SOS seeds, please ensure that you are following the appropriate protocols specified by your Agency in your contract or agreement (Section 11c).

Collectors should enter all collection on the SOS Digital Collection Form via a mobile device (Section 11a). Consult your group's GeoPlatform Help Documents for collecting workflows and assistance on filling out the collection form.

Table 5. Seed Collection Process

Step	Action	Rationale
1	Assess the target population and confirm that enough individual plants (> 50) have seeds at natural dispersal stage.	Ensures adequate genetic diversity can be sampled from the population and that seeds are likely to be mature / maintain maximum viability and longevity.
2	Carefully examine a small, representative sample of seeds using a cut test and hand lens.	Estimates the frequency of empty or damaged seeds and confirms that most seeds are mature and healthy.
3	If seeds look mature and ready to collect, open a SOS digital collection form in the center of your population. You can wait until later to enter collection data, but opening the form onsite is crucial.	Opening the collection form onsite guarantees that location information is captured correctly and ensures any location-based autofilled information is accurate.
4	Use information from the cut test to estimate the viable seed production with this equation: *(# of viable seeds per fruit) * (# fruits per plant) * (# of plants in the population) * 0.2 ≥ 10,000 seeds (or other collection target)* Optional *(but required for some collectors)* – enter data on seed viability equation tool page of the collection form.	Documents species seed biology, assess the influence of collecting on the population, prevents collection from unhealthy, small, or unripe populations. Helps track collector effort and potential yields for reports and informs which collections should be requested back for NPMD projects.
5a	Collect mature, dry seeds in either cloth or brown paper bags. If using plastic buckets or non-breathable containers transfer into paper bags soon after collecting. Tape the corners or seams of bags to prevent losing material.	Ensures the highest possible viability at collection, maximizes viability in storage, prevents mold and seed death.
5b	Fleshy fruits should be collected directly into plastic bags and sent to cleaning facility ASAP. More information on collecting and shipping fleshy fruits is in Section 14b.	Fleshy fruits decompose rapidly, and poor storage can lead to mold and seed death.
6	Collections should consist of seed, petals, chaff, pods, receptacles, short stems or some leaf material. Detailed cleaning is done at cleaning facility**. Do not collect large stems, woody material, rocks or other non-target material.**	Maximizes available field time and allows seeds to be cleaned in controlled conditions. Balance this with the knowledge that excess material can reduce the longevity of the seed.
7	Sample equally and randomly across the population and record of the number of individuals sampled.	Captures the widest possible genetic diversity from the plant population sampled. Where the population exhibits a pattern of local variation, use a stratified random sampling

		method to ensure sampling from each microsite.
8	Collect no more than 20% of the viable seed available on the day of collection.	Ensures that the sampled population is not over collected and can sustain itself into the future.
9	Collect at least 10,000 viable seeds, though the minimum collection size is 3,000 PLS. Regardless of size, all collected seed should be submitted to ensure the associated data reflects what is put in storage.	Enables maximum use of the collection after 3,000 PLS are sent to USDA-ARS.
10	Collect seeds from a population throughout the dispersal season. Combine seeds collected at the same site across a season as one collection. Use the same seed collection reference number. Note the multiple dates of collections on the SOS field data form.	Maximizes genetic diversity in the collection, capturing early, mid, and late bloomers.
11	Clearly label all bags (inside and out) with the Seed Collection Reference number, USDA PLANTS code, and collection date.	Ensures that this unique identifier is attached to each sample of a collection. All other data will be recorded on the field data form.
12	Let your seeds dry in a cool safe location until they are ready for treatment and shipping. See Section 13 for more information.	Properly drying seeds decreases the chances of mold and encourages after-ripening of some seeds.
13	Treat seeds for 72 hours with Terro Gabage Guard (NPS) or 48 hours with HotShot NoPest strips (BLM, USFWS), and write “treated” on all bags before sending to a cleaning facility. See Section 13 for more detailed instructions.	Kills any seed pests that may be loose in the collection, limits spread of pests during shipping, and limits seed cleaners’ exposure to mites or other insects that could cause allergic reactions.
14	Once all collection data is entered on the data form begin the data finalization/QC process outlined in Section 14a and detailed the document “SOS Digital Data QC Guide 2025”. After completing the data finalization process, collectors will be assigned a seed cleaning facility for each collection and may export data sheets and ship seeds.	Ensures all scouting and collection data is accurate and complete before data sheets are exported and sent to cleaning facilities. Allows National Office to assign cleaning facility to a collection based on size and desired cleaning speed. Allows cleaning facilities to plan cleaning workflows to meet seed use deadlines.
15	Package seeds securely so that no seeds are lost or damaged during shipping. Include a copy of SOS data sheet in the box, clearly label all bags and boxes as bag 1 of 3, 2 of 3, etc. See Section 14 for more detailed instructions.	Ensures seeds can be matched with data sheets at the cleaning facility and complete collections are cleaned together.
16	Submit a seed tracking form via mobile device or your group’s GeoPlatform data	Allows the National Office to track which collections are shipped in real time and allows teams to track where

	management site at the same time you ship seeds to a cleaning facility.	seeds were sent to submit the correct clearance forms at the end of the season.
17	Send collections to designated cleaning facility. Collections larger than 3,000 viable seeds can be requested back if they are needed NPMD project. See Section 14 for details on requesting material from a cleaning facility.	Cleaning prolongs the life of the seed and ensures the purity of the collection. 3,000 PLS from each collection is then sent to the NLGRP in Fort Collins, Colorado for long-term storage and the PGITRU in Pullman, Washington for storage and distribution through GRIN-Global. All remaining seed is stored at the cleaning facility until requested.

10. Identification and Herbarium Specimens

Accurate species identification is crucial for the value of SOS seed collections. While identifying to species level is mandatory, identifying to subspecies or variety is preferred. **Collections that are identified only to the genus level cannot be submitted to the program.** Obtaining high quality voucher specimens, photos, and getting external verification of a species' ID are essential steps in the SOS process.

10a. Identification and Verification

All species identifications must be verified by a second individual with a high level of botanical expertise. Ideally, species verification occurs before a collection has begun. Collectors should follow these steps to ensure correct identification:

1. Identify the target species using their local flora while scouting. Record key identifying characteristics and traits like flower color that could change when a plant is pressed for a voucher specimen in the scouting of collection notes. Identify to sub species or variety when possible.

2. Collect at least one voucher specimen and take good photos of key identifying characteristics before pressing (Section 10d).

3. Verify the species by sharing photos and pressed specimen with someone who has a high level of botanical expertise. The verification is usually done by a field office botanist, science lead, crew manager, or other expert in local flora.

4. Record species verification information on the scouting and collection data form.

5. If a target population is difficult to key out/confirm identification, collectors should not collect from the population until obtaining a second opinion confirming the ID. In the case of an ambiguous identification, it may be worth reaching out to a local herbarium for additional support with taxonomic verification. If local or regional herbaria offer this service, send a duplicate set of herbarium specimens along with a copy of the field data form. Not all herbaria do this, but many will assist if the specimens are of good quality and can be added to their collection.

10b. Correct a Misidentification

If a species is misidentified on a collection sheet, photos, or herbarium voucher collectors must correct it as soon as they realize it was misidentified.

To correct a misidentification, follow these steps:

1. If you still have the seeds and voucher specimens:
    a. Edit the species on the original scouting and collection Survey123 data form if you have **not** begun editing data in the data management site.
        -OR-
    b. Edit the species for both the scouting and collection records on the data management site if you **have** already begun editing data via the data management site. You will need to correct all instances of species, USDA PLANTS code, common name, duration, and habit.
    c. Change the ID on all collection bags and boxes.
    d. Change the ID on the herbarium sheet.
    e. Change the ID on all photo labels associated with the collection.
    f. If you already exported herbarium labels and datasheets from the GeoPlatform, make sure the ID is changed on the label and that the data sheet title and contents are updated.
    g. Ensure correct ID is listed on annual report.

2. If you have already sent seed or vouchers and do NOT have them on hand:
    a. Follow all the steps outlined above to modify the data records.
    b. Reach out to the SOS National Curator and your SOS Agency Coordinator ASAP. Tell them what needs to change (voucher label, collection label, etc.) and where material was sent (which cleaning facility or herbarium material was sent to).
    c. The National Curator will need to communicate with the herbarium(s) and cleaning facilities to make sure the ID is updated.

10c. Nomenclature

The USDA PLANTS database is the taxonomic standard for SOS and is accessible online (https://plants.usda.gov/home). Collectors must enter the accepted USDA PLANTS name on their data forms, photos, voucher specimens, and annual report. If a taxon is missing in the USDA PLANTS database, contact the SOS National Curator (Appendix A). If discrepancies exist between the USDA PLANTS database and your regional flora, note the preferred accepted name in the "Tricky Taxonomy" section of the data form.

10d. Herbarium Vouchers

While vegetative material and close-up photography can assist in identification, high-quality herbarium vouchers (pressed, dried plant specimens) provide the most critical material for ID verification**. One mandatory unmounted voucher per collection will be sent the US National Herbarium at the Smithsonian***. Additional vouchers may be sent to the land managing office where the collection took place, or a regional herbarium if storage space is available. Collectors must check with their coordinating office/agency to know whether additional voucher collection will be required and if so, if the vouchers will need to be mounted when sent to local or regional herbaria. **For 2025, NPS agency teams and DOI teams (when collecting on NPS managed land) should collect vouchers, make herbarium labels, and draft transmittal letters, but NOT send vouchers to the Smithsonian. Contact Katie VinZant, NPS SOS Agency Coordinator for further information on temporary voucher storage.*

Examples of good vouchers from the Smithsonian's Digital Collections.

Collecting good vouchers takes some skill and attention to detail. While voucher collection addressed in virtual SOS training, collectors are encouraged to seek hands-on training from an experienced botanist while collecting specimens in the field. Additional guidance on proper techniques for herbarium specimen preparation includes Radford et al. (1974), Ross (1994), Bridson and Forman (2010) (see Appendix J), and numerous online resources found in the SOS Resources document in the GeoPlatform Help Documents. Collectors can also browse the Smithsonian's digital herbarium records to see examples of good vouchers (https://collections.nmnh.si.edu/search/botany/)

Keep the following in mind when collecting herbarium specimens for the SOS program:

a. **Each collection must have at least one complete set of herbarium vouchers submitted to the Smithsonian Institute**. Herbarium specimens are valuable outputs of the program. If local or regional herbaria have been identified to accept specimens, crews may collect additional sets of vouchers to be stored at these locations, at the discretion of the acting field office or contracting agency.

b. **Herbarium specimens are scientific records unto themselves**. Vouchers become official records of a plant's morphology, phenology, and presence at a specific location at a specific point in time. Herbarium records are used for a variety of scientific studies and high-quality specimens and accompanying data are critical for good research.

c. **Close-up photographs, particularly of flowers or parts that have been damaged from pressing and drying, are welcomed** and can be emailed to the herbarium coordinators along with the vouchers. Any accompanying photos should include the Seed Collection Reference Number and Species in the file title.

d. **Voucher specimens should include flowers and any plant parts necessary to confirm species ID.** Collect flowering voucher specimens prior to seed collection (i.e. during scouting). If plants are no longer blooming during a scouting or collecting visit document that information on the collection form and plan a return to collect a voucher the next season. These specimens **must** be taken from the same population seed is collected from to ensure accurate identification and population monitoring.

The Herbarium Voucher Collection Process

1. *Collection tips*
   a. The standard size for a Smithsonian herbarium sheet is 11 ¾ inches wide by 16 ½ inches long. If your specimen is larger than this, consider dividing or folding it so it fits comfortably on the sheet.

   b. Cut the newspaper in your plant press to the size of the herbarium sheet to ensure that your specimen is the correct size.

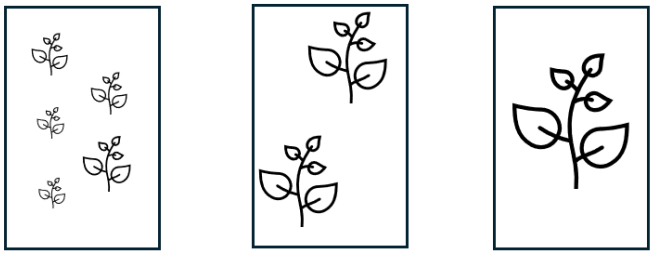
   c. An ideal specimen displays all parts of the plant, including vegetative, reproductive, and root structures.

   d. Carefully select the individuals you will collect to minimize impact on the population. For example, if collecting perennials, leave the largest, oldest plants to continue providing seed for future generations. If bulblets, offshoots, or seeds are present, plant those back in the hole.

e. You can use more than one newspaper sheet for a single collection if there are multiple specimens which will be submitted on separate sheets. Ensure that your labels and notes indicate which specimens belong to a collection.

f. When arranging the specimen on the sheet for pressing, make sure to leave space for a label.

g. When collecting herbarium specimens, consider the plant size. The number of plants collected per herbarium voucher depends on the size of the plant. For small plants, collect enough individuals to adequately cover an entire herbarium sheet (one sheet per herbarium), capturing the morphological diversity present in the population. For larger plants, one individual is sufficient if it fully covers an herbarium sheet. For example, all three of these would be acceptable vouchers for plants of various sizes:



h. **Do not mount voucher materials for the Smithsonian on an herbarium sheet.**

2. *Pressing*

For most vascular plant species, no special consideration is needed when pressing other than ensuring key taxonomic features are easily observable. Collectors should leave the plant press somewhere with adequate ventilation. If thick plant material was collected the blotter paper should be checked and changed a few times to prevent specimens from molding.

If working with large and bulky fruits, grasses, seeds, or large leaves look at digital herbarium examples and keep these pressing tips in mind:

Large, Bulky Fruits and Cones (e.g., pinecones)

Fruits and the points of fruit attachment are among the most delicate parts of an herbarium specimen, often breaking away during preparation or examination. To prevent this, indicate the presence of bulky fruits on the label and place them in a paper or plastic envelope (labeled accordingly) when shipping to the herbarium. This ensures that fruits do not get separated and lost during processing. This may also apply to cactus specimens, which can become brittle and dry during the drying process. In this case, it is recommended to place the entire specimen in a plastic bag

during shipping. This method helps to contain any detached pieces while also protecting processing technicians from potential injury.

Grasses

Due to the bunchy or tuft-like growth habit of some grasses, it may be necessary to harvest large specimens for pressing. In this case, it is important to consider the dimensions of the herbarium sheet and arrange the specimens accordingly. Start by folding the specimen or carefully cutting it to size. Take note that once dried, it becomes nearly impossible to rearrange the specimen to fit on the sheet, which may force you to cut it into smaller pieces. However, this can jeopardize both the scientific and physical integrity of the specimen.

Seeds

After pressing and drying, a collection may start to shed seeds. If this happens, the seeds may get separated from the specimen during shipment and processing. Once separated, unless directly witnessed by a processing technician, the seeds cannot be placed back with the specimen, as it cannot be guaranteed that they belong to that specimen. To prevent this, any loose seeds should be placed in a paper or plastic envelope labeled with the relevant collection information. This will ensure that the seeds can be included with the mounted collections.

Large Leaves

The protocol used for grass specimens also applies to large leaves. Consider the dimensions of the herbarium sheet and plan your specimen collections with these dimensions in mind.

3. Labeling

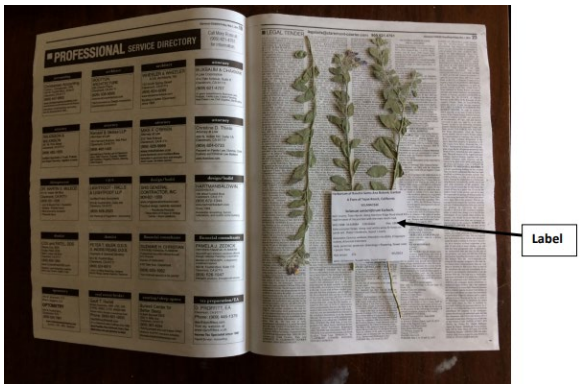
Labels are essential for the utility of an herbarium specimen. Missing or inaccurate labels make specimens ineffective as a scientific or historical artifact. Future researchers should be able to use a specimen label to connect a specimen to its collection date and location, as well as the original collector. Local or Regional herbaria may have specific label guidance that is different than the label used for the Smithsonian collection.

a. Herbarium labels should be printed on acid-free paper

b. At a minimum, the label must include the following information: identification (family, genus, and species), collection location (country, state, county, area name, and GPS coordinates), date of collection, name(s) of the collector(s), and the collection number.

c. **Do not send SOS data forms with herbarium specimens**. Instead, include the labels alongside the corresponding specimens when shipping.

d. Herbarium labels can be exported from the GeoPlatform. See the document All Digital Data Guides in the GeoPlatform help documents for more information about exporting labels. There are three versions of the template, each with a different agency listed at the bottom. Please use the one that corresponds to the agency you are collecting for.

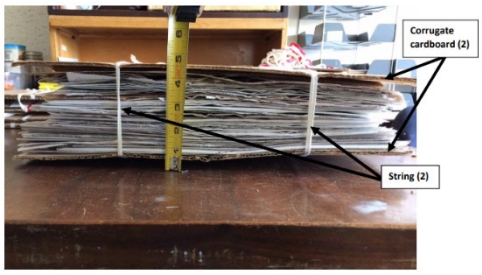


Herbarium label placed loosely on unmounted plant material. This specimen is ready to be shipped.

4. Shipping

Specimens may travel a considerable distance to the Smithsonian or their respective regional herbarium. Consider the following guidelines to ensure safe arrival of herbarium packages:

a. Specimens should be placed between newspapers, which are both affordable and readily available. Stack the layers of specimens and newspaper between two pieces of cardboard, securing them at both ends with string. Finally, wrap the entire bundle in newspaper or craft paper to prevent any loose pieces from becoming dislodged in transit.



Layers of newspaper containing specimens and labels, sandwiched between cardboard and secured with string.

b. Select a box that fits the bundle snugly to minimize movement and reduce the risk of damage. You can also add extra newspaper as padding to fill in empty space. This is both cost-effective and highly efficient for shipping specimens over long distances.

c. **For Smithsonian vouchers, please include a notice of transmittal in the package.** The transmittal notice should indicate the sender (the institution or agency) and the number of specimens being sent. It is also important to clearly state the purpose of the shipment. If the specimens are being sent from a BLM office or affiliate, the transaction will be classified as a "transfer" of material. Conversely, if the specimens are from a private entity, such as a botanic garden or university, the transaction will be considered a "gift" to the Smithsonian. The notice of transmittal can either be emailed directly to the Smithsonian point of contact or included in the shipment. A signature from the depositing agent is required on all received documentation. The Notice of Transmittal template is

available on the SOS website, and shipping contacts and addresses can be found in Section 14e.

11. Data Collection

11a. Data Forms and Digital Data Collection

Detailed documentation is an essential component to a good SOS seed collection. As of 2024, all SOS data collection is conducted through BLM GeoPlatform groups using tablets or mobile devices with Survey123 and FieldMaps. See Appendix L for more information on mobile device specifications. Partners collecting seeds from tribally managed lands remain the exception and can continue to utilize the legacy data collection process of collecting on paper datasheets and entering that information directly into BGBASE, the SOS long term database. Partners who will be using the legacy data collection process must contact the SOS National Curator for more information on how to use this process. **All data must be finalized BEFORE seasonal collectors leave for the season, before any seeds are shipped, and no later than December 15th.**

Accessing SOS data collection tools through the BLM GeoPlatform

Access to digital data collection tools and a regional SOS GeoPlatform group are granted to **active** collectors and support staff at the start of the collection season and access is removed once the season ends. All digital data users must read and understand the SOS data policy found in Section 2a. Registering for GeoPlatform access should be done as part of the annual onboarding process and must be done at the beginning of each season even if someone had access in a previous year. All digital data users will receive training on how to use the GeoPlatform and associated data collection tools and training as part of the national SOS training. For more information about GeoPlatform access or trainings, visit the SOS website's "Getting Started" page or contact your Agency Coordinator.

Digital Data collection guidelines

Resources

Detailed guides for completing digital data collection forms, conducting data quality control (QC), editing, and data management are in the GeoPlatform group help documents:

a. *"All Digital Data Guides"*
   Data collection workflows and tutorials. Contains step by step directions on how to use scouting and collection forms, submit and edit data, export data sheets and herbarium

labels, and change collection coordinate locations.

b. *"SOS Forms Walkthrough"*
A walkthrough of the scouting and collection forms, with information on what data goes in each field, formatting, and other data collection tips.

c. *"Seeds of Success Digital Data QC Guidelines"*
Detailed overview of the data finalization and QC process. Contains information on how to submit data for final approval, get assigned a cleaning facility for shipping, and thorough review of common data errors and how to fix them.

d. "*GeoPlatform and Data Collection Onboarding Process 2025*"
Reviews each step of the onboarding process that enables people to use digital data collection tools including creating a GeoPlatform account, elevating editing permissions, completing required pre-season activities.

e. "*SOS Digital Data Collection User Guide*"
Detailed information about how to create an account, use FieldMaps, use Survey123, and frequently asked questions about the digital data collection.

Data collection forms

There are four forms used to collect SOS data. Collectors should keep backup paper copies of the Field Data Form and Scouting Form in case their tablets fail in the field. Paper copies are included in Appendix C and in the GeoPlatform Help Documents. Two forms are required and two are optional:

a. *Seed Collection Form - Required*. The digital data collection form contains the same fields as the legacy paper Field Data Form (Appendix C), tracks phenology on the day of collection, and tracks estimated seed yields for that collection.

b. *Seed Tracking Form - Required*. The seed tracking form is filled out when seeds are shipped and serves as real time tracking for cleaning facility capacity. It also allows collectors and managers to record where collections were sent so they can fill out the appropriate clearance forms to request seed back at the end of the season. This form can be accessed through Survey123 on a tablet or via the desktop GeoPlatform group.

c. *Optional Scouting Form* (Appendix C). Scouting forms are used for pre-collection visits. The scouting form tracks a population's potential seed yield and phenology, while providing space for collecting habitat and voucher data before seed collection. Scouting forms can be used for species that are targets for collecting this season, to mark

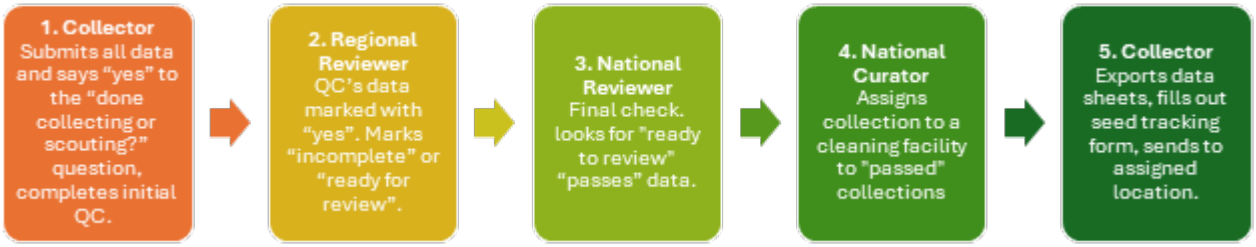
populations with future collection potential, or document locations that should not be revisited. Most data entered on the scouting form will autofill onto the future collection form.

d. *Optional Points of Interest Form.* Collectors can use the points of interest form to detail anything that might be of interest to future collectors including good campsites, water sources, washed out roads, gas stations, and anything else that might be helpful.

Obtaining accurate location information for each collection is critical. Opening data collection forms in the center of a population, even if the rest of the data entry is done later, ensures correct location information. Location information is autogenerated from where each form (Scouting and Collection) is opened. While it is possible to change this information manually, it can lead to errors if not done carefully.

<u>Data finalization and shipping</u>

There is a 5-step data finalization process that must be completed BEFORE a collection is shipped.



Detailed information about the data finalization/QC process and shipping instructions are in the document "SOS Digital Data QC Guide 2025."

The data review process is critical to getting the correct data to cleaning facilities. Data sheets are exported from the GeoPlatform Data Management Site and the data forms are generated with the information captured in the GeoPlatform. If data is incorrect in the GeoPlatform, it will be incorrect on exported data form, and incorrect data will travel with the seeds to the seed cleaning facilities.

In addition to sending a data sheet with seed shipments, collectors will provide one data sheet copy for the local land management office and submit a digital copy to your Agency Coordinator as part of the end-of-season reporting (Section 2e).

11b. Seed Collection Reference Number Format and Collector Codes

A key aspect of SOS collections is the unique identifier assigned to each collection, called the Seed Collection Reference Number. This number connects who collected the seed, the collection, associated data, herbarium vouchers, photos, and annual report and tracks the collection through cleaning facilities, and through the NPGS.

Seed Collection Reference Number

The Seed Collection Reference Number consists of two parts: the SOS collector code (Appendices G and H) and the individual collection number. Seed collection reference numbers should be unique and sequential each year, and they should never be repeated. If the last collection of the previous year was numbered 34, the following year's collection numbering should start with 35. **Avoid using leading zeros (e.g., do not write 035).** Below are some examples of Seed Collection Reference Numbers:

- "OR020-26" represents the BLM Burns District Office's 26th collection
- "CBG-25" indicates the Chicago Botanic Garden's 25th collection.
- "DUT040-1" Is the first ever collection for a DOI collection team in Utah
- If collector FWS0800's (Fish and Wildlife collections based in Reno) last collection of 2024 as FWS0800-150, the first collection with that collector code in 2025 would be FWS0800-151.

Collector Codes by Agency:

To maintain consistency, all established collecting teams will use their historic codes, even if they do not align with the agency specific guidelines below. For additional information, see Appendix H for all 2025 collector codes and Appendix G for a list of historic BLM collector codes. If you are a new team that needs a code, or if you are continuing collections and are unsure of what number to start with, contact your Agency Coordinator.

For BLM Teams Associated with a Field Office

Collector codes are determined by the BLM field office the teams are based out of. Regardless of funding sources or collection locations, the code is based on the geographic location of the field office. For instance, if a team collecting in the Mojave Ecoregion is based out of the Ridgecrest Field Office, they will use CA650 as their SOS collector code. If a team operates from multiple field offices, they will alternate codes based on the field office boundaries they are collecting in. Contact the SOS National Curator for the correct field office codes.

For BLM Teams Not Associated with a Field Office

If a team is not associated with a BLM field office, the SOS National Coordinating Office will assign a collector code using the acronym of the organization. For example, if the team is

affiliated with a botanical garden or university and not collecting for a specific field office through an agreement or contract, the corresponding acronym will be used (e.g., Chicago Botanic Garden = CBG, Southern Utah University = SUU).

NPS Teams
NPS teams will receive a unique number associated with the state they are collecting in. For example, a team collecting in a national park in California could have the code NPCA00, while another team in California would be assigned NPCA01.

USFWS Teams
USFWS teams will also be assigned a unique number based on the USFWS region they are collecting in. For example, a team based in Region 2 would have the code FWS0201, and a second team in that same region would receive the next sequential number, FWS0202.

DOI/Interagency Teams
Some SOS collection teams gather material to be shared among various Department of Interior agencies, such as the BLM, NPS, and USFWS. If these teams operate in an area with an established SOS code, they will use the letter "D" in front of the existing agency code. For instance, DNV030 would indicate a DOI team based in the BLM Carson City Field Office. If a DOI team collects material across a broader region than defined by historic codes, they will receive a code representing the state where the collections are taking place, followed by a unique number. For example, DUT00 would refer to a DOI team collecting throughout Utah, while DUT01 would represent a second, unique DOI collection team covering another part of Utah.

11c. NON-SOS Collections

With the transition to all digital data collection in 2024, the SOS National Office began providing an optional form for active SOS teams to also enter data for non-SOS collections. The intention of the NON-SOS form is to streamline the workflows of partners who are doing **both** SOS and NON-SOS collections in the same season. **Only active SOS teams for the current season can use the NON-SOS form for data collection.** If a team collects only NON-SOS seeds for the season, they cannot be added to the GeoPlatform group or use Survey123.

Collectors must carefully follow these guidelines if using the NON-SOS form:

a. **NON-SOS collections CANNOT share the same collector number as SOS collections**. NON-SOS collections must have a distinct naming method separate from SOS collections. For example, SOS team UT080 is also doing small research collections for another project – They create the code RC080-1 for their non-SOS collection

b. **Data integrity and review is the responsibility of the collection team.** The National Coordinating Office is not responsible for reviewing or managing NON-SOS data. Teams

must ensure data accuracy, as the National Office will only export the data and send it to the designated recipient at the end of the season. To prevent overharvesting in future seasons, NON-SOS collections documented using the NON-SOS form will appear as static points on the collection map. These points will not interact with SOS data, forms, dashboards, or reports.

c. **Teams must write "NON-SOS" on the outside of all NON-SOS boxes when shipping**. This prevents them from being processed as SOS collections.

d. **NON-SOS collections are not covered by the National Coordinating Office's cleaning estimates or agreements with cleaning facilities**. The SOS program does not cover cleaning or storage costs for NON-SOS collections. Teams must arrange these services separately.

e. **NON-SOS collections cannot be made from historic SOS populations.** Once a population has been designated for SOS, all future collections from that site must be SOS collections.

f. **The NON-SOS form is intended to be used for pre-determined NON-SOS collections**. It is not a substitute for populations that were too small for SOS but were collected anyway.

12. Photos

Photos of landscapes, plants, and seeds are critical for confirming collection's identification. Digital photos of the species being collected should always be taken while in the field. At the end of the season, SOS photos are uploaded to a public SmugMug site (https://seedsofsuccess.smugmug.com/) which serves as an important source of training material for future collectors. For more information on taking quality photos, refer to the "Taking Quality Photos for Seeds of Success" guide on the SOS website. **Photos must be submitted as .jpeg format. Convert all HEIC photos to .jpeg format before submitting.**

At least three photos must be taken for each collection, though additional photos are encouraged:

1. Landscape Level/Population – Shows the broader habitat and population density.
2. Individual Plant – Captures key features of a single plant.
3. Material Collected (Seeds) – Displays seeds and seed heads

Photo Labeling

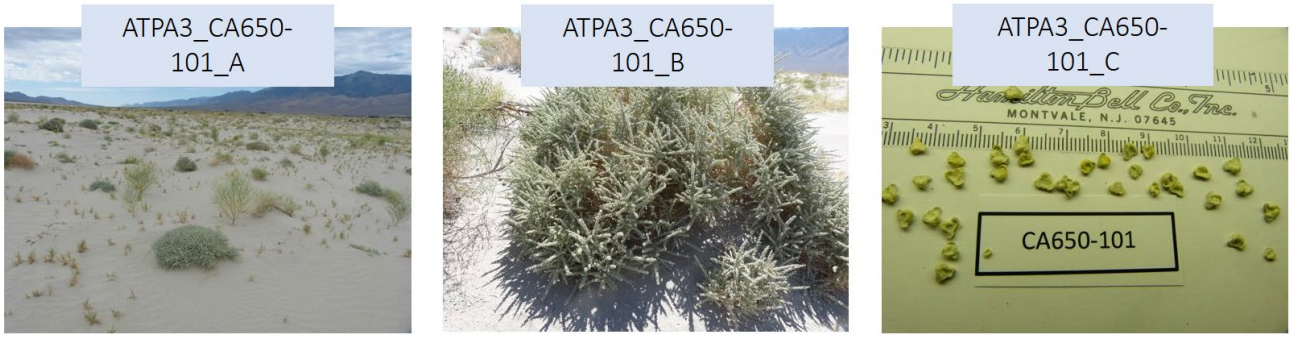
SOS photos follow a specific naming convention that must be applied to all photos. The naming convention allows for quick querying if there is a question about a collection, and also easy searching by location or species on the smugmug site.

The following naming convention should be used for all SOS photos:

- USDA-PLANTS Code_Collection Reference Number_Unique Letter (A, B, C, etc.)
  - A – Landscape
  - B – Plant
  - C – Seeds
  - Any additional photos of the plant (for key Identifying characteristics) should be tagged D, E, F, etc.

Any other additional photos (collection process, crew members, other fun photos) should be titled CollectorID_Year_1 (2, 3, 4, etc.). Crews may also add a description of what is happening in the photos if they wish.

Example: CA650_2025_1, CA650_2025_2_Collecting, CA650_2025_3_VoucherCollection, etc.



Below is an example of photos from the Atriplex pacifica (ATPA3) collection with the Seed Collection Reference Number CA650-101:

End of season photo submission

Follow these steps to send photos with the rest of the end of season data:

1. Label all photos for each collection using the naming convention above.

2. Remove any GPS/coordinate data from photos. For instructions on location removal refer to the “Taking Quality Photos for Seeds of Success” guide on the SOS website.

3. Send labeled photos to your Agency Coordinator electronically using either a Google Drive folder or a zipped folder in an email. **Do not send photos in individual folders**; instead, submit all photos together in one large file without any subfolders.

13. Post-Collection Seed Care

13a. Drying

Proper seed handling is essential to maintain viability before shipment to a cleaning facility. **Seed collections should be kept in a cloth or paper bag and stored in a cool, dry place** prior to sending to a cleaning facility.

Keep these guidelines in mind while storing seeds prior to shipping to a cleaning facility:

a. **Do not expose seeds to high temperatures**. Avoid leaving the collections in a vehicle under direct sunlight, as sustained heat can damage the seeds. If you will be in the field for an extended period, avoid keeping seeds in a vehicle that will get hotter than the ambient temperature. If possible, park your vehicle in the shade and use windshield covers to mitigate heat buildup, or move collections to a safe location in the shade outside of the vehicle. If storing outside of a vehicle, protect from wind, rain, and seed predators.

b. **Do not freeze seeds**, even fleshy fruits. Freezing seeds with a high moisture content will kill them. See Section 14b for more information on shipping fleshy fruit.

c. Dry seed as soon as possible before shipping, ensuring adequate ventilation and airflow around the collections. If collections are damp, spread them out on newspaper or a tarp to dry naturally, either outdoors in the shade or indoors in a well-ventilated area. If collections are left in paper bags or the material is laid out in a thick pile, fluff/turn material regularly so it dries evenly and does not have damp pockets.

d. Collections must be dry and treated (Section 13a,b) before sending to a cleaning facility. A dry collection will feel warm to the touch, while damp material will feel slightly cool. Any green herbaceous material, flower heads, or capsules should be completely dry. The collection must be dry enough to safely stay in its bag and shipping box, without molding during transit or while waiting to be cleaned at the cleaning facility. The collection might not get cleaned for weeks or months after arriving at the cleaning facility since processing times depend on the season and individual workloads.

Below are some various approaches to transporting and drying seed:
There are many more methods, get creative, and let the National Office know what you come up with so it can be shared with other collectors!

A. Box lined with newspaper

B. Latching plastic bins, modified with cut out tops covered in window screen. This method is good for extended field time so collections can be safely stored in the shade outside of a vehicle. Keeping collections inside paper bags in the containers would allow collections to dry more easily compared to the loose material in the picture.

C. Kept in original paper bags and fluffed up regularly to ensure thorough drying.

D. Large collection spread out on a tarp and mixed regularly in a climate-controlled shed, with box fans to circulate air.

13b. Pest Treatment

All SOS collections must be treated with insecticide before being sent to a cleaning facility. This step is crucial to minimize insect predation of seeds and to protect the staff and contractors who handle the seeds. Even collections that show no visible signs of insects may harbor larval-stage pests that can damage the seeds, so all collections must be treated. **Different protocols are in place for teams working with each agency.**

For BLM/USFWS collections follow this process – HotShot NoPest Strips and 48-hour treatment.

1. Use Hotshot No-Pest strips. No-Pest strips emit a harmful vapor that kills insects.

2. **Always wear a mask and gloves when conducting seed treatments.**

3. Avoid over-application; one 16-gram strip is sufficient for treating 100 to 200 cubic feet. Always wear gloves when handling the pest strips.

4. **Do not fumigate seed collections in occupied rooms.** Pets and children should not play or sleep in areas where the strips are in use, and the strips should not be utilized in any room where humans are likely to spend more than four hours a day. Do not use the strips in kitchens or areas where food is stored or prepared or where unwrapped food may be exposed.

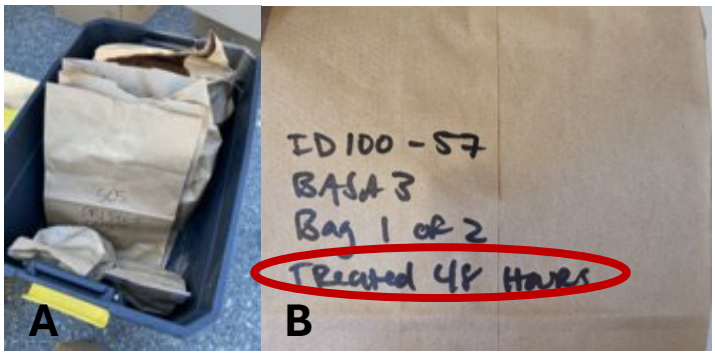
5. To treat the seeds, place them in an open paper bag or box and seal it in a plastic bin for at least 48 hours, or until no insects are alive in the seed.

6. Move the bin outside before opening it and removing the treated seeds. Exercise caution when opening the bin, as inhaling fumes can be hazardous. Limit exposure to

the chemicals to less than four hours per day.

7. After seeds are treated, write “Treated 48 Hours” on the outside of each bag.

Below is an example of a seed treatment box (A) and a collection bag after treatment (B)
Note the open bags in the treatment bin – this is important so the vapor can reach all the material.



For NPS or DOI collections that are held at NPS units until shipment to a seed cleaning facility, follow the process below using Terro Garbage Guard and a 72-hour treatment:

1. **Use Terro Garbage Guard (EPA #5481-348-149 for treatment**. This product emits the same a harmful vapor that kills insects as the HotShot strips but at a lower concentration, so a longer treatment period is needed.

2. **Always wear a mask and gloves when conducting seed treatments.**

3. Seeds should be treated for a minimum of 72 hours.

4. Place the product and seeds in an outdoor garbage can (not a Rubbermaid tote) and store it outside in a non-natural area, preferably in a developed area like a maintenance yard or an area adjacent to a building. This limits potential impacts to native insects. Ensure the seeds are in the shade and will not be damaged by excessive heat.

5. After treatment, open and "air out" the garbage can for at least 2 hours before retrieving the seeds.

6. Write “Treated for 72 hours” on the outside of each bag of treated seed.

7. Once completing the use of the product (and there are no more seeds to send to the cleaning facility), the park must dispose of the product immediately.

Parks must adhere to additional processes to comply with Integrated Pest Management (IPM) policies. Contact the NPS SOS Agency Coordinator for more on implementing these processes:

1. Do not stockpile this product. Since the sealed product is only valid for 2 years, a park should only purchase an amount of this product equal to the number of garbage cans they plan to use for prepping seed (for instance, if they have only one garbage can, they should purchase only a one-pack of this product each year).

2. Each park that intends to use this product is required to send an email to IPM@nps.gov each year after submitting the required PUP, confirming that they will follow these requirements and acknowledging that all liability for using the product lies with them. They must also keep track of any instances of non-target mass die-off. If any listed Threated and Endangered (T&E) species of insects reside in the park, they must consult with USFWS regarding the use of this product in the park.

14. Packing and Shipping Seed

All collections made for SOS must adhere to the following packaging and shipping protocols:

a. Collectors will be assigned a specific cleaning facility. Do not send seeds to a facility for cleaning unless instructed to do so after finalizing your data. Assignments will be made via the QC tab on the Data Management Site (Section 14a).

b. Senders are responsible for all shipping costs related to seed and voucher transport.

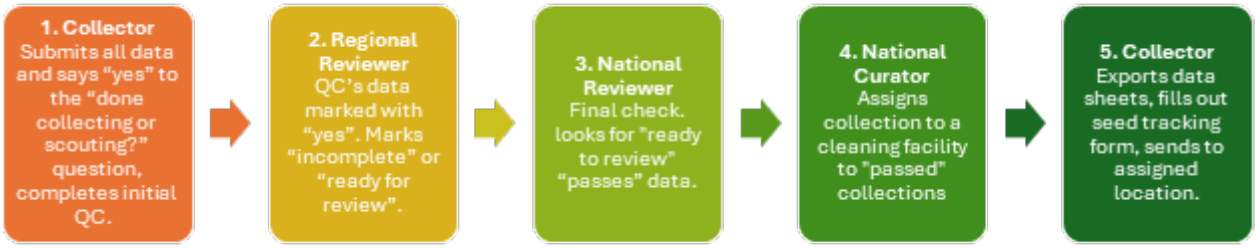
c. Datasheets must accompany all seed shipments to cleaning facilities.

d. If your team is making NON-SOS collections as part of your contract or agreement, label the boxes for these collections as “NON-SOS.” Note that the National Coordinating Office will not cover the cleaning and processing costs for these collections.

14a. Data Finalization, Cleaning Priority, and Seed Cleaning Facility Assignment

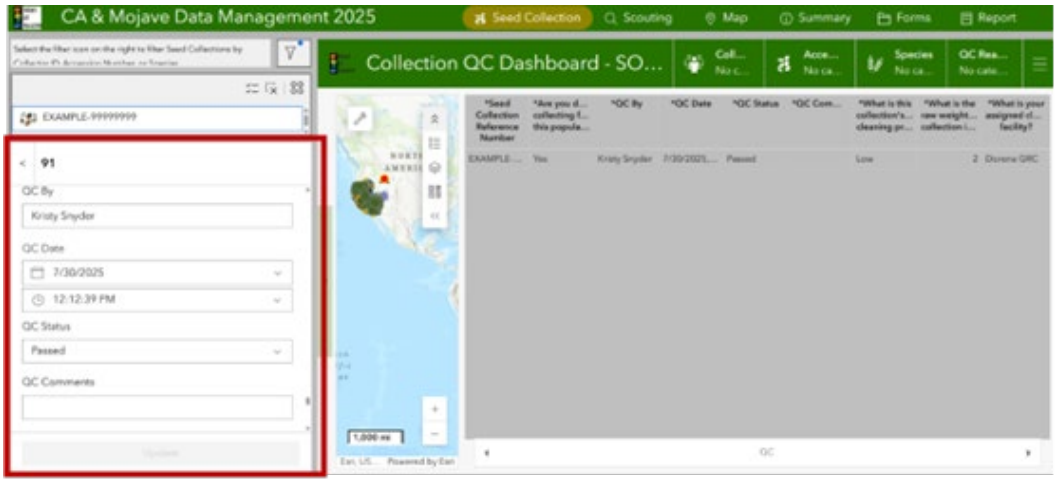
Data finalization

A five-step data finalization process must be completed before seeds can be shipped to a cleaning facility. Details of roles, responsibilities, and considerations for each of these steps are outlined in the document “Seeds of Success Digital Data QC Guidelines 2025.”



Collectors, Regional Reviewers, and National Reviewers are all responsible for checking and finalizing SOS collection and scouting data. Following the five-step process below ensures that data sheets or labels are not created too soon or with incomplete/incorrect information and allows the National Office to prioritize collection cleaning needs. If seeds are shipped with incorrect data sheets, we must get information corrected by the seed cleaning facilities. Form corrections after seeds are shipped decrease the capacity of the seed cleaning facilities AND can incur extra charges to the program for each request to change information.

Implementing the QC process occurs though the data management site and can be visualized on the QC tab of the dashboard:



Instructions on using the data management site for data review and QC are detailed in the 2025 QC guide.

Reviewing scouting and collection data

Use the 2025 Data management site and 2025 QC guide to check data for accuracy and completeness. There are five steps to reviewing your Scouting and Collection data:

1. Ensure the written coordinates, mapped points, and associated location data are correct.
2. Check the dashboard for auto-flagged errors and alerts.
3. Review all other data tabs for accuracy, completeness, and common errors.
    a. If needed, edit data according to Section D of the 2025 Data QC guide.

4. Check for matching forms
5. Update the QC status as appropriate

Once data has been reviewed and is passed collectors may ship to a designated seed cleaning facility.

Alaska Collections – Shipping to Palmer Plant Materials Center

Once data has "passed" National QC review, collectors may export their data sheets, pack up collections, ship them to the Palmer Plant Material Center, and fill out a seed tracking form when shipping. They do not need to wait to be assigned a cleaning facility.

Lower 48 Collections – Need a collection cleaning priority, bulk seed weight in lbs, and to wait for a cleaning

All collections in the lower 48 need to have an assigned cleaning priority (Low, Medium, High) and have their bulk seed weight in lbs. listed to be assigned a cleaning facility. Priorities can be assigned by the collector if they are involved in determining the end use of the seed. Collectors should mark "unknown" if they are not planning seed use. A Regional or National Reviewer will follow up on "unknown" collections during the QC process.

Cleaning Priority Definitions

Unknown: Collector does NOT know/is not involved in planning the end use of these seeds. Status will be updated via the Data Management site during final QC review.

Low: Collections that are **not needed** back for use in 2026. These are the easiest for cleaning facilities to accommodate. Seeds will be cleaned, tested, and stored at various cleaning facilities and will remain in the SOS inventory for future use.

> *Example: Conservation collections, collections that are too small to use for a project this year, or collections that don't have an anticipated use in 2026.*

Medium: Collections that **might** need test results or seed returned before fall 2026. These will be considered with high-priority collections based on monthly capacity. If tests or seeds are needed by May 1st, submit a clearance form by January 30th. Otherwise, seeds and test results will remain in SOS inventory at a cleaning facility for future use.

> *Example: A collection that depends on final PLS results for use in 2026, or a collection you can de-prioritize if too many others are considered higher priority.*

High: Collections with **strong likelihood** of needing test results or seeds returned by May 1, 2026. Cleaning space for high priority collections is limited each month, and Sarah will help coordinate priority needs across partners.

> *Example: You have a confirmed 2026 project for these seeds and plan to submit a seed clearance form by January 30th, 2026.*

14b. Packaging Seed

To ensure the successful conservation of seeds, it is essential to send them to a designated cleaning facility once they are dried and treated for pests. Each seed shipment must include complete and accurate field data forms.

Whenever possible, ship each seed collection in a single bag. Clearly label the seed bags with the unique collection number. If a collection must be divided into multiple bags, label each bag accordingly, such as “Bag 1 of 3,” “Bag 2 of 3,” etc. As an extra precaution, place a second label inside the bag, directly on top of the seeds (image A below).

Ensure that the labeled bags are securely packaged for shipping. To test the security of packaging, shake the packaged bag vigorously and secure any areas where seed comes out. Rolling down the tops of paper bags and securing the OUTSIDE of the bag with tape can prevent seed loss. Never tape the inside of the bags. We recommend using a sturdy cardboard box for paper or cotton seed bags. Alternatively, shipping seeds in woven PVC or nylon air freight sacks may be appropriate, depending on the seed type.

Do not use:

- Non-breathable bags or containers
- Bags made from solid plastic or PVC-backed fabric (except when shipping fleshy fruits in PVC bags, as stated in Section 13)

Below are examples of properly labeled (A) and packed seed (B)

14c. Fleshy Fruits

Fleshy fruits require careful handling and prompt shipping. To follow these steps when shipping fleshy fruit:

1. Keep fleshy fruits cool in a refrigerator after collection and before shipping. Never freeze fleshy fruits. Freezing will kill the seeds.

2. If more than one trip is necessary to complete the collection, fleshy fruit can be stored in a refrigerator for up to a week until the collection is finished. Shipping the fruits cold and damp helps prevent them from becoming squashed and reduces the risk of fermentation during transport. Plan the timing of fleshy fruit collections to harvest enough material while avoiding late shipping during the week.

3. When preparing to ship fleshy fruit, pack the entire fruits in sturdy plastic bags. Write the collection number, species, and # of bags (1 of 2, 2 of 2 etc.) on an index card and put in in a small zip top bag and then place it inside the larger bag with the fruits. Wrap the bags with cold packs and newspaper. Make sure newspaper completely fills the box and add the SOS data sheet on top.

4. **Ship overnight immediately after collection is complete, and never on a Friday.** Notify the seed cleaning facility when fleshy material is expected to arrive.

14d. Shipping Reminders and Cleaning Facility Contacts/Addresses

All seeds must be received by the designated cleaning facility **by December 15th.** All Alaska collections will be sent to the Palmer Plant Materials Center. Collections in the lower 48 will be assigned a specific cleaning facility after they complete the data finalization process (Section 14a). Some cleaning facilities require notification when you ship seeds. Table 6 below has cleaning facility contact list and their respective notification requirements.

Shipping Reminders:

a. If you are collecting seeds over multiple days for a single collection, wait until the collection is complete before shipping.

b. **ONLY send seeds early in the week; do not ship on Fridays or weekends.**

c. Always ship the seeds overnight or with two-day shipping using UPS or FedEx**.**

d. Include a copy of the completed data sheet for each collection in a box on top of the seeds when shipping. Seeds will not be cleaned without a data sheet. If you are shipping multiple boxes, ensure that the correct data sheets are included in each box with their associated collection.

e. Refer to section 14c for guidance on how to properly package collections.

f. **Fill out a seed tracking form when seeds are shipped**. If shipping is going to be done by someone who does not have GeoPlatform access, contact the SOS National Curator for further instructions on completing the seed tracking form.

Table 6. Cleaning Facility Contact and Shipping Information

Facility	Special Instructions	Contact Information	Shipping Address
Alaska Plant Materials Center	Notify when shipping fleshy fruit only	Lyubomir (Lubo) Mahlev, lyubomir.mahlev@alaska.gov Phone: (907) 745 8782	Alaska Department of Natural Resources Division of Agriculture Plant Materials Center 5310 S. Bodenburg Spur Palmer, AK 99645
Bend Seed Extractory	Notify when shipping fleshy fruit or collection over 50 pounds. FedEx and UPS preferred.	Matt Horning, matthew.horning@usda.gov cc Malcolm Howard, malcolm.howard@usda.gov Phone: (541) 383-5646	USDA USFS - Bend Seed Extractory 63095 Deschutes Market Road Bend, OR 97701
Dorena Genetic Resource Center	Notify when shipping all collections. Use UPS or FedEx only to ship**. NO USPS. Packages could get lost.**	Bracken Bing, bracken.bing@usda.gov cc Lisa DeWeese, nicole.l.deweese@usda.gov Phone: (541) 767-5708	Dorena GRC Attn: Bracken Bing 34963 Shoreview Rd Cottage Grove, OR 97424
National Seed Lab	Add a packing slip with the list of collections in each box. No preference on carrier, teams should track shipments if using USPS. Email victor.vankus@usda.gov, with a CC to agency coordinator prior to sending each shipment.	Victor Vankus, victor.vankus@usda.gov , sm.fs.nsl@usda.gov Phone: (478) 751-3551	National Seed Lab 5675 Riggins Mill Road Dry Branch, GA 31020
Southeastern Grasslands Institute	Notify when shipping all collections.	Gus Rasich gus.rasich@segrasslands.org	APSU, Southeastern Grasslands Institute 681 Summer Street Clarksville, TN 37040

University of Nevada, Reno	Notify when shipping all collections.	Shannon Swim, shannonswim@gmail.com, swim@unr.edu	UNR Shannon Swim/Bio dept 1664 N. Virginia St MS 314 Reno, NV 89557

14e. Shipping Herbarium Vouchers

*All SOS teams must collect and send 1 **unmounted** herbarium vouchers per collection to the U.S. National Herbarium at the Smithsonian Museum of Natural History. Additional vouchers may be sent to local or regional herbaria if desired by the local land managing agency or if an office has an existing partnership with a regional herbaria.

**For 2025, NPS agency teams and DOI teams (when collecting on NPS managed land) should collect vouchers, make herbarium labels, and draft transmittal letters, but NOT send vouchers to the Smithsonian. Contact the NPS SOS Agency Coordinator for further information on temporary voucher storage.*

Sending to US National Herbarium at the Smithsonian

Teams must send **unmounted** and labeled herbarium vouchers to the Smithsonian. Ensure all vouchers material are labeled with the seed collection number and have herbarium labels printed on acid-free paper. Shipments must include a Notice of Transmittal either inside the package or sent separately via email. The Notice of Transmittal template can be found on the SOS website. For more information on collecting herbarium vouchers, see Section 10d or resources on the SOS website.

Shipping Instructions

Contact

- Erika Gardner, gardnere@si.edu . Notice of Transmittal may be emailed directly to Erika Gardner, or a paper copy may be included with the shipment.

If Shipping with **USPS**

- Smithsonian Institution
  NMNH Department of Botany, MRC 166
  P.O. Box 37012
  Washington, DC 20013-7012

If shipping with **FedEx**, please us the Smithsonian's non-PO Box address:

- Smithsonian Institution
  NMNH Department of Botany, MRC 166
  10th and Constitution Ave., NW
  Washington, DC 20560

Sending vouchers to local or regional herbaria

Each local and regional herbaria may have their own requirements for submitting voucher material. Collectors should reach out to their local or regional herbarium (Appendix F) to see whether they want voucher submissions, and if so, what additional requirements they might have.

14f. Seed Return Requests

Each SOS coordinating office or agency can request any seed remaining after the 3,000PLS submission to USDA-ARS seeds for research, restoration, or partner projects. The seed request happens via two separate forms; either a Clearance Form for collections that will be requested back immediately after they are cleaned, or a Seed Order Form if collections are in storage. The SOS National Coordinating Office tracks all Clearance and Seed Order Forms to monitor seed distribution and usage. Cleaning facilities will only process forms submitted through the SOS National Coordinating Office*. They do not accept forms included with seed shipments or emailed directly from teams. Depending on where seeds are being cleaned and stored, shipping and handling fees may be charged to the requestor (table 7 below). **Requests for SOS collections in Alaska should go through the BLM Alaska State Plant Conservation and Restoration Program Lead, contact the SOS National Office for more information on the AK specific process*.

Clearance Form (Request seed return immediately after cleaning)

Complete an SOS Clearance Form to return seed and/or obtain testing results from the most recent collection season (example in Appendix D). Clearance forms are processed in the order they are received and are how cleaning facilities prioritize which collections to clean first. The SOS National Coordinating Office reviews the requests and assigns clearance numbers after approval. Approved forms are then sent to the cleaning facility for processing. Facilities can ship or test up to 25 seed lots per month, so teams should plan accordingly or coordinate urgent requests with their Agency Coordinator and the National Coordinating Office.

Clearance forms should be used to **return ALL of a single collection to ONE location**. If you need to send partial collections, or to send collections to different locations, contact your Agency Coordinator BEFORE submitting a clearance form. Teams do not have to request every collection back – only collections that have an immediate use. Otherwise please leave them in storage until they are needed. If shipping details are uncertain, submit an initial form without the shipping information, then submit a revised version to the National Coordinating Office once the details are confirmed.

Clearance forms should be submitted **no later than January 30th. The last "return by" date that can be submitted on a clearance form is May 1st.** All collections not requested back by

May 1st will be moved into storage, and a seed order form will be needed to request them in the future.

Follow these steps to submit a clearance form:

1. Download the most recent Clearance Form version from the SOS website. Follow directions on the form to indicate WHICH cleaning facility the form will be sent to, and title the form according to the form instructions.

2. Submit the form once ALL collections have been sent for the season. The sooner the form is submitted, the better your chance of getting seeds cleaned and returned by a desired date.

3. Send the SOS Clearance Form via email to your Agency Coordinator. The Agency Coordinator is responsible for reviewing and forwarding the form to the SOS National Curator.

4. Clearance forms are due as soon as all collections have been shipped and no later than **January 30th**.

Seed Order Form (Requesting seeds in storage)

Any seed not requested back after cleaning via a clearance form will remain at the cleaning facility in a long-term storage freezer until a Seed Order Form is submitted. The National Coordinating Office maintains an annual inventory of stored seed and tracks the use of SOS seed collections. SOS partner agencies/offices may email their Agency Coordinator for information about the SOS seed inventory.

For distribution requests, teams requesting seed must provide an explanation on how they plan to use the material. Reasons for seed usage must accompany each request and be submitted via Seed Order Form. Seed Order Forms may be submitted at any time.

Follow these steps to submit a Seed Order Form:

1a. If seed is stored at the Bend Seed Extractory*:* Download the most recent Bend Seed Extractory Seed Order Form from the SOS website.

1b. If seed is stored at any other SOS Partner cleaning facility: Download the most recent Seed Order Form version from the SOS website. Follow directions on the form to indicate WHICH cleaning facility the form will be sent to and to title the form correctly.

2. Requested weight must be entered in LBS, if in PLS or another unit the Seed Order Form will not be processed.

3. Seed use must be entered on form. If it is missing the form will not be processed.

4. Send the Seed Order Form via email to your Agency Coordinator. The Agency Coordinator is responsible for reviewing and forwarding the form to the SOS National Curator.

Table 7. Shipping and Handling Costs for seeds at each seed cleaning facility

These fees are subject to change, check in with your Agency Coordinator for current information.

Facility	Clearance Form	Seed Order Form	Return Shipping	Notes
Alaska Plant Materials Center	No fee	No fee	No fee	
Bend Seed Extractory	No fee	$35/collection handling fee	Charged to requestor	Requestor needs FedEx account for return shipping
Dorena Genetic Resources Center	No fee	No fee	No fee	
National Seed Lab	No fee	No fee	No fee	
University of Nevada, Reno	No fee	No fee	No fee	Return Shipping fee may occur after June 2025. Contact the SOS National Office for more info.

Appendix A. SOS National Contacts and Agency Coordinators

BLM	USFWS	NPS

Fred Edwards Restoration Coordinator Bureau of Land Management fsedwards@blm.gov	**Patricia S. De Angelis** Botanist U.S. Fish & Wildlife Service – Division of Scientific Authority 5275 Leesburg Pike, MS: IA Falls Church, VA 22041 703-358-1708 x 1753	**Lori Makarick** Branch Chief, Landscape Restoration and Adaptation Biological Resources Division National Parks Service 1201 Oakridge Drive Fort Collins, CO 80525 970-817-0025 lori_makarick@nps.gov
Sarah Hill, *BLM SOS Coordinator* SOS National Curator/National Coordinating Office Bureau of Land Management 1387 S. Vinnell Way Boise, ID 83709 sehill@blm.gov	**Kelly Thomas, *USFWS SOS Coordinator*** Native Seed Coordinator U.S. Fish & Wildlife Service – Division of Scientific Authority 5275 Leesburg Pike, MS-IA Falls Church, VA 22041 703-358-1708 x 2635 kelly_thomas@fws.gov	**Katie VinZant, *NPS SOS Coordinator*** Restoration Ecologist National Parks Service 1201 Oakridge Drive Fort Collins, CO 80525 720-701-0737 katharine_vinzant@nps.gov

Appendix B. SOS Data Confidentiality Agreement

Seeds of Success Data Confidentiality Agreement

The purpose of this agreement is to prevent the unauthorized disclosure of current or historical Seeds of Success (SOS) program data. Due to the sensitive nature of data associated with each seed collection, SOS data is not posted or shared publicly. The SOS National Coordinating Office determines the appropriate use and disclosure of SOS data. To confirm your awareness of this responsibility please sign and date this form. The SOS National Coordinating Office will maintain a record of all those who have signed this agreement and a copy of this confidentiality agreement will be emailed to you for your records. A different Confidentiality Agreement and authorization process is required for data associated with research purposes. Contact the SOS National Curator for more information on SOS data research requests.

SOS is the national native seed collection program, led by the Bureau of Land Management in partnership with the National Park Service, U.S. Fish and Wildlife Service, U.S. Department of Agriculture Agricultural Research Service and many non-federal partners. The purpose of the Seeds of Success program is to establish a national, high quality, accurately identified, and well documented native plant seed collection. All seed collections made following this protocol support the development of geographically appropriate native plant materials for ecosystem restoration, research, and germplasm conservation.

The term "SOS data**"** refers to information collected, stored, or maintained as part of the Seeds of Success wildland seed collection program, including but not limited to data on species, geographic coordinates, maps, directions, site names, trail names, county location, nearby towns/cities, species names (both scientific and common), associated species, collection numbers, seed inventories, testing results, and any other information related to scouting, collecting, or monitoring activities within the scope of the program. This data may include both electronic copies (e.g., digital files, databases) and physical copies (e.g., paper forms, physical logs) and is subject to strict guidelines regarding its maintenance, access, sharing, and disclosure.

SOS Data Use and Guidelines

1. **General Rule on Data Sharing:**

   No SOS data (including geographic coordinates, maps, directions, site names, trail names, county location, nearby towns/cities, species name [scientific or common], associated species, and collection numbers) may be discussed, disclosed, released, reproduced, or otherwise provided to any third party without prior, written consent from the SOS National Coordinating Office with the exception of non-sensitive end of season data as outlined in section 3 below. *All other requests for data sharing should go to the BLM SOS National Curator.*

2. **Data Security and Confidentiality Requirements:**

To ensure the protection and integrity of SOS data, all individuals involved with the program must adhere to strict guidelines regarding data maintenance, access, and sharing.

A. *Data Maintenance:*
All SOS data (both electronic copies and physical data sheets) must be stored in a secure location. A secure location is one that is not publicly accessible and can only be accessed by individuals directly involved with the SOS program. SOS data should not be stored on personal devices.

B. *Data Sharing and Access:*

   i. SOS data must not be shared or made accessible to unauthorized individuals.

   ii. GeoPlatform and Data Portal login information will remain confidential and must not be shared.

   iii. SOS data should not be posted on public-facing websites or otherwise disclosed in a manner that could compromise confidentiality.

   iv. After gaining written permission from the SOS National Coordinating Office, any reports, maps, or visuals produced with SOS data must have a 10-mile buffer around the collection or scouting site.

C. *Photo and Public Content Restrictions:*

   i. Do not post photos or information that show recognizable landmarks, formations, or specific coordinates related to SOS data on social media platforms, iNaturalist, websites, personal blogs, or newsletters without prior, written consent from the BLM SOS National Curator.

   ii. Collectors are required to disable/delete location data from all SOS-related photos.

3. Additional Data Sharing Guidelines for Current Season Collection Teams

A. *Reporting Current Season Data*
Active SOS teams may need to share their team's current season collection and scouting activities to fulfill obligations for permits, activity reports, or other necessary reporting purposes.

   i. <u>Current season data requests</u>

a. SOS data is not exportable from the GeoPlatform. Teams must submit a data sharing request through the GeoPlatform Data Request form in their data management site.

b. Requests will be reviewed and approved by the corresponding SOS Agency Coordinator.

c. Sensitive data will be provided if approved by the SOS Agency Coordinator and National Coordinating Office.

ii. Reportable data

Active collecting teams may report the following types of data from **their** current season's collections, as long as it complies with all other data security guidelines:

a. Species, state, county, or any collated numbers (e.g., scouting visits, collection visits, total plants sampled, estimated PLS collected, etc.).

iii. Additional permission needed for reporting sensitive data

Justification for sharing sensitive data must be included in the initial data sharing request. The following can only be shared after prior, written consent has been obtained from the SOS National Office:

a. Specific location data, including coordinates

b. After gaining written permission from the SOS National Coordinating Office, any reports, maps, or visuals produced with SOS data must have a 10-mile buffer around the collection or scouting site.

By typing my name I, the undersigned, acknowledge that I am not the custodian of SOS data but have been granted access to this data in order to carry out the duties assigned to me within the SOS program, either through agreement or contract under which I am participating, or in my capacity as a federal employee. I assume responsibility for the use of all information contained within these records. I agree to adhere to all guidelines established for these data to ensure SOS data security.

I understand that any inappropriate unauthorized use, disclosure, release or reproduction of SOS data may result in removal from the SOS program, loss of access to SOS data, and ineligibility for future participation in SOS. I understand that this confidentiality agreement is subject to applicable laws and regulations. I freely, and willingly sign this document, fully understanding its purpose and content.

SEEDS OF SUCCESS FIELD DATA FORM

Seed Collection Ref. Number:		**Collector Code:**	
Date(s) Collected (MM/DD/YY)**:**		**Collector Name(s):**	
		Collection Number:	
		Alt. Collection Number:	
		If yes Recollection, Original Seed Reference #:	

COLLECTION DATA

Phenology = 100%	Dormant__% Vegetative__% Bud__% Flower __% Pre Seed__% Seed __% Post Seed__%		
Family:		**No. of Plants Sampled** (min. 50)**:**	
Genus:		**No. of Plants Found** (approx.)**:**	
Species:		**Area Sampled** (acres)**:**	
Subspecies/Variety:		**Seeds Collected From:**	
Plant Habit:		**Avg Plant Height** (ft)**:**	
Field Notes to assist in identification of pressed specimen (e.g. flower color)**:**			
Collection Method: (circle)			
Common Name(s) of Plants:		**NRCS PLANTS Code:**	

LOCATION DATA

Ecoregion (Omernik Level III)**:**		**State:**		**County:**			
Provisional STZ		**Empirical STZ**		**Desert SW STZ**		**Eastern States STZ**	
Subunit (BLM area, park name, etc.):		**Area within Subunit** (trail name, etc.):					
Land Owner:		**Non-BLM Permission Filed:**					
Location Details:							
Source Used:		**Accuracy:**					
GPS Datum:							
Latitude:		**Elevation:**					
Longitude:		**Unit** (ft or m)**:**					

HABITAT DATA			
Associated Species (Scientific Name)**:**			
Ecological Site Description, Habitat Type and/or National Vegetation Classification :			
Modifying Factors:			
Land Form:		**Avg Slope** (degrees)**:**	
Land Use:		**Aspect:**	
Geology:			
Soil Texture:		**Soil Color:**	

HERBARIUM VOUCHERS			
Number of pressed specimens:		**Date Voucher Taken:**	
Herbaria Names (Smithsonian, Regional, Local):			

SPECIALIST IDENTIFICATION			
Identified by (name and organizational affiliation):			
Material Identified:		**Date Identified** (MM/DD/YY):	

PRE-COLLECTION CHECKLIST

This section is for your reference only and not required as part of the data collected by the SOS National Coordinating Office. The conditions indicated in **boldface** *describe ideal population size and seed dispersal stage for seed collecting.*

Assess Population & Seed Dispersal Stage
Approximate area of population: x (feet, yards, miles……)
Approximate total number of individual plants present and accessible: *0-50* *50-500* *500-5000* *> 5000*
Evidence of disturbance or damage: *Resown* *Burnt* *Sprayed* **No damage**
Readiness of population for collecting: give percentages or circle the most frequently occurring: *Vegetative* *In flower* *Immature seeds* **Around natural dispersal** *Post dispersal*
Estimate the number of individual plants at natural dispersal stage: *<50* **≥50**
Is the population: ***A single population*** *A population with distinct sub-populations* (Can you sample separately or from the most suitable?)

Assess Seed Quality & Availability
On a typical individual, where on the plant/branch/fruit is the seed at natural dispersal stage? **I can identify the location of ripe seed on this plant**
Using a cut test on the seeds at this stage, give percentages or circle the most frequently occurring: **Healthy** *Insect-damaged* *Empty* *Moldy* *Malformed/other damage*
Estimate the number of healthy seeds per fruit:
Estimate the number of fruits per individual plant:

Should Seed Be Collected On This Trip?
Use the collection equation *(# of plants in population) * (avg # fruits per plant) * (avg. # healthy seeds per fruit) * 0.2 = X*) to determine if collecting 20% of the healthy seeds available today will result in **≥10,000 PLS.**

BACKUP SCOUTING AND RESCOUTING FORM

Scouting ID		**Collector Code:**	
Scouted in Previous Years?	Y N	**If yes Scouted in previous years, Original Scouting ID:**	

COLLECTION DATA

Family:		**Estimated Population Size** (approx.)**:**	
Genus and species:		**Approximate Area** (acres)**:**	
Subspecies/Variety:		**Does this population have potential as a future collecting site?**	Y N
NRCS PLANTS Code:		**Is this species a target for 2025?**	Y N
Common Name(s) of Plants:			
Plant Habit:	*Standard (3,000-8,000) Operational (>80,000) Other*	Other:	
Field Notes to assist in identification of pressed specimen (e.g. flower color)**:**			

LOCATION DATA

Ecoregion (Omernik Level III)**:**		**State:**		**County:**			
Provisional STZ		**Empirical STZ**		**Desert SW STZ**		**Eastern States STZ**	
Subunit (BLM area, park name, etc.):		**Area within Subunit** (trail name, etc.):					
Land Owner:		**Non-BLM Permission Filed:**	Y N				
Location Details:							
Source Used:	*GPS Survey123 Other:*	**Accuracy:**	Meters				
GPS Datum:	*NAD83 NAD27 WGS84 Other:*						
Latitude (dg/min/sec) (ex: 40˚ 34’ 19.5” N)**:**	N	**Elevation:**					
Longitude (dg/min/sec) (ex: 107˚ 36’ 51.54” W)**:**	W	**Unit** (ft or m)**:**					

Repeat on every day you scout:	
Date:	
Phenology:	Dormant:___% Vegetative:__% Bud:_____% Flower:___% Seed:____% Post-Seed:__%
Scouting Notes:	
Date:	
Phenology:	Dormant:___% Vegetative:__% Bud:_____% Flower:___% Seed:____% Post-Seed:__%
Scouting Notes:	
Date:	
Phenology:	Dormant: % Vegetative: % Bud: % Flower: % Seed: % Post-Seed: %
Scouting Notes:	
Date:	
Phenology:	Dormant: % Vegetative: % Bud: % Flower: % Seed: % Post-Seed: %
Scouting Notes:	
Date:	
Phenology:	Dormant: % Vegetative: % Bud: % Flower: % Seed: % Post-Seed: %
Scouting Notes:	

Appendix D. EXAMPLE – Seeds of Success Return Request: Clearance Form

Seeds of Success CLEARANCE FORM

BLM / NPS / USFWS: How to Request Seed and/or Seed Test Results Back to Your Office

After cleaning, the first 3,000 seeds are taken off the top of each SOS collection and sent to Pullman, WA and Ft. Collins, CO for incorporation into the Seeds of Success National Collection. This form allows the coordinating Agency/Office responsible for an SOS team can request the entire remaining balance (anything over 3,000 PLS) be returned to their office or shipped to a cooperator. This form can also be used to request seed test result data. A monthly review of clearance forms will occur on the first Tuesday of the month, following the national coordinating call.

Form Instructions:

1) Fill out form and replace the example content with appropriate information.
2) Save the form under the title:
    a. Year_CleaningFacility_Clearance_CollectorCode_RequestDate (in YYYYMMDD format).
    b. Example: 2025_Bend_Clearance_MT050_20250402
3) Send to your Agency Coordinator (BLM, NPS, USFWS) as soon as possible once all collections have been sent to a cleaning facility for the season, and no later than January 30th.

If both test results and shipping are requested, please fill out both the "shipping" column and "seed test results" column. If shipping is in planning stages, but not certain until after data is received, omit the shipping info and complete a second form to the SOS National Coordinating Office when shipping information is determined.

The SOS National Coordinating Office will review the request, if approved, assign a clearance number(s), and send the approved clearance form to the appropriate cleaning facility. Cleaning facilities will not send seeds without a clearance number assigned by the SOS National Coordinating Office.

A limit of 25 seed lots will be shipped or tested each month, please plan requests accordingly or work with your Agency Coordinator and the SOS National Coordinating Office for more urgent requests.

Allow at least 30 days from date of approval to the date you would like the seed or seed test results returned.

Which cleaning facility are you requesting seeds from?

Cleaning Facility Name
Dorena Genetics Resource Center

Requester Contact Information

Name	Kristy Snyder
Email	ksnyder@blm.gov
Phone Number	(208) 867-5309
FedEx Account Number	1234-5678-9
SOS Collector Code	MT050
Agency	BLM

Return Request Type

	Shipping request	**Seed Test Results**
Date Needed	April 2, 2025	April 2, 2025
Name & Organization	Sarah Hill, BLM Dillon Field Office	Sarah Hill, sehill@blm.gov
Recipient's physical address or email address – NO PO BOX	1005 Selway Drive Dillon, MT 597235	

Please return or test the following collection(s):

SOS Collection Reference Number	**Species**	**Clearance Number** (assigned by the National Office) Leave blank
MT050-77	*Camassia quamash*	Leave blank
MT050-78	*Achnatherum hymenoides*	Leave blank
MT050-79	*Cordylanthus ramosus*	Leave blank
MT050-80	*Orthocarpus luteus*	Leave blank

Please describe, in detail, how the returned seed will be used, i.e. common garden study, restoration project, academic partnership, etc. This section must be filled out for your request to be processed.

Native Plant Materials Development Project
Seed will be used through sage grouse habitat restoration projects, timber harvest areas. Seed will be sent to a nursery to grow out. Camassia quamash will eventually be planted back out on native habitats within the DFO and with help from tribal partner groups.

Appendix E. EXAMPLE – Seeds of Success Annual Report

******** *Download the annual report template from the SOS website (www.blm.gov/sos)*

Location: Mother Lode Field Office, El Dorado Hills, California	
Number of species collected: 18	**Number of SOS collections made:** 25

Collecting Season Summary (accomplishments and challenges):

**Note – missing photos for CA180-277*

This year was a team effort by Jake Picardat (Bio Science Tech), Landon Eldredge (Bio Science Tech), Sophia Weinmann (Bio Science Tech), Graciela Hinshaw (Pine Hill Preserve Manager), Haley O'Mara (ARC Intern), and Faith Provost (MLFO Intern). The interns benefited from the new experiences and working on these projects promoted their overall knowledge about ecology and conservation of the rare and native plant species.
All personnel worked well to overcome difficulties caused by COVID-19, heat, and UV exposure.

Having three Bio Science Techs and two interns made the completion of the collections this year not only possible, but run smoothly as well. Eldredge played an essential role in the very early part of the year with scouting and collecting herbarium vouchers with the assistance of O'Mara. Picardat was hired in April and soon after took lead over SOS related projects and the majority of collections were completed by Eldredge and Picardat. Weinmann and Provost were hired in July and were vital in completing later seed collections alongside Picardat.

There were two new survey locations visited this year: the Lotus Parcel about 4 miles south of Lotus, CA, and the Big Canyon Creek Parcel about 3 miles southeast of Latrobe, CA. Both parcels are of interest due to their serpentine soils and riparian aspects as Weber Creek flows through the Lotus Parcel and both the Cosumnes River and Big Canyon Creek flow through the Big Canyon Creek Parcel. We expect numerous collections from both parcels next year after more surveying has been completed.

This year brought more precipitation to California than a lot of years prior and because of this we were able to complete 25 collections from 18 different taxa. Nine species have not been part of our SOS collections before and of those, four appear to be first time collections for SOS as a whole, with no records of prior teams collecting them before in the SOS database.

Partners *(Other agencies, NRCS, non-profit, etc.)* and in what capacity you worked together:

California Native Plant Society (CNPS), non-profit: Provided technical expertise verifying voucher specimens.

California Department of Fish and Wildlife: Pine Hill Preserve consists of managed lands by federal, state, and county entities. As such, one of our seed collections this year was partially done on one of CDFW's parcels of the Pine Hill Preserve.

Organizations that provided volunteers, and how many:

YCC Generation Green: The YCC program provided us with 2 crews of 4-5 high school age students that helped complete one SOS and multiple in-house seed collections.

American River College: Provided an intern who helped scout and complete early seed collections.

Education and Outreach: ***(include any work with other groups to promote or highlight Seeds of Success, i.e., citation for a newsletter, web article, conference/meeting display, or presentation on SOS and/or the Native Plant Materials Development Program, etc.)***

Format (talk, exhibit, publication)	Title	Name of Event or Publication	Location (Nearest City, State)	Date
Presentation	Pine Hill Preserve: A Geologically and Botanically Unique Area	Wildflowers Class Presentation at American River College	Sacramento, California	3/8/2023 Given by Graciela Hinshaw

Distributions: ***(include information for collections that have been shipped out of your office to the Bend Seed Extractory or any other receiving institution)*** **all 25 collections submitted in original report, this section is abbreviated for this example*

Species	SOS Seed Coll. Ref. Num	Receiving Institution	What the SOS Material will be Used For
Meconella californica	CA180-275	Bend Seed Extractory	Storage for future needs
Mimulus cupriphilus	CA180-276	Bend Seed Extractory	Storage for future needs
Pogogyne serpylloides	CA180-277	Bend Seed Extractory	Storage for future needs
Mimulus guttatus	CA180-278	Bend Seed Extractory	Storage for future needs
Epilobium minutum	CA180-279	Bend Seed Extractory	Storage for future needs
Mimulus guttatus	CA180-280	Bend Seed Extractory	Storage for future needs
Collinsia heterophylla var. *heterophylla*	CA180-281	Bend Seed Extractory	Storage for future needs
Calochortus albus	CA180-282	Bend Seed Extractory	Storage for future needs
Githopsis pulchella ssp. *serpentinicola*	CA180-283	Bend Seed Extractory	Storage for future needs
Eriophyllum lanatum var. *achilleoides*	CA180-284	Bend Seed Extractory	Storage for future needs
Chlorogalum pomeridianum	CA180-294	Bend Seed Extractory	Storage for future needs

Internal Research using non-SOS collections: ***(include tracking information for collections that are kept at your office for Native Plant Materials Development projects. This section is for non-SOS collections only).***

Species	Seed Coll. Ref. Num (e.g., CBFO-23-2020)	What the non-SOS material will be used for
Calochortus albus	N/A	Planting in a pollinator garden project this fall/next spring
Triteleia ixiodes	N/A	Planting in a pollinator garden project this fall/next spring
Erythranthe guttata	N/A	Planting in a pollinator garden project this fall/next spring
Clarkia purpurea	N/A	Planting in a pollinator garden project this fall/next spring
Phacelia ssp.	N/A	Planting in a pollinator garden project this fall/next spring
Elymus glaucus	N/A	Future grassland/prairie restoration efforts

Please submit the final annual report to your Agency Coordinator December 15th.

BLM: Sarah Hill, sehill@blm.gov.
USFWS: Kelly Thomas, kelly_thomas@fws.gov.
NPS: Katie Vinzant, Katharine_Vinzant@nps.gov.

Appendix F. Offices and Regional Herbaria

*Contacts may be out of date, and the list does not reflect all SOS crew assignments. Crews in similar geographic areas to teams listed below can reach out to the same contacts listed in this document. Crews may also search for active herbaria and contacts on the Index Herbariorum site compiled by the NY Botanical Garden (https://sweetgum.nybg.org/science/ih/).

Office/ Team Code	Statewide or Regional Herbaria	Index Herb Code	Contact Info	Local Herbaria chosen	Contact Info
ALL Teams *NPS hold until further notice	US National Herbarium, Department of Botany MRC-166 Smithsonian Inst. 10th and Constitution Ave., NW Washington, DC 20560	US	Erika Gardner gardnere@si.edu		
AK930	Univ. of AK Anchorage Herbarium 3311 Providence Dr. Anchorage, AK 99508	UAAH	Justin Fulkerson 907-786-6287	BLM, ASO 930, Lands and Renewable Resources Anchorage, AK 99513	John Payne 907-271-3431
AK040	University of Alaska Museum Herbarium PO Box 756960 907 Yukon Dr. Fairbanks, AK 99775-6960	ALA	Jordan Metzgar 907-474-7109	BLM, Anchorage FO 6881 Abbott Loop Rd. Anchorage, AK 99507	
AK025	University of Alaska Museum Herbarium PO Box 756960 907 Yukon Dr. Fairbanks, AK 99775-6960	ALA	Jordan Metzgar 907-474-7109	BLM, NFO Kotzebue Field Station Kotzebue, AK	
AZ930	Arizona State Univ. Herbarium Dept. of Plant Biology PO Box 87101 Tempe, AZ 85287-1601	ASU	Elizabeth Makings 480-965-6162	Phoenix Field Office 21605 N. Seventh Ave. Phoenix, AZ 85027	John L. Anderson 623-580-5520
All AZ Field Offices	Arizona State Univ. Herbarium Dept. of Plant Biology PO Box 87101 Tempe, AZ 85287-1601	ASU	Elizabeth Makings 480-965-6162	Desert Botanical Garden 1201 N.Galvin parkway Phoenix AZ 85008	
AZ010, AZ100				Arizona Strip FO 345 E. Riverside Dr. St. George, UT 84790- 9000	Jacqueline Roaque 435-688-3242
CA160	UC Jepson Jepson Herbarium University of California 1001 Valley Life Sciences Bldg. #2465 Berkeley, CA 94720-2465	JEPS	Bruce Baldwin 510 643-7008	Bakersfield FO	Denis Kearns 661-391-6115
CA169	UC Jepson	JEPS	Bruce Baldwin 510 643-7008	Goodwin Education Center	Kathy Sharum 661-391-6033
CA170	Herbarium California Botanic Garden 1500 N. College Ave. Claremont, CA 91711-3101	RSA	Mare Nazaire 909-625-8767	BLM Bishop Field Office 785 N. Main, Suite E Bishop, CA 93514	Martin Oliver 760-872-5035

CA180	UC/Jepson Herbarium	JEPS	Bruce Baldwin 510 643-7008	University of California Davis	Ellen Dean 530-752-1091
CA190	UC/Jepson Herbarium	JEPS	Bruce Baldwin 510 643-7008		
CA320	UC/Jepson Herbarium	JEPS	Bruce Baldwin 510 643-7008		
CA330	Herbarium, Biological Sciences Department Humboldt State Univ. Arcata, CA 95521-8299	HSC	Robin Bency 707-826-4801	Arcata Field Office Herbarium	Jennifer Wheeler 707-825-2316
CA340	UC/Jepson Herbarium	JEPS	Bruce Baldwin 510 643-7008	University of California Davis	Ellen Dean 530-752-1091
CA350	UC/Jepson Herbarium	JEPS	Bruce Baldwin 510 643-7008	Eagle Lake FO Herbarium 2950 Riverside Dr. Susanville, CA 96130	Valda Lockie 530-252-5325
CA360	Herbarium, Biological Sciences Department California State Univ. Chico, CA 95929-0515	CHSC	Lawrence Janeway 530-898-5381	Redding FO Herbarium 355 Hemsted Dr. Redding, CA 96002	Kendra Fallon 530-224-2107
CA370	UC/Jepson Herbarium	JEPS	Bruce Baldwin 510-643-7008		
CA650	California Botanic Garden	RSA	Mare Nazaire 909-625-8767		
CA690	UC/Jepson Herbarium	JEPS	Bruce Baldwin 510 643-7008		
CA930	UC/Jepson Herbarium	JEPS	Bruce Baldwin 510 643-7008		
CBG	Nancy Poole Rich Herbarium, Research Department Chicago Botanic Garden 1000 Lake Cook Rd. Glencoe, IL 60022	CHIC	Dr. Kayri Havens 847-835-8378		
All CO offices 1ST	Univ. of Colorado Museum Herbarium Clare Small Bldg. Campus Box 350 Boulder, CO 80309-0350	COLO	Dr. Erin Tripp 303-492-3216		
All CO offices 2ND	University of Wyoming Rocky Mt. Herbarium Dept. of Botany PO Box 3165 Laramie, WY 82071-3165	RM	Ron Hartman & Ernie Nelson 307-766-2236	Colorado College 14 E. Cache la Poudre Colorado Springs, CO 80903 4TH	Dr. Tass Kelso 719-389-6405
All CO offices 3RD	CSU Herbarium Dept. of Biology Colorado State Univ. Fort Collins, CO 80523- 1878	CS	Jennifer Ackerfield 970-491-0496	Adams State College 208 Edgemont Blvd. Alamosa, CO 81102 5TH	Kristy L. Duran 719-587-7767
All CO offices				Univ. of CO - Denver Dept. of Biology Campus Box 171 PO Box 173364 Denver, CO 80217-3364 6TH	Leo Bruederle 303-556-3419

FWS0201	Arizona State Univ. Herbarium Dept. of Plant Biology PO Box 87101 Tempe, AZ 85287-1601	ASU	Elizabeth Makings 480-965-6162	Desert Botanical Garden 1201 N. Galvin Parkway Phoenix AZ 85008	Wendy Hodgson 480-481-8107
FWS0202	Department of Biology New Mexico State University Biology Annex Building Las Cruces, New Mexico 88003-0003	NMC	Sara Fuentes Soriano and Zachary Rogers 575-646-3732		
FWS0300	Nancy Poole Rich Herbarium, Research Department Chicago Botanic Garden 1000 Lake Cook Rd. Glencoe, IL 60022	CHIC	Dr. Kayri Havens 847-835-8378	Nancy Poole Rich Herbarium, Research Department Chicago Botanic Garden 1000 Lake Cook Rd. Glencoe, IL 60022	Dr. Kayri Havens 847- 835-8378
FWS0400	Biology Department Austin Peay State University 681 Summer Street Sundquist Science Complex D127 Clarksville, Tennessee 37044	APSC	Dwayne Estes 931-221-7781	Biology Department Austin Peay State University 681 Summer Street Sundquist Science Complex D127 Clarksville, Tennessee 37044	Dwayne Estes 931-221-7781
FWS0401	Biology Department Austin Peay State University 681 Summer Street Sundquist Science Complex D127 Clarksville, Tennessee 37044	APSC	Dwayne Estes 931-221-7781	University of Georgia Herbarium Plant Biology Department University of Georgia 120 Carlton Street Athens, Georgia 30602-7271	Steven Hughes 706-583-0565
FWS0402	Biology Department Austin Peay State University 681 Summer Street Sundquist Science Complex D127 Clarksville, Tennessee 37044	APSC	Dwayne Estes 931-221-7781	University of Arkansas Herbarium Department of Biological Sciences University of Arkansas 850 W. Dickson Street; SCEN 601 Fayetteville, Arkansas 72701	Jennifer Ogle 479-575-4372
FWS0403	Biology Department Austin Peay State University 681 Summer Street Sundquist Science Complex D127 Clarksville, Tennessee 37044	APSC	Dwayne Estes 931-221-7781	Jones Center at Ichauway 3988 Jones Center Drive Newton, Georgia 39870	Lisa Giencke 229-734-4706
FWS0404	Biology Department Austin Peay State University	APSC	Dwayne Estes 931-221-7781	University of North Carolina Chapel Hill Herbarium	Carol McCormick 919-962-6931
	681 Summer Street Sundquist Science Complex D127 Clarksville, Tennessee 37044			North Carolina Botanical Garden 120 South Road, Campus	

				Box #3280, Coker Hall Chapel Hill, North Carolina 27599-3280	
FWS0800	NRES, MS-186 Univ. of Nevada Reno 1664 N. Virginia St. Reno, NV 89557	RENO	Jerry Tiehm 775-784-1105	Austin Forest Service Herbarium Botany Austin Ranger District US Forest Service - Humboldt-Toiyabe National Forest P.O. Box 130 Austin, Nevada 89310	Dirk Netz 775-340-8505
ID070 and other Idaho without info.	Museum of Nat. History Ray D. Davis Herbarium Idaho State University Campus Box 8096 Pocatello, ID 83209	IDS	Dr. Lief Tapanila 208-202-3871		
ID080	Dept. of Biological Sciences Stillinger Herbarium Univ. of Idaho Moscow, ID 83844	ID	David Tank 208-885-7033		
ID090	Boise State University Herbarium Dept. of Biology 1910 University Dr. Boise, ID 83725	SRP	Dr. Jim Smith 208-426-3551	Lower Snake River District Herbarium 3948 Development Dr. Boise, ID 83705	Ann DeBolt 208-384-3465
LBJWC	Herbarium, Plant Resources Center Univ. of Texas at Austin 1 University Sta. F0404 Austin, TX 78712-0471	TEX	Dr. George Yatskievych 512-471-5904 512232-3402 f		
MT030	North Dakota State Univ.. Herbarium Hastings Hall Fargo, ND 58105	NDA	Edward DeKeyser 701-231-8180 edward.dekeyser@ndsu.edu	Dickinson Research Ext. Center 1089 State Ave. Dickinson, ND 58601	Dennis Whitted 701-231-5583
MT923	408 Lewis Hall Dept. of Plant Sciences Montana State Univ. Bozeman, MT 59717	MONT	Curator Matt Lavin 406-994-2032 w 406-994-1848 f mlavin@montana.edu,		
MT923	Herbarium Univ. of Montana Missoula, MT 59812-1002	MONTU	Shannon Kimball 406-270-3702		
MT923	Charles A. Taylor Herbarium Agricultural Hall 320 Dept. of Biology & Microbiology SD State Univ.	SDC	Gary E. Larson, Curator 605-690-3435		
NV030 NV052 NV930	NRES, MS-186 Univ. of Nevada Reno 1664 N. Virginia St. Reno, NV 89557	RENO	Jerry Tiehm 775-784-1105	BLM Las Vegas FO 4701 N. Torrey Pines Dr. Las Vegas, NV 89130	Lara Kobelt 702-515-5022
OR010 OR014 OR020 OR030 OR050 OR080 OR090 OR100 OR110 OR120 OR134	OSU Herbarium Dept. of Botany and Plant Pathology 2082 Cordley Hall Corvallis, OR 97331-2902	OSC	Aaron Liston-Director Richard Halse- Curator 541-737-4106		
OR030				Albertson Coll. of Idaho 2112 Cleveland Blvd. Caldwell, ID 83605	Dr. Don Mansfield 208- 459-5287

OR020				BLM Burns District Herbarium 28910 Hwy 20 West Hines, OR 97738	Skyler Hickey 541-573- 4478
OR090B				Upper Willamette Field Office 3106 Pierce Parkway Suite E Springfield Oregon 97477	Jessica Celis 541-683- 6794
OR110				Medford BLM Herbaria, 3040 Biddle Rd, Medford, OR 97504	Bryan Wender 541-471- 6549
OR130 OR134	Herbarium Botany Dept. Univ. of Washington Box 355325 Seattle, WA 98195-5325	WTU	David Giblin 206-543-1682 206-685-1728 f	Spokane District Herbarium Wenatchee, WA	Molly Boyter 509-665- 2137
UT931 (formerly known as RBG)	Stanley L Welsh Herbarium Brigham Young Univ. 378-MLBM Provo, UT 84602	BRY	Aaron Roe 801-539-4065	BLM Utah State Office P.O. Box 45155 Salt Lake City, UT 84145-0155	Aaron Roe 801-539- 4065
UT030				Grand Staircase- Escalante NM 190 E. Center St. Kanab, UT 84741	Amber Hughes 435- 826-5602
UT050	Stanley L. Welsh Herbarium Brigham Young Univ. 378 MLBM, BYU Provo, UT 84602	BRY	Robert Johnson 801-422-7094	Utah Valley State College - Herbarium Dept. of Biology Life Sciences 800 W. 1200 S. Orem, UT 84058-5999	James Harris 801-863-8623 Jason Alexander 801- 863-6806
UT080	Intermountain Herbarium Utah State University 5305 Old Main Hill Logan, UT 84322	UTC	Dr. Michael Piep 435-797- 0061	Uinta Basin Herbarium BLM 170 S. 500 East Vernal, UT 84078	Sandra Robins 435-781- 4448
UT080	Rocky Mt. Herbarium University of Wyoming 3165 University Sta. Laramie, WY 82071	RM	Ron Hartman and Ernie Nelson 307-766-2236		
VA (vnps)	Massey Herbarium, Biology Dept. VA Polytechnic Inst. and State Univ. Blacksburg, VA 24061- 0406	VPI	Thomas F. Wieboldt 540-231-5746 540-231-9307 f wieboldt@vt.edu	URV Herbarium, Biology Department University of Richmond Richmond, VA 23173	W. John Hayden 804-289-8232 804-289-8233 f jhayden@richmond.edu
WY930	Western Wyoming College				
WY930	Rocky Mt. Herbarium University of Wyoming	RM			

Appendix G. BLM Offices and Mail Stop/Collector Codes

AK020 - Northern Field Office
AK025 - Central Yukon Field Office, Fairbanks District Office
AK040 - Anchorage Field Office
AK050 - Glenallen District Office
AK930 - Alaska State Office
AZ030 - Kingman Field Office
AZ010 - Arizona Strip Field Office
AZ020 - Phoenix Field Office
AZ040 - Safford Field Office
AZ050 - Yuma Field Office
AZ060 - Tucson Field Office
AZ061 - San Pedro Project Office
AZ070 - Lake Havasu Field Office
AZ930 - Arizona State Office
CA067 - El Centro Field Office
CA068 - Barstow Field Office
CA160 - Bakersfield Field Office
CA170 - Bishop Field Office
CA180 - Folsom Field Office
CA190 - Hollister Field Office
CA320 - Alturas Field Office
CA330 - Arcata Field Office
CA340 - Ukiah Field Office
CA350 - Eagle Lake Field Office
CA360 - Redding Field Office
CA370 - Surprise Field Office
CA610 - California Desert District
CA650 - Ridgecrest Field Office
CA660 - Palm Springs-South Coast Field Office
CA690 - Needles Field Office
CA930 - California State Office
CO100 - Little Snake Field Office
CO110 - White River Field Office
CO120 - Kremmling Field Office
CO130 - Grand Junction Field Office
CO140 - Glenwood Springs Field Office
CO150 - Uncompahgre Field Office
CO160 - Gunnison Field Office
CO172 - San Juan Field Office
CO200 - Royal Gorge Field Office
CO210 - La Jara Field Office
CO220 - Saguache Field Office
CO932 - Colorado State Office
ES930 - Eastern States Office
ID100 - Boise District Office
ID120 - Bruneau Field Office
ID110 - Four Rivers Field Office (was ID095)
ID130 - Owyhee Field Office (was ID096)
ID200 - Twin Falls District Office
ID210 - Jarbidge Field Office (was ID097)
ID220 - Burley Field Office (was ID078)
ID230 - Shoshone Field Office (was ID076)
ID300 - Idaho Falls District Office
ID310 - Upper Snake Field Office
ID320 - Pocatello Field Office (was ID075)
ID330 - Challis Field Office (was ID084)
ID340 - Salmon Field Office (was ID085)
ID400 - Coeur d'Alene District Office
ID410 - Coeur d'Alene Field Office (was ID086)
ID420 - Cottonwood Field Office (was ID087)
ID930 - Idaho State Office
MT010 - Billings Field Office
MT020 - Miles City Field Office
MT030 - North Dakota Field Office
MT040 - South Dakota Field Office
MT050 - Dillon Field Office
MT06? - Havre Field Office
MT060 - Lewistown Field Office
MT070 - Butte Field Office
MT090 - Malta Field Office
MT092 - Glasgow Field Station
MT100 - Missoula Field Office
MT923 - Montana/Dakotas State Office
NM010 - Albuquerque Field Office
NM011 - Cuba Field Office
NM012 - Grants Field Station
NM018 - Taos Field Office
NM030 - Las Cruces District Office
NM040 - Tulsa Field Office
NM050 - Socorro Field Office
NM060 - Roswell Field Office
NM070 - Farmington District Office
NM080 - Carlsbad Field Office
NM930 - New Mexico State Office
NV010 - Elko Field Office

NV020 - Winnemucca Field Office
NV030 - Carson City Field Office
NV040 - Ely Field Office
NV050 - Las Vegas Field Office
NV060 - Battle Mountain Field Office
NV065 - Caliente Field Station
NV065 - Tonopah Field Station
NV930 - Nevada State Office
OR010 - Lakeview District Office
OR014 - Klamath Falls Resource Area
OR020 - Burns District Office
OR030 - Vale District Office
OR035 - Baker Resource Area
OR050 - Prineville District Office
OR054 - Central Oregon Resource Area
OR056 - Deschutes Resource Area
OR080 - Salem District Office
OR086 - Tillamook Resource Area
OR090 - Eugene District Office
OR091 - West Eugene Wetlands
OR100 - Roseburg District Office
OR110 - Medford District Office
OR115 - Butte Falls Resource Area
OR116 - Ashland Resource Area
OR117 - Grants Pass Resource Area
OR118 - Glendale Resource Area
OR120 - Coos Bay District Office
OR130 - Spokane District Office
OR134 - Wenatchee Resource Area
OR930 - Oregon State Office
OR931 - Berry Botanic Garden
TC200 - National Training Center
UT010 - Fillmore Field Office
UT020 - Salt Lake Field Office
UT030 - Escalante Interagency Resource Center
UT030 - Grand Staircase-Escalante National Monument
UT040 - Cedar City Field Office
UT052 - Richfield Field Office
UT055 - Henry Mountains Field Station
UT060 - Moab Field Office
UT070 - Price Field Office
UT080 - Vernal Field Office
UT090 - Monticello Field Office
UT100 - St. George Field Office
UT110 - Kanab Field Office
UT930/3 - Utah State Office
UT931 - Red Butte Botanical Garden
WO230 - Fish, Wildlife, and Plant Conservation Division
WY010 - Worland Field Office
WY020 - Cody Field Office
WY030 - Rawlins Field Office
WY040 - Rock Springs Field Office
WY050 - Lander Field Office
WY060 - Casper Field Office
WY070 - Buffalo Field Office
WY080 - Newcastle Field Office
WY090 - Kemmerer Field Office
WY100 - Pinedale Field Office
WY930 - Wyoming State Office

Appendix H. 2025 Collector Codes and Coordinating Agencies As of 8/15/2025

*Collector codes will be updated throughout the season as new collection teams begin. Contact your Agency Coordinator with any questions about collector codes.

Collector Code	Name	Agency Coordinator
AK930	AK930-Alaska State Office, UAA	BLM
AK930A	AK930A-Salcha-Delta SWCD	BLM
AK930B	AK930B-Kawerak Inc.	BLM
AK930C	AK930C-Copper River Watershed Project	BLM
AK930D	AK930D-Kodiak	BLM
AZ010	AZ010-Arizona Strip Field Office	BLM
BLR	BLR-Blue Lake Rancheria - Arcata FO	BLM
CA067	CA067-El Centro Field Office	BLM
CA180	CA180-Mother Lode Field Office (Formerly Folsom)	BLM
CA180A	CA180A-Cosumnes River Preserve	BLM
CA320	CA320-Applegate Field Office (Formerly Alturas FO)	BLM
CA330	CA330-Arcata Field Office	BLM
CA350	CA350-Eagle Lake Field Office	BLM
CA360	CA360-Redding Field Office	BLM
CA370	CA370-Applegate Field Office (Formerly Surprise FO)	BLM

Collector Code	Name	Agency Coordinator
DOR00	DOR00-Bend, OR	DOI
DOR020	DOR020-DOI Burns District Office	DOI
DOR030	DOR030-DOI Vale District Office	DOI
DUT00	DUT00-DOI Color Country District Office, Paria River District Office, Zion NP	DOI
DUT03	DUT03-DOI Capitol Reef NP, Color Country District Office	DOI
DUT04	DUT04-DOI Canyon Country DO, Arches NP, Canyonlands NP	DOI
DUT040	DUT040-Cedar City Field Office	DOI
DUT075	DUT075-Green River District Office	DOI
DWA00	DWA00-DOI Wenatchee, WA	DOI
DWA01	DWA01-DOI Northern Cascades NP	DOI
DWA02	DWA02-Olympic NP	DOI
DWY00	DWY00-DOI Green River/Seedskadee, WY	DOI
DWY01	DWY01-DOI Grand Teton NP, Yellowstone NP	DOI
DWY02	DWY02-Buffalo/Worland, WY	DOI
ES040	ES040-Northeastern States	BLM

CA660	CA660-Palm Springs Field Office	BLM
CA930A	CA930A-California Botanic Garden (Formerly RSABG)	BLM
CTLR	CTLR-Cahto Tribe of the Laytonville Rancheria	BLM
DAK930	DAK930 - Homer SWCD	BLM
DAK931	DAK931-Alaska Village Initiatives	BLM
DAK932	DAK932-Fairbanks SWCD	BLM
DAZ00	DAZ00-DOI Saguaro NP, Tucson Field Office	DOI
DAZ01	DAZ01-DOI NE AZ BLM/NPS lands	DOI
DAZ02	DAZ02-DOI Glen Canyon, Grand Canyon, Vermillion Cliffs	DOI
DAZ03	DAZ03-DOI Safford FO, Coronado NM, Chiricahua NM	DOI
DAZ04	DAZ04-Southern half of Phoenix & CO River Districts/Kofa & Cabeza Prieta NWR/Organ Pipe NM	DOI
DCA00	DCA00-DOI Point Reyes	DOI
DCA02	DCA02-DOI Cosumnes River Preserve	DOI
DCA03	DCA03-DOI Sequoia/Kings Canyon National Park	DOI
DCA04	DCA04-Mojave National Preserve, CA	DOI
DCA99	DCA99-Annual DOI CA Scouting	DOI
DCA170	DCA170-DOI Bishop Field Office	DOI

ES041	ES041-Lower Potomac Field Station	BLM
FWS0100	FWS0100-PFW Region 1, The Understory Initiative	FWS
FWS0101	FWS0101- Oregon Ecological Services with The Great Basin Institute	FWS
FWS0202	FWS0202-New Mexico ES Field Office, Southwest Seed Partnership	FWS
FWS0400	FWS0400-PFW HQ, Southeastern Grasslands Institute	FWS
FWS0401	FWS0401-PFW HQ, State Botanical Garden of Georgia	FWS
FWS0402	FWS0402-PFW HQ, Audubon Delta	FWS
FWS0403	FWS0403-PFW HQ Jones Center at Ichauway	FWS
FWS0404	FWS0404-PFW HQ, North Carolina Botanical Garden	FWS
FWS0405	FWS0405-Caribbean ES Field Office, East Puerto Rico	FWS
FWS0406	FWS0406-Caribbean ES Field Office, West Puerto Rico	FWS
FWS0500	FWS0500-NWRS Region 5, Native Plant Trust	FWS
FWS0502	FWS0502-NWRS Region 5, MARSB	FWS
ID320	ID320-Pocatello Field Office	BLM
MT050	MT050-Dillon Field Office	BLM
MT923	MT923-Montana/Dakotas State Office	BLM
NM018	NM018-Taos Field Office	BLM

DCA340	DCA340-DOI Ukiah BLM Field Office	DOI
DCA350	DCA350-Eagle Lake Field Office	DOI
DCA370	DCA370-Applegate Field Office (Formerly Surprise FO)	DOI
DCA660	DCA660 - Palm Springs FO	BLM
DCO00	DCO00-DOI Rocky Mountain NP	DOI
DCO01	DCO01-DOI Southwest DO, Mesa Verde NP, Hovenweep, Canyon of the Ancients	DOI
DCO02	DCO02-DOI Dinosaur NM, Browns Park NWR, Ouray NWR	DOI
DCO110	DCO110-White River District Office	DOI
DCO150	DCO150-Uncompaghre Field Office	DOI
DCO160	DCO160-Gunnison Field Office	DOI
DCO810	DCO810-Tres Rios Field Office	DOI
DFWS0407	DFWS0407-DOI Georgia Ecological Services	DOI
DFWS0408	DFWS0408-NWRS Region 4 Florida- TNC	DOI
DFWS0503	DFWS0503-NCTC- Catoctin National Park	DOI
DFWS0504	DFWS0504-NCTC- New River Gorge National Park & Preserve	DOI
DFWS0600	DFWS0600-NWRS Region 6 Eastern South Dakota	DOI
DFWS0800	DFWS0800-Winnemucca DO, Sheldon-Hart NWR	DOI

NM080	NM080-Carlsbad, NM	BLM
NM930	NM930-New Mexico State Office	BLM
NPAK00	NPAK00-Alaska regional office (AKRO)	NPS
NPAK01	NPAK01- AKRO traveling weeds crew"	NPS
NPAK02	NPAK02-AKRO traveling elodea crew	NPS
NPAK03	NPAK03-Katmai -NPS	NPS
NPAK04	NPAK04-Denali -NPS	NPS
NPCO00	NPCO00-Sand Creek Massacre National Historic Site and Black Canyon of the Gunnison, Colorado	NPS
NPID00	NPID00-Craters of the Moon - NPS	NPS
NPIN00	NPIN00-Indiana Dunes, IN -NPS	NPS
NPKS00	NPKS00-Tallgrass -NPS	NPS
NPMI00	NPMI00-Sleeping Bear Dunes, MI -NPS	NPS
NPSD00	NPSD00-Northern Great Plains - NPS	NPS
NV030	NV030-Carson City Field Office	BLM
NV052	NV052-Southern Nevada District Office	BLM
NV930	NV930-Nevada State Office	BLM
OR010	OR010-Lakeview District Office	BLM

DFWS0801	DFWS0801-DOI Stillwater Wildlife Refuge, Stillwater Field Office, Mount Lewis Field Office	DOI
DID00	DID00-DOI Idaho Falls, Idaho	DOI
DMT00	DMT00-DOI Glacier and Big Hole NP	DOI
DMT01	DMT01-DOI Billings, Lewistown, MT	DOI
DNM00	DNM00-DOI Las Cruces, NM	DOI
DNM01	DNM01-DOI Santa Fe, NM	DOI
DNM070	DNM070-Farmington Field Office	DOI
DNPNV00	DNPNV00- GBI Great Basin NP, NV	DOI
DNPNV00A	DNPNV00A - ACE Great Basin NP, NV	DOI
DNV010	DNV010-DOI Elko District Office	DOI
DNV040A	DNV040A-DOI Bristlecone Field Office	DOI
DNV060	DNV060 -DOI Tonopah Field Office	DOI
DNV065A	DNV065A- Caliente Field Office	DOI
DNVBRM	DNVBRM- DOI Basin and Range Monument	DOI

OR080	OR080 - NWO District - Tillamook	BLM
OR090B	OR090B-NWO District	BLM
OR110	OR110 – Medford District Office	BLM
OR135	OR135-Border Field Office	BLM
OR930A	OR930A-BLM lands, OSU team NW Oregon	BLM
OR930B	OR930B-BLM lands, OSU team Roseburg District	BLM
TYT	TYT-The Yurok Tribe	BLM
UT020	UT020-Salt Lake Field Office	BLM
UT030	UT030-Grand Staircase-Escalante National Monument	BLM
UT060	UT060-Moab FO	BLM
WY040	WY040-Rock Springs Field Office	BLM
WY090	WY090-Kemmerer Field Office	BLM
WY930	WY930-Wyoming State Office	BLM

Appendix I. CPC National Collection of Endangered Plants

Seeds of Success does not collect seeds from threatened or endangered species. The SOS Technical Protocol is designed for the sustainable collection of common 'workhorse' species that can be used in restoration projects.

The Center for Plant Conservation's (CPC) National Collection of Endangered Plants contains plant material for more than 2,000 of the country's most imperiled native plants. Seeds, cuttings, and other plant material are collected and carefully maintained by botanical institutions that participate in the CPC. Researchers and botanists at each participating institution collect plant material and seeds from the most imperiled plants in their regions. The institutions study and hold this material in protective custody. An important conservation resource, the CPC National Collection is a backup in case a species becomes extinct or no longer reproduces in the wild. The Collection is also an important resource for the scientific study of plant rarity, rare plant life cycles, and rare plant storage and germination requirements.

After studying and growing the plants, institutions provide plant material to federal and state agencies and private land managing organizations to assist their efforts to recover imperiled plants in the wild. CPC participating institutions are involved in restoring more than 60 of America's rarest plants in their natural habitat.

More information about the Center for Plant Conservation is available online at https://saveplants.org/

For more information contact:
Center for Plant Conservation, info@saveplants.org, (760) 796-5686.

Appendix J. References

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Appendix K. Glossary

Denotes required data field.

Accession Number – A number representing a unique germplasm or collection and associated with a Seed Collection Reference Code or field number. This number is consecutive and never to be reused. Collections made in different growing seasons from the same population are unique accessions or collections, assigned unique seed collection reference numbers.

Example: CO932-5. See also ***Seed Collection Reference Number*** for the accession number format required for SOS.

Alt. Collection Number – Alternate collection numbers are secondary identification number representing a code assigned by another institution – they are *not* required for the SOS National Office. They may represent another organization or individual involved in the collection, a batch number or other numbering system previously employed by the current institution. E.g., MSB378585, CH-101, or 2014-16.

Agency Coordinator – The SOS coordinator for the BLM, NPS, or USFWS that is the primary point of contact for a collection team for the season. You will send this person all end of year reporting data and attend the breakout session they lead during the monthly collector calls.

***Area Sampled** – In acres, the size of the area in which the collection was made. Since collections should ideally be made from the entire population, this number should be very close to the actual population size, in acres.

***Area within Subunit** – The geographic area where this collection was made. Geographic areas are physical or logical areas that transcend the geopolitical areas defined in the State, County, Subunit fields. These may include mountain ranges, river valleys, trail names, etc. e.g., Marigold Trail, Red Rocks Canyon, or Maroon Bells.

***Aspect** – The cardinal direction of the slope where the collection was made. Measure using a compass. E.g., NW.

***Associated Species** – List the scientific name for all plants found coexisting with the collected species, ideally at least five for SOS.

***Collector Code** – BLM field office or institutional code assigned to your collection team. These are assigned by the SOS National Coordinating Office. E.g., AK930, NCBG or CP2.

***Collector Name(s)** – All active participants participating in seed collection. Collectors' name should be entered as last name, first initial. Example: Dawson, C., Howard, M., Haidet, M.

***Collection Number** – The collection number is the sequential, unique, number assigned to a given collection. This number is the second part of the seed collection reference number.

***Common Name(s)** – The vernacular or trade name(s) of the collected species. Common names should be lower case, except for proper nouns within the name. E.g., blue grass, Iowa tall grass, and creeping Jenny.

***County** – The county the collection was made.

Cut Test – A test performed by splitting seeds in half to determine the viability of a potential collection. Immature seeds are usually green, and seeds ripe for collecting are usually brown with a notable live embryo. A cut test can be used to estimate the number of healthy seeds per fruit.

Dashboard – An application that allows you to view data at a glance. For SOS, dashboards are used to view commonly requested summary statistics and highlight fields that may have been incorrectly entered.

Data Management Site – An immersive web application that serves as a place to QC collection and scouting data, plan collections using a web map, view summary statistics, create reports, create herbarium labels, and submit Seed Tracking Forms.

Data QC (Quality Control) – Assessing data for potential errors and quality.

Date(s) Collected** – Enter up to two dates a collection was made from the same population. Use MM/DD/YY format. Collections made in different growing seasons from the same population are unique accessions or collections, assigned unique seed collection reference numbers (see ***Recollection). E.g., August 4, 2021 is recorded as 08/04/2021.

Date Range – If the collection dates span more than two dates, utilize this field in the web portal, which is a free text box. Enter the range of dates, or the individual dates. Use MM/DD/YY format and separate multiple dates with a comma. For example, if the collection took place on August 4th, 5th, 7th, and 9th, 2021, then enter the first two dates in the first two fields, and then "08/07/2021, 08/09/2021" in the "Date range" field.

***Ecoregion** – Ecoregions denote areas within which ecosystems (and the type, quality, and quantity of environmental resources) are generally similar. The SOS standard is to use Omernik Level III and IV Ecoregions (https://www.epa.gov/eco-research/level-iii-and-iv-ecoregions-continental-united-states).

***Elevation** – Distance above or below sea level. If necessary, indicate a range, e.g., 1200-1400 feet.

Estimate the number of healthy seeds per fruit – After performing a cut test, calculate the number of seeds ripe for collection per fruit.

Estimate the number of healthy fruits per plant – This number will yield an approximation of how many plants in the population need to be sampled to reach the ideal sample size of more than 10,000 healthy seeds.

Evidence of disturbance or damage – Any manipulations made to the collection site. Most collections should be made on sites falling under 'No Damage.'

***Family** – The family to which the collection belongs.

FieldMaps – An application that allows you to create interactive, downloadable maps. For SOS, users can view and download maps for offline use.

***Genus** – The genus to which the collection belongs.

***Geology** – The mineral structure of the collection site, either a formation type or specific rock which makes up the parent material. E.g., granite, limestone, or sandstone. If you are unable to recognize the parent material, reference the soil map for the location at https://websoilsurvey.sc.egov.usda.gov

GeoPlatform – A GeoSpatial Platform (akin to ArcGIS Online), that allows users from federal and non-federal to collaborate.

***GPS Datum** – GPS device setting, when using GPS with a map, make sure both tools match. The SOS standard is NAD83.

***Habitat Type** – Description of the collection site as a plant community or ecosystem. Example: oak savanna, prairie, sagebrush steppe. Ecological site descriptions and national vegetation classifications are also accepted for this field on the SOS data form.

***Identified by** – The name and organization of the botanist or plant specialist who identified the taxa of the collection.

Infraspecific Rank – The term preceding the infraspecific epithet. E.g., ssp. (subspecies), var. (variety), or subvar. (subvariety).

Infraspecific Epithet – The taxonomic designation below the species level to which the collection belongs, part of the scientific name. Example: *multiflora* in *Brickellia longifolia* var. *multiflora*.

***Landform** – Description of local topography. E.g., mountain, hill, alluvial fan, flat, etc. A selection of landforms and their definitions is available on blm.gov/sos.

***Landowner** – This should reflect the public agency or municipality that is responsible for the land on which the collection was made. Omit private individuals' names. You MUST keep written permission on file in your office if a collection was made on private land or land other than BLM. E.g., USFWS.

***Land Use** – How the land is used by humans. E.g., mining, recreation, grazing, conservation.

***Latitude** – Direction from the equator (N/S), degree, minute, and second.

Layer – Each individual geographic dataset in a map.

Legend – What each symbol, image, or graphic on a map represents.

***Location Details** – The locality of the collection site, including driving and hiking directions from some recognizable point to the collection site. Be detailed enough that someone can retrace the location details and find the population using cardinal directions, mileage, and permanent landmarks. *E.g., Starting at the intersection of Fifth St and Cole Ave, head SW on Fifth St towards Albert St. and turn right onto Albert St. In 6 miles slight right east onto Coffee Pot Rd E. In 5.4 miles turn S (right) to Coffee Pot Recreation area and continue for 3 miles. The population primarily lines the road just after the cattle guard and is off to the right when facing the lake.*

***Longitude** – Direction from the Prime Meridian (E/W), degree, minute, and second.

Long-term storage portion – The first 3,00 seeds from any SOS collections are stored in long-term storage conditions for conservation purposes with the USDA-ARS.

***NRCS PLANTS Code** – A code system for recording plant names in the United States is used in the USDA NRCS PLANTS Database. Plant species "symbols," as they're called, are comprised of the first two letters of the genus, followed by the first two letters of the species, the first single letter of the variety name (if present), and sometimes a tie-breaking number. See http://plants.usda.gov/ and query the scientific name to find the unique code.

***Modifying Factors** – Any event that has altered the collection site, such as burning, grazing, or seeding. If a modifying factor results in a cultivated population, the population can no longer be considered for collection. However, naturally occurring populations within a seeded area may be considered as suitable collection populations.

Native Plant Materials Development Process – The interagency process developed by the BLM which works to develop a reliable, stable crop of high-quality native seeds and seedlings from wild collected species for restoration, rehabilitation, and reclamation.

Natural Dispersal Stage – The point in the population's growing cycle where seeds would be distributed without human interference. The best stage at which to collect seed.

***Non-BLM Permission Filed** – Permission is needed to collect on all private and public lands. Written permission should be kept on file for all collections. Indicate "yes" that permission is filed.

***No. Plants Found** – Total number of plants living at the collection site; this number includes those plants whose seeds are not ripe for collection on the day of collection.

***No. Plants Sampled** – Number of plants seed was collected from. There should be a minimum of 50 plants sampled, and the number should be exact, *not* an average or range.

Operational Collection – A seed collection made following the SOS Protocol that is over 80,000 estimated PLS (weight can vary). The purpose of these collections is for restoration, particularly for increasing through a grow-out.

Organization – On the collection form, this refers to the federal agency associated with the team organization and seed use. E.g. BLM, NPS, USFWS, DOI.

Photograph Reference – Use the following naming convention to document each of the three digital images taken with for every collection: PLANTS Code_Collection Number_Letter. Example: Photos for Chicago Botanic Garden's collection of *Symphyotrichum lanceolatum* are named SYLA6_CBG-419_A.jpg, SYLA6_CBG-419_B.jpg, SYLA6_CBG-419_C.jpg.

Plant Habit – The way the collected species grows. E.g., tree, shrub, forb, succulent, or grass/grasslike.

***Plant Height** – Distance from the ground to the top of the plant in feet and inches**.** This number should be an average of the population.

PLS – Pure live seed. The number of viable seeds in a collection.

Population – A group of individuals living within the same collection site, continuous in range and generally uniform in appearance; one accession or collection. Geographic features such as roads, ridges, and rivers inhibit gene flow between populations, and thus are useful indicators of separate populations.

Readiness of Population – The ripeness of the population on collection day; collections should be made when the population is closest to natural dispersal stage.

Recollection – A seed collection made from a population that has previously been collected from following the SOS Protocol.

***Seed Collection Reference Number** – Collector code, BLM field office or institutional code, followed by collection number, a consecutive and chronological number representing the

unique collection or accession, never to be reused. See ***Accession Number***. Example: CA170-42, OR110-347 or CBG-2481.

***Seed Collected From** – Choose from the following: plant, ground, both. The best collections are made from plants.

Seed Transfer Zones – There are many different seed transfer zones, all which are used to determine where seeds can be moved and sourced within a region. All SOS collections in the lower 48 have a Provisional Seed Zone associated with them. Depending on the geographic area and species, there may be additional zones to narrow the area based on additional further research.

Provisional Seed Zone – An area defined by annual temperature and aridity, which is used as a general guideline to determine where seeds can be moved and sourced within a region. Source: Bower et al. Provisional Seed Zones (https://www.fs.usda.gov/wwetac/seedzoneGISdata.php)

- **Eastern States Seed Zone** – Seed transfer zones specific to eastern states. Eastern States Seed Transfer Zones created by Carolyn Pike et al. (Pike, Carolyn; Potter, Kevin M; Berrang, Paul; Crane, Barbara; Baggs, Joanne; Leites, Laura; Luther, Tom. 2020. New Seed-Collection Zones for the Eastern United States: The Eastern Seed Zone Forum. Journal of Forestry. 9(2): 271-. https://doi.org/10.1093/jofore/fvaa013.)

- **Desert Southwest Seed Zone** – Seed transfer zones specific to the desert southwest. Shyrock et al. Desert Southwest Provisional Seed Zones. Source: https://www.fs.usda.gov/wwetac/seedzoneGISdata.php

- **Empirical Seed Zones** – Includes Climate Matched, Common Garden, and Landscape Genetic Seed Zones for specific species: Basin wildrye (*Leymus cinereus*), Blue grama (*Bouteloua gracilis*), Blue wildrye (*Elymus glaucus*), Bluebunch wheatgrass (*Pseudoroegneria spicata*), Bottlebrush Squirreltail (*Elymus elymoides*), Desert globemallow *(Sphaeralcea ambigua*), Hoary tansyaster (*Machaeranthera cancescens*), Indian ricegrass (*Achnatherum hymenoides*), James' galleta (*Pleuraphis jamesii*), Mountain Brome (*Bromus carinatus*), Mtn. Big Sagebrush (*Artemisia tridentata ssp vaseyana*), Nevada ephedra (*Ephedra nevadensis*), Oceanspray (*Holodiscus discolor*), Prairie junegrass (*Koeleria macrantha*), Rocky Mountain beeplant (*Cleome serrulata*), Rushy milkvetch (*Astragalus lonchocarpus*), Sand dropseed (*Sporobolus cryptandrus*), Sandberg's bluegrass (*Poa secunda*), Showy goldeneye (*Heliomeris multiflora*), Small-leaf globemallow (*Sphaeralcea parvifolia*), Sulfur-flower buckwheat (*Eriogonum umbellatum*), Tapertip onion (*Allium acuminatum*), Thurber's needlegrass (*Achnatherum thurberianum*), WY Big Sagebrush/Big Sagebrush (*Artemisia tridentata ssp wyomingensis and spp tridentata*), Yellow spiderflower/Yellow beeplant (*Cleome lutea*).
Source :https://www.fs.usda.gov/wwetac/seedzoneGISdata.php

Short-term storage portion – The seed remaining in a collection after the long-term storage portion has been removed. These seeds are kept in short-term storage conditions by the

Bend Seed Extractory or other facility until requested. The original collecting team has right of first use or can make seed available for other SOS partners for native plant materials development projects.

***Slope** – The degree of steepness at the collection site; record a number representing the degree of slope 0-90 measured with a clinometer. E.g., 30 degrees.

***Soil Color** – Refer to the Munsell Soil Color Chart and document color using the code and descriptive name. E.g., 7.5 YR 3/3 "dark brown".

***Soil Texture** – Describes the soil at the collection site with the following terms: clay, silt, and sand etc. Soil texture is best estimated by rolling a sample of soil between your finger and thumb.

***Source Used** – The source used to obtain the lat/long coordinates for the collection site. E.g., gps, map, other.

***Species** – The species to which the collection belongs.

Standard Collection – A seed collection made following the SOS Protocol that is under 80,000 PLS. All SOS collections are for restoration purposes.

***State** – The state in which the collection was made.

Sub-Populations – A cluster of individuals that are divided from the main population either physically or in appearance.

Subspecies** – See ***Infraspecific Rank.

***Subunit** – The descriptive name of the area given to it by the landowner or land manager. This may include the city, town, village, park, forest, or refuge in which the material was collected. E.g., Blue Mountains, Antelope Island State Park, Ridgecrest Field Office, Phoenix.

Survey123 (forms) – An application that allows you to create surveys and submit responses. For SOS, the paper Data Form has been digitalized into the Survey123 application to streamline data collection.

Variety** – See ***Infraspecific Rank.

Viability Equation – The equation used to determine whether only collecting 20% of the healthy seeds available on a given day will result in a collection greater than 10,000 seeds. *(# of viable seeds per fruit) * (# fruits per plant) * (# of plants in the population) * 0.2 = >10,000 seeds*.

Appendix L. Device Specs for Digital Data Collection

Many different devices can be used with the SOS digital data collection platform if they meet the following specifications (as outlined by BLM NOC in 2021):

- Minimum storage space is 128 GB. Maps, data, apps and other crew resources tend to eat up a significant amount of this space, so we recommend opting for more storage space on the device itself.
- **Device MUST be a Wi-Fi + Cellular model** (network provider doesn't matter). This is required for the device GPS to work. Wi-Fi only devices do not have a GPS chip. **The device does not have to have an active cellular plan,** though it can be helpful for troubleshooting in the field. Crews should be able to download all that they need in the office or somewhere with Wi-Fi connection.
- A waterproof case, heavy duty straps, and battery pack are HIGHLY recommended for all devices.
- You can also purchase USB type devices to back up tablet data if you are going to be in remote areas for an extended amount of time.

Below is a list of BLM recommended devices from FY 2021, there is not a more up-to-date list. As long as the device meets the requirements above**, it does not have to be from this BLM list**. The list has a variety of devices, so you could investigate the most current models of those listed. It is purely for illustrative purposes.

Mobile device models approved for purchasing for field data collection by the national BLM GIS Programs (FY21)

1. Samsung Galaxy S21 (Phone)
2. Samsung Galaxy S21+ (Phone)
3. Samsung Galaxy Note20 (Phone)
4. Samsung Galaxy Note20 Ultra (Phone)
5. Samsung Galaxy Tab A 8" 2019 (Tablet)
6. Samsung Galaxy Tab A 10" 2019 (Tablet)
7. Samsung Tab Active 3 8" (Ruggedized Tablet)
8. Samsung Tab Active Pro 10" (Ruggedized Tablet)*
9. Samsung Tab S7 (11") (Tablet)
10. Samsung Tab S7+ (12.4") (Tablet)
11. Samsung XCover Pro 6.3" (Ruggedized Phone)
12. Apple iPhone 11 2019
13. Apple iPad Air 2019 (GPS chip in 4G model only)**
14. Apple iPad Mini Gen 5 (GPS chip in 4G model only)**

Appendix M. End of Season Checklist

***A copy of this checklist is also available to download from the SOS website

General

- ☐ Each collection has:
  - 3 photos, one of the seed, one of the plant, and one of the landscape.
  - 1 herbarium specimen for the Smithsonian, and extra copies for local or regional herbaria as appropriate.
  - Each collection has data forms with all the required fields filled out.
    - Collection/Field Data Form - Required
    - Scouting Form – optional (but highly encouraged) if conducting site visits before collecting)
    - Seed Tracking Form - Required
- ☐ Each collection's seeds:
  - Have been treated with a No-Pest Strips, are securely packaged, and labeled inside and outside of the bags and boxes.
    - *Seed treatment protocols differ by agency. See section 13b in the SOS Technical Protocol for guidance.*

Data Submission – All due before crews leave for the season and no later than December 15th.
Submit all deliverables in one closing email at the end of the season to your Agency Coordinator. You may get some feedback about incomplete or missing data, so do this at least two weeks before crewmembers leave.

- ☐ Each collection has been reviewed in the GeoPlatform Data Management site or entered directly into BGBASE using the legacy paper/data portal system.
- ☐ Photos
  - Are in JPG/JPEG format and correctly labeled (PLANTS Code_Seed Collection Reference Number_Picture Number; e.g., SYLA6_CA180-419_A.jpg)
  - Location data is deleted from the photos. Follow instructions on the "Taking Quality Photos" help document.
  - Are submitted in ONE file via drive link or emailed .zip drive. **Do not submit in subfolders.**
  - If photos are missing at the end of the season, make a note at the top of your annual report. See Appendix E of the SOS Technical Protocol for an example.
- ☐ Data forms are **exported ONLY once data is reviewed and 100% correct** in GeoPlatform. Data forms are correctly labeled with the SOS Seed Collection Reference Number and are saved as individual PDFs or Word documents.
- ☐ Permits/permissions for all collections made on ALL non-BLM lands are sent in one folder to your Agency Coordinator
- ☐ Submit an annual report to your Agency Coordinator, according to the annual report template found on the SOS website and the example report in Appendix E of the Technical Protocol.
- ☐ Local copies of the data forms, photos, permits, and annual report are saved at the coordinating land managing agencies' office.

Seed Shipping

- ☐ Ensure you are shipping to your **designated** cleaning facility.
- ☐ Fleshy fruit will be shipped cold, overnight, ASAP once the collection has been completed. Fleshy fruits will should never be frozen.

- ☐ Bags:
  - Sealed securely, including corners and any other weak points, and pass the "shake test" (no seeds escape when the bag is shaken).
  - Labeled with the SOS Seed Collection Reference Number and species.
  - If there are multiple bags for a single collection, they are labeled 1 of 3, 2 of 3, etc.
  - Bags are placed in a box with their associated Field Data Form(s). **Data forms should only be exported from the GeoPlatform once data QC is 100% complete.**
- ☐ Boxes:
  - If a single collection is sent in multiple boxes, boxes should be labled box 1 of 3, 2 of 3, etc on the outside of the box.
  - Boxes should be sealed securely and have the correct mailing address.
  - Mailed early in the week rather than on a Thursday or Friday.
- ☐ **Fill out the Seed Tracking Form** on either a tablet or the GeoPlatform Data Management Site. If the person who is shipping does not have access to the GeoPlatform, contact the SOS National Curator with the collection number, species, and the cleaning facility destination.
- ☐ Notify your Agency Coordinator when the last boxes have been shipped for the year.
- ☐ Any Clearance Forms must be emailed to your Agency Coordinator by January 30th.
- ☐ All NON-SOS seed should have "NON-SOS" Written on the outside of the box.

Herbarium Vouchers

- ☐ *One **unmounted** voucher per collection has been prepared following the "Guide to Herbarium Specimens for SOS" on the SOS website
  - **NPS and DOI teams collecting on NPS managed lands – Create herbarium label/notice of transmittal for each collection but do not send the vouchers. Contact Katie VinZant, katharine_vinzant@nps.gov, for information on where to store vouchers and transmittal notices.*
- ☐ Labels with proper agency attribution are exported from the Data Management Site and **reviewed/edited before printing on acid-free paper**.
- ☐ Vouchers are safely packaged to avoid damage during shipment.
- ☐ **A Notice of Transmittal** has been emailed to Erika Gardner or printed and sent in with the vouchers.
- ☐ One voucher is kept at the local Field Office/local organization (optional)
- ☐ One voucher has been sent to a regional herbarium (optional; see list of herbaria in Appendix F of the SOS Protocol)

Note: There may be additional end of season duties or requirements requested by the SOS National Curator, your Agency Coordinator, your organization, your contract, or agreement.

Appendix N. Landform Dictionary

This is a dictionary of commonly used landforms. If the landform you need is not listed, contact the SOS National Curator and GIS Analyst.

LANDFORM	DESCRIPTION
Alluvial Fan	Outspread mass of loose rock material deposited by a stream where it issues from a narrow mountain valley
Alluvial Valley	An elongate, relatively large, externally drained depression of the Earth's surface that is primarily developed by stream erosion or glacial activity and has accumulated alluvial material since its formation.
Arroyo	Small, deep flat-floored channel or gully of an ephemeral or intermittent stream
Badlands	Intricately stream-dissected topography, characterized by a very fine drainage network with high drainage densities and short steep slopes with narrow interfluves
Bajada	Broad alluvial slope extending from the base of a mountain range into an inland basin
Bald	Elevated grassy area, as a mountain top or high meadow, that is devoid of trees
Ballon	Rounded or dome-shaped hill formed either by erosion or by uplift
Basin	Depressed area with no surface outlet
Bench	Level, or nearly level, strip of land that dissects a generally steeper slope
Blowout	Butte, the top of which has been blown out by the wind until it resembles a volcanic crater, or a shallow basin formed where vegetation has been destroyed by fire or overgrazing
Bottomland	Low-lying, level land, usually highly fertile; an alluvial plain or a flood plain; the floor of a valley
Break	Marked variation of topography or a tract of land distinct from adjacent land, or an irregular and rough piece of ground
Canyon	Long, deep, relatively narrow steep-sided valley confined between lofty and precipitous walls in a plateau or mountainous area, often with a stream at the bottom; larger than a gorge
Cliff	High, very steep to perpendicular or overhanging face of rock; a precipice
Coastal Plain	Low, broad plain that has its margin on an oceanic shore and its strata either horizontal or very gently sloping toward the water
Colluvial Fan	A cone-shaped landform composed of unconsolidated sediments (colluvium) that accumulate at the base of a slope due to gravity and mass wasting processes like rockfalls, debris flows, and snow avalanches. Unlike alluvial fans which are formed by water, colluvial fans are primarily formed by the downslope movement of material due to gravity.

Colluvium	Unconsolidated, unsorted earth material being transported or deposited on sideslopes and/or at the base of slopes by mass movement (e.g. direct gravitational action) and by local, unconcentrated runoff
Depositional Stream Terrace	One of a series of platforms in a stream valley, flanking and more or less parallel to the stream channel, originally formed near the level of the stream, and representing the dissected remains of an abandoned flood plain, stream bed, or valley floor.
Depression	Relatively sunken part of the surface drainage area, as an interior basin or a karst sinkhole
Drainage	Collective term for the streams, lakes, and other bodies of surface water by which a region is drained
Draw	A small stream channel, more open and with a broader floor than a gulch
Drumlin Field	Landscape characterized by swarms of closely spaced drumlins, distributed more or less en echelon and commonly separated by small marshy tracts
Dune Field	An expanse covered by dunes
Escarpment	Long, continuous cliff or steep slope facing in one general direction, separating two level or gently sloping surfaces and produced by erosion or faulting
Flat	Level surface or small area of land marked by little or no relief
Floodplain	Smooth land adjacent to a river channel, constructed by the present river in its existing regimen and covered with water when the river overflows
Floor	Bottom of a depression, such as the floor of a crater or valley floor
Foothills	A region of relatively low rounded hills at the base of or fringing a mountain range
Gorge	Narrow, deep valley with nearly vertical rocky walls, enclosed by mountains, smaller than a canyon and more steep- sided than a ravine
Gulch	Narrow deep ravine with steep sides; larger than a gully
Gully	Deep erosion channel excavated in soil on a bare slope
Highland	Large area of elevated or mountainous land standing prominently above adjacent low areas; a mountainous region
Hills	Natural elevation of the land surface, rising rather prominently above the surrounding land, generally less than 300 m from base to summit
Hillslope	Part of a hill between its crest and the drainage line at the foot of the hill
Hummock	Rounded or conical knoll, mound, hillock or other small elevation
Intermontane Basin	Situated between or surrounded by mountains, mountain ranges or mountainous regions

Knob and/or Mound	Peak or other projection from the top of a hill or mountain; also a low rounded natural hill, generally of soil
Lowlands	Low, relatively level ground of a region, in contrast with the adjacent, higher country
Plains	Extensive, lowland area that ranges from level to gently sloping or undulating, with few or no prominent hills or valleys
Plateau	Extensive upland mass with a flat summit area that is considerably elevated above the adjacent lowlands, separated by escarpments
Ravine	Small, narrow, steep-sided valley larger than a gully, smaller than a canyon, and usually carved by running water
Ridge	Long, narrow elevation of the land surface, usually sharp crested with steep sides
Rift Valley	Valley that has developed along a rift, which is a long, narrow continental trough that is bounded by normal faults
Rim	Border, margin, edge or face of a landform such as the curved brim surrounding the top part of a crater caldera, or the rimrock of a plateau or canyon
Saddle	Low point in the crest of a ridge, commonly between the heads of streams flowing in opposite directions
Scour	Feature resulting from the powerful, concentrated clearing and digging action of flowing air, water or ice
Scree	A collective term for an accumulation of coarse rock debris or a sheet of coarse debris mantling a slope. Scree is not a synonym of talus, as scree indicates loose, coarse fragment material on slopes without cliffs.
Seep	Small area where water or oil percolates slowly to the land surface
Stream Reach	All or portion of a stream/reach
Stream Terrace	One of a series of level surfaces in a stream valley, flanking the stream channel
Swale	Slight depression, sometimes swampy, in the midst of generally level land
Talus	Rock fragments derived from and lying at the base of a cliff or very steep, rocky slope
Till Plain	Extensive area, with a flat to undulating surface, underlain by till with subordinate end moraines
Trench	Narrow, steep-sided canyon, gully or other depression eroded by a stream
Valleys	Elongate, relatively large, gently sloping depression, commonly situated between mountains or ranges of hills and often containing a stream with an outlet
Wash	Broad, gravely bed of an intermittent stream, often situated at the bottom of a canyon, occasionally filled by a torrent of water