Technical Protocol

For the Collection, Study, and Conservation of Native Plant Seeds through the National Seeds of Success Program

Last updated March 2026

BUREAU OF LAND MANAGEMENT

NATIONAL PARKS SERVICE

U.S. FISH & 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 U.S. Department of Agriculture's Agricultural Research Service (USDA-ARS), Tribal Nations, and other non-federal partners.

The purpose of the SOS program is to establish national high-quality, accurately identified, and well-documented seed collections from native plant species across the United States. SOS seed collections support the development of native plant materials for ecosystem restoration, stabilization, and rehabilitation projects, 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 was to get native plant seeds from around the world into long term conservation with the BLM coordinating U.S. partner contributions.

In June 2008, a Memorandum of Understanding (MOU) between the BLM and several NGOs formally recognized SOS as a U.S. national native seed collection program, coordinated by the BLM. The 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.

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 after funding from Kew was no longer provided to U.S. partners. Without sending seed collections to Kew, SOS continued its strategy of making multiple collections of restoration species to compile genetically representative seeds from across a 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 NPS and USFWS signed an interagency MOU with the BLM to collaborate on national seed collections. The 2023 MOU

codified 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 SOS 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. Agencies also work collaboratively across different regions to share insights and resources, enhancing the effectiveness of their conservation efforts.

1b. Membership

Today, the SOS program is led by the BLM in close collaboration with NPS and USFWS. The agencies work with other federal organizations, Tribal Nations, and non-federal groups to coordinate 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 participating agencies is to increase access to a reliable, cost-effective supply of native plant materials for restoration and rehabilitation. SOS serves the first step in the Native Plant Materials Development Process (NPMDP), which focuses on increasing the quality and quantity of native plant materials available (Figure 1).

Figure 1. The Native Plant Materials Development Process

SOS's role in the NPMDP is collecting wildland native seeds for research & development, germplasm conservation, and use in seed production. SOS seeds used in production efforts eventually return to 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, SOS seeds capture the genetic diversity needed to develop suitable ecotypes for restoration.

2. Getting Started

A successful SOS season begins with the annual onboarding process which occurs via the SOS website's (blm.gov/sos) "Getting Started" section. All SOS participants must go through this process to be included in program communications, sign a confidentiality agreement, attend training, and if needed, obtain access to their regional SOS GeoPlatform Group for data collection and review. Returning participants must complete onboarding for each season they participate in the program, information does not carryover year-to-year.

2a. SOS Data Policy

Everyone participating in the SOS program ***must*** **sign an SOS Data Confidentiality Agreement** before gaining access to any data. Signing the Confidentiality Agreement is incorporated as part of filling out the 2026 SOS Registration Form on the SOS website. The SOS 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. A copy of the agreement is also available in Appendix B.

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

The term "SOS data**"** refers to information collected, stored, or maintained as part of the SOS 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 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. *All requests for data sharing should go through 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 BLM SOS National Curator, any reports, maps, or visuals produced with SOS data must have an offset 10-mile buffer around each 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. SOS data is not to be exported from GeoPlatform. Teams must submit a data sharing request through the GeoPlatform Data Request form on their regional group's data management site.
ii. Requests will be reviewed and approved by the corresponding SOS Agency Coordinator.
iii. Sensitive data will be provided if approved by both the SOS Agency Coordinator and SOS National Coordinating Office.

B. Reportable Data
Active collecting teams may report the following types of data from their current season's collections **only** if they comply with all other data security guidelines:
i. Species, state, county, or any collated numbers (e.g., scouting visits, collection visits, total plants sampled, estimated collection size, etc.).

C. Additional Permission Needed for Reporting Sensitive Data
Justification for sharing sensitive data must be included in the initial data sharing request. The following types of data can only be shared **after** written consent has been obtained from the SOS National Coordinating Office:
i. Specific location data, including coordinates

2b. SOS Communication

Effective communication is critical for successful seed collecting. The BLM oversees the SOS 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.

Figure 2. Interagency Coordination Communication

Questions about logistics, training, or support should be directed to your agency's coordinator (Appendix A). Coordinators communicate regularly with the SOS National Coordinating Office and other agencies to ensure everyone has the necessary information and support. Appendix H lists the 2026 teams and their corresponding coordinators.

SOS facilitates communication through its website, email list, and monthly Collector Calls.

- **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:** All active participants should follow the steps in the Getting Started section to register for 2026 communications and monthly collector calls, 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 website (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 it you will receive an email that requires a response to confirm and subscribe. After confirmation, you will receive instructions on how to use the list. If you are having trouble, contact the SOS National Curator.

- **Monthly National Collector Calls:** SOS holds a meeting on the first Tuesday of every month which acts as a forum to discuss issues, ask questions, and share updates for all active partners. *At least one representative from each collection team is required to attend each month.* To receive a meeting invitation, fill out the 2026 registration form found in the “Getting Started” section of the SOS website. Meeting notes will be uploaded to regional GeoPlatform groups’ Help Documents. Calls are conducted via Microsoft Teams, but there is also a dial-in option available for folks in the field.
    - Start of Collector Calls for each time zone:
        - 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. SOS Training and Early Season Resources

Proper training is essential to ensure that seed collectors follow the SOS protocol, minimize harm to plant populations during collections, and collect reliable data. Visit the SOS website’s “Getting Started” section to view available dates and register for a training. ***Contact your SOS Agency Coordinator if you cannot find a training session that meets your team’s needs.***

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

Before attending training, if you are collecting/editing/reviewing collection data for the year, register for a GeoPlatform account following the directions on the 2026 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 training.

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

- **BLM National Training Center (either virtual or in-person depending on the year)**: A free training course is offered each spring for BLM, NPS, and USFWS employees and partners. Depending on the year, it is either virtual or in person. For in-person years, non-federal participants are expected to cover their own travel expenses.

- **In-Person Training**: Occasionally additional in-person training courses are offered throughout the collection season. All available in-person training will be posted on the training registration form.

- **Live Virtual Training**: 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 an in-person course but do not include hands-on/in-field components. Teams are encouraged to pursue additional in-person training specific to their regions.

Supplemental Training & Early Season Resources

- **Supplemental Resources**: Numerous additional training resources which reinforce elements of the SOS process can be found in the "SOS Collector Resources 2026" help document. Topics include collecting herbarium vouchers, soil texture and color assessments, collecting slope and aspect data, seed images, safe driving, and much more.

- **Help Documents**: The SOS website and the GeoPlatform groups host numerous help documents and guides for participants to refer to throughout the season. See Appendix R for a list of available help documents.

- **Appendix Q:** List of suggested equipment and supplies.

- **SOS Operations Manual:** Reviews SOS processes, including scouting, collections, and data management. It outlines key roles and responsibilities, provides structured workflows for scouting and collecting, and includes checklists to ensure efficiency in the field.

2d. GeoPlatform Onboarding

SOS participants with data collection and/or reviewing responsibilities will need to use a GeoPlatform account to access SOS digital data tools. Essential digital data tools include reviewing data in the office through the GeoPlatform Data Management Site, and using a mobile device with the apps Survey123 for data collection and Field Maps to view collection maps in the field. Digital data collection users will need to use a mobile device for data collection, see Appendix L. for details on acceptable devices. GeoPlatform registration is part of the annual registration process and occurs through the 2026 SOS Registration form found in the "Getting Started" section of the SOS website. For more information on Digital Data tools and processes, refer to the "SOS Digital Data Collection Guide 2026" help document available in GeoPlatform.

General workflow for GeoPlatform registration and SOS data collection access:

1. Those who need access to Digital Data collection tools provide their GeoPlatform username as part of completing the 2026 Registration form.
    a. New GeoPlatform users create a GeoPlatform account via instructions provided on the registration form and/or the document "1. GeoPlatform Account Setup External Partner" on the SOS Website right side bar, under the heading "GeoPlatform Onboarding Documents 2026."
        i. New users must submit a Rules and Behaviors (ROB) form. Without this form the account will not be functional. Submitting the ROB form upgrades a user's GeoPlatform account role from "Viewer" to "BLM Partner Data Editor." An editor role is required for using Survey123 forms and downloading offline maps. Delays in submitting the ROB form or incorrect titling will result in account access delays.
            - Title the form "GPLAT_ROB_Organization_Username"
              "Organization" = the company you work for
              "Username" = your exact GeoPlatform username
              Examples:
              GPLAT_ROB_BLM_ksnyder14
              GPLAT_ROB_CBG_kthomas0.
            - Send an email to the SOS National Coordinating Office, BLM_HQ_SeedsofSuccess@blm.gov, with the subject "SOS GPLAT Sign Up" and attach your signed ROB form.

b. Those with existing GeoPlatform accounts and BLM-Egis users can use their existing account information, if the account is active and was used in the last year.

2. Once the registration form is completed, participants are added to the 2026 Preseason Activity GeoPlatform group. Participants should check of their role is “viewer” or “BLM Partner Data Editor.” Users can only complete the activity if they correctly submitted the ROB form and their Geoplatform account role is “BLM Partner Data Editor” or are a retuning user who already has an “Editor” role.
    a. New Users
        i. The SOS National Coordinating Office submits ROB forms for processing on Mondays, Wednesdays, and Fridays at 9 am MT. If the ROB form is not in the inbox at that time, it will be submitted in the next batch. Wait up to 7 days for the BLM to process your form and elevate your role to “Data Editor.”

        ii. After 7 days, check if your role was elevated. To check, login to GeoPlatform, select your username in upper right-hand corner, select “My settings”, click on “General”, and then look at your role. If your role is “viewer”, you will not be able to submit or edit forms. Double check that you submitted all the necessary information and then reach out to the SOS National Coordinating Office for assistance.

3. Once a user has a “Data Editor” role they must complete the 2026 Preseason Activity to practice the SOS digital data collection process before they will be moved into their regional collection group and able to collect real data. Participants must also attend an SOS National training to learn the details of data collection and data management. Users may attempt the preseason activity anytime, however moving to a regional group will only occur once both the Preseason Activity AND training are complete. If you need access to your regional group BEFORE training, contact your SOS Agency Coordinator to discuss your options.

    a. The SOS National Coordinating Office checks the Preseason GeoPlatform group for completed activities on Mondays, Wednesdays, and Fridays at 9:30 am MT. Users are added to the regional group specified in the registration form within a week of completing the activity and training. If someone is not moved after a week, reach out to the SOS National Coordinating Office at BLM_HQ_SeedsofSuccess@blm.gov.

    b. After users are in their regional group, they must remove all Preseason Activity forms and maps from their device and then download their region’s 2026 Scouting, Collection, Miscellaneous Points, and Seed Tracking forms.

2e. Seasonal Workflow

Although seed collection timing depends on species phenology, all SOS teams follow the same general workflow as seen in Figure 3. Minor variations for each agency are in Table 1. The "SOS Operations Manual 2026" (found in the GeoPlatform group's Help Documents) contains a detailed guide on an SOS team's roles, responsibilities, and example scouting/collection workflows.

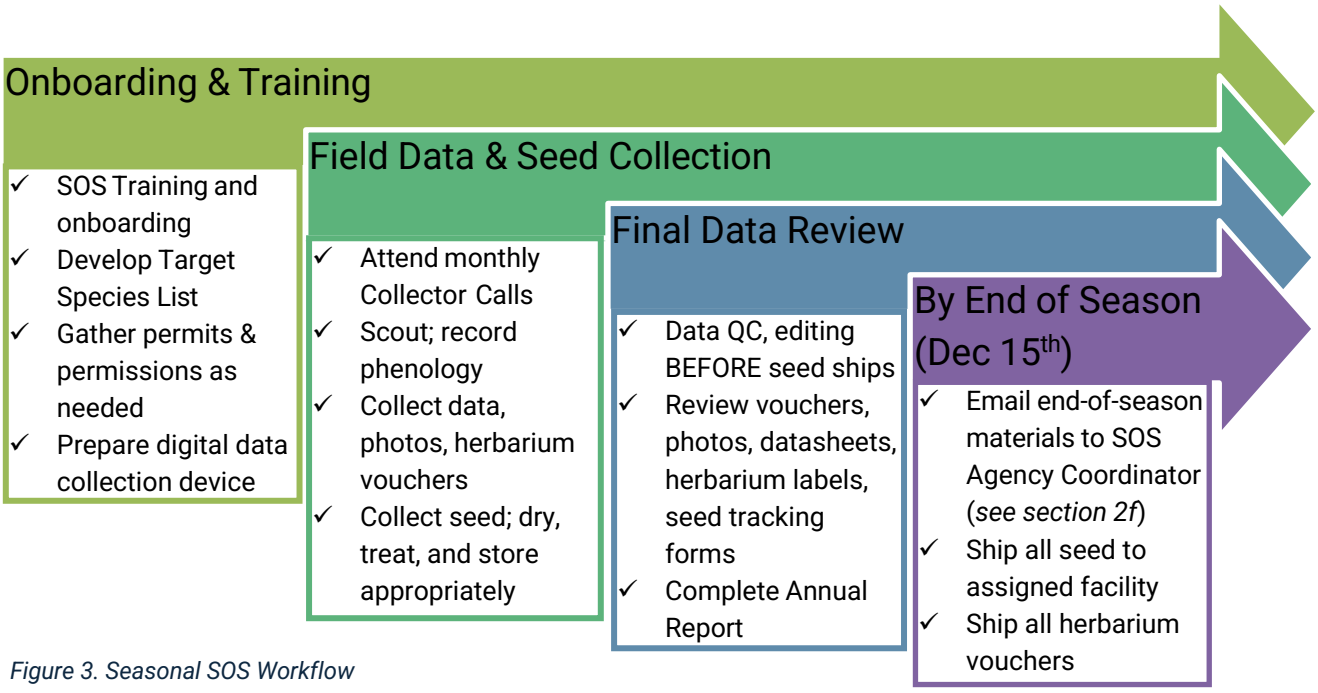


Figure 3. Seasonal SOS Workflow

Table 1. Seeds of Success agency workflow differences

Activity	BLM	USFWS	NPS	DOI/Interagency
Monthly Collector Calls Section 2b	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 SOS Agency Coordinator
Herbarium Vouchers Section 10d	Use BLM label as exported from GeoPlatform	Use USFWS label as exported from GeoPlatform	Use NPS label as exported from GeoPlatform but do NOT send to the Smithsonian; store specimens with labels until further notice*	Use the BLM label as exported from GeoPlatform for all collections EXCEPT from NPS managed lands*
Treating Seeds Section 13b	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 elsewhere, use either treatment protocol
Seed Cleaning Facility Section 14a	All teams will have their collections assigned to a specific seed cleaning facility. Cleaning facility assignments will be noted on the Data Management Site after the QC process is complete (See Section 14a for more information)			

*Note for NPS/DOI Teams: For 2026, if collecting within NPS lands, **do not** send vouchers to the Smithsonian. Create the labels and transmittal notices, then contact Katie VinZant (*katharine_vinzant@nps.gov*) for storage instructions. See "Identification and Herbarium Specimens" (Section 10) for more information.

2f. End of Season Reporting and Data Management Requirements

SOS teams must finalize scouting and collection data and submit all required materials to their SOS Agency Coordinator (and CC the SOS National Coordinating Office at BLM_HQ_SeedsofSuccess@blm.gov) BEFORE any seasonal collectors leave, and no later than ***December 15th***. Failure to submit complete and timely end-of-season data may affect an organization's eligibility to host SOS crews in the future. Teams may submit additional

comments throughout the year to their SOS Agency Coordinator or through the "Feedback Form" found on the GeoPlatform Data Management site.

An end-of-season checklist detailing end of season reporting guidelines is available in Appendix M and on the SOS website. Final deliverables include:

- Photos (Section 12)
- Data forms (Section 11)
- Permits (Section 6)
- Notice of transmittal for all vouchers being sent to the Smithsonian National Herbarium (Section 14e)
- An annual report summarizing collections, challenges, highlights, and recommendations for improvement. The annual report template can be found on the SOS website. An example annual report is available in Appendix E.

Submission Details
Email everything in a compressed (.zip) folder to your SOS Agency Coordinator and the SOS National Coordinating Office (BLM_HQ_SeedsofSuccess@blm.gov) **BEFORE** collection crews leave and **NO LATER** than December 15th

Example folder structure for Collector Code ID931:

- ID931_Final_Deliverables
    - ID931_YEAR_Photos
        - *Folder includes individual photos, not sorted into subfolders*
    - ID931_YEAR_Permits
        - *Folder includes individual documents, titled Year_Landowner_Permit*
    - ID931_YEAR_Data sheets
        - *Folder includes individual data sheet files for all collections*
    - ID931_YEAR_Transmittal_Notice
    - ID931_YEAR_Annual_Report

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

- **All data must be reviewed and finalized BEFORE seasonal collectors leave for the season, before any seeds are shipped, and no later than December 15th.** See Section 14a for more information about the data finalization process.

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

- Ensure all elements of a collection (data, photos, vouchers, and permits) are at least 95% complete. Teams missing components have a one-year grace period; repeated issues will result in a one-year suspension on collecting.

- Retain copies of applicable records, photos, and/or annual reports at participating field offices, parks, or refuges after confirming they have the interest and capacity.

- Notify the SOS National Coordinating 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).

- Teams using digital data tools must use the GeoPlatform Data Management Site to check for errors and incomplete information.

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

3. Target Species

Target species lists are due to the SOS National Curator, Sarah Hill (sehill@blm.gov) before April 30th. 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.

3a. How Are Target Species Selected?

The SOS program focuses on collecting common, native, "workhorse" species appropriate for restoration, stabilization, and rehabilitation projects. SOS seed is 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 elevation ranges, level 3 or 4 ecoregions (https://www.epa.gov/eco-research/ecoregions) or seed transfer zones (https://research.fs.usda.gov/pnw/products/dataandtools/interactivemaps/seed-zone-webmap).

Collection teams should work with their state and ecoregional botanists or other science leads to create appropriate target lists. Historic collection data can also be used to help compile a target species list, and teams can contact their SOS 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 as outlined in Section 7d.

3b. 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 sent to a cleaning facility per collection. The genera and species listed in Table 2 below are limited to 5 or 10 pounds 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 SOS Agency Coordinator. ***Contact your SOS Agency Coordinator and the SOS National Curator ahead of time if planning to have <u>any collections</u> close to or over 50 pounds.***

Table 2. Seeds of Success collection weight limits

Limited to 5 pounds uncleaned weight	Limited to 10 pounds 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. Excluded Species

Contact the SOS National Curator if you have any questions on the acceptance of a particular species. The following are excluded from the SOS program:

- 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).
- All non-native species to the U.S.
- All 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 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 were established with the USDA-FS Dorena Genetics Resource Center, the USDA-FS National Seed Laboratory and the University of Nevada, Reno. The Alaska Plant Materials Center in Palmer manages seed collected in Alaska.

After cleaning and processing, collections are divided into two portions: ***long-term storage*** and ***short-term storage*** – see Table 3 below for how the storage differs. Long-term and

“working” collection storage needs are managed by the USDA-ARS, while short-term storage needs are addressed by the cleaning facilities.

Table 3. Seeds of Success storage definitions

Duration	Process	PLS
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
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 stored in appropriate 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.	Everything left over 3,000PLS

USDA-ARS Partnership Details

The first 3,000 seeds of a collection are reserved for long-term storage. The long-term storage portion is received by the USDA-ARS Plant Germplasm Introduction Testing and Research Unit (PGITRU) in Pullman, Washington. PGITRU keeps 2,000 pure live seed (PLS) and sends 1,000 PLS to another USDA-ARS facility, the National Laboratory for Genetic Resources Preservation (NLGRP) in Fort Collins, Colorado.

PGITRU enters collection data into the National Plant Germplasm System (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 (Table 4).

From 2005 to 2021, PGITRU received 10,000 seeds to split between a working collection long-term storage. In 2022, the standard number of seeds sent 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 have 3,000 seeds allocated for long-term storage.

Table 4. Seeds of Success germplasm proportioning for long-term storage

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

Short-Term Storage at Cleaning Facilities

All seed remaining after the long term storage portion is separated are made available for native plant materials development projects. These seeds are referred to as the short-term storage portion and are kept at a designated cleaning facility. For more information on how to request seed be taken out of storage and sent for use in projects, refer to Section 14f.

6. Permission to Collect

All SOS seed collections require permission from land managers to maintain 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 Managed Land

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 stay compliant with local policies. A free-use permit may be issued to SOS collectors in specific areas, or the local BLM contact may decide no permits are needed for collection. Regardless of whether a permit is issued, **collectors should always have some written documentation** (such as an email from the local BLM contact) with them to prove 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 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 is 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, if a volunteer is collecting and entering data separately, the team lead's name must appear as the collector on data forms to comply with DOI privacy standards.

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

Collections on private, state, or other non-BLM managed federal lands (e.g., NPS, USFWS, USDA Forest Service, Department of Defense) require landowner permission. Teams must document permission on the seed collection data form and ***retain written authorization*** at their agency office and keep a printed copy in the work vehicle(s) in case it is ever needed.

If the landowner does not provide a collecting permit, teams can use the SOS Authorization Letter Template which is available on the SOS website.

All teams must submit all non-BLM collection permits to your SOS Agency Coordinator during end-of-season reporting using this file naming convention: Year_Landowner_Collection_Permit. *Example: 2026_RockyMtnNationalPark_Collection_Permit.*

7. Assessing Populations for Collection

There are three distinct types of SOS collections: standard, operational, and recollection – see Table 5 below for how these differ. Collectors should know which type of collection they are looking for each target species before beginning the scouting and site assessment process.

Table 5. 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, such as a seed increase grow out.	80,000+ PLS
SOS Recollection	A seed collection made from a population that has previously been collected from following SOS protocols.	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 the larger the collection, the more likely there will be:

- Seed available for viability testing.
- 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.

It is essential that a knowledgeable botanist guides each collection team and is actively involved in species identification and choosing the most appropriate population to collect from. The selection of target populations is the responsibility of the lead botanists in close consultation with plant ecologists from the BLM ecoregional, state, or field offices; ecology and restoration specialists from NPS; or science leads from USFWS.

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 species population is “plants within a 1km radius and a narrow 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 be used to separate collection sites and consider them 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, collecting herbarium voucher specimens (Section 10), taking photos, estimating potential seed production, and planning collection 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 seed is adequate, it may be possible to collect several different species from the same site. If you find a native plant population not on the target species list at a collection site, consult with your local botanist or project lead about making an opportunistic collection of the species of interest.

Before collecting seeds, consider the following:

- 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 are confirmed to not be seeded may be collected there.)

- 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.

- 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.

- You can revisit a site to collect multiple times throughout the season to enhance the genetic diversity of the samples, as long as ***no more than 20% of the total seed in a population*** is collected.

7c. 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 "SOS Digital Data Collection Guide 2026" help document for workflows and instructions on how to use the scouting form, and the "SOS Forms Walkthrough 2026" for an example of how to fill out the scouting form.

7d. Recollecting from Previous Populations

While SOS encourages prioritizing 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 species decline, or the impact of adverse conditions like drought over previous years.

Recollections must follow all the same steps as a new SOS collection including securing permission to collect for the season, confirming species ID, verifying the population is healthy enough for harvesting, collecting photos, vouchers, and associated scouting/collection data, and completing the QC and shipping process.

Recollection Guidelines

Recollections must follow these steps:

1. Confirm that the population is the same as the original collection. Appendix P contains a decision matrix that collectors can use if they are unsure if a population is considered a recollection or not.

2. Confirm species ID and ensure the population is still healthy/large enough to sustain harvest.

3. Allow adequate rest between collections
   Ideally allow a three-year population rest period 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 until 2029. If you collect in 2025 and 2026, you must wait three full years – until 2030 – for the next recollection.*

4. Document New and Historic Seed Collection Reference Number
    a. Assign a new Seed Collection Reference Number for each recollection (see Section 11b for formatting and numbering).
    b. Document the original Seed Collection Reference Number on the Survey123 form. The original Seed Collection Reference Number is the number associated with the very first collection of the population. The original number is listed on the popup table in Field Maps when you click on the historic collection. If using paper data sheets, you will link the recollection to the original SOS collection in the data form by circling *Yes* in the "Recollection" field and record the original seed reference number as the "Original Seed Reference Number."

5. Document In Field Notes
   Begin the "Field Notes" section with "RECOLLECTION."

6. Document In Annual Report
   List both the original and new reference numbers in the annual report.
   Example: NM930-86/NM930-555

7e. Cut Tests and Viability Equation

When scouting and before each collection day, all collectors should use the viability equation below to determine whether a particular plant population will yield the 10,000+ seeds needed for an SOS collection. This method is outlined on the back of the paper data sheet and is incorporated into the digital data collection form's Cut Test Tool and Estimated Yield Tracker.

To estimate PLS you will need to know:

1. Average number of seed-containing structures per plant
    a. A seed-containing structure can be a variety of fruit types; be consistent for what you are counting as a structure. For grasses, treat each stalk as one structure and use the average number of seed-bearing stalks per plant.

2. Average number of total seeds per structure
    a. This is the total number of seeds, including non-viable ones. Be consistent with what you are counting as a 'seed' when calculating averages. For grasses, enter the average total number of seeds per stalk.

3. Estimated number of seed-bearing plants in the population

4. Cut test viability (when collecting)
    a. The average viability will be multiplied by the total number of seeds per structure to inform how many ripe healthy seeds will be present in a collection. If it is too early in the season for a cut test, this part of the equation is eliminated.

The viability equation can be used in different ways to make estimates based on the information available at each phenology stage.

Scouting – Estimating the potential for the entire population

When scouting, estimating the total seed in the population indicates whether the population will be suitable for collection. If it is still early in the species' seed development, collectors should estimate the number of seeds per seed-containing structure by examining the population's inflorescences. Use details like potential insect damage, disease, or risk of predation to inform estimates on how many healthy seeds could be produced.

Collecting – Estimating how much seed you will collect each day

When collecting, estimating how much ripe seed is available in a population and how much will be sampled that day allows collectors to reach their target amounts without exceeding the 20% collection rule (see Section 7b). Cut tests are used in this phase to determine the average viability of seeds *before* using the equation below.

Equation for estimating PLS

Estimated PLS = ^(Cut test viability [#ripe and healthy seeds from cut test / total # seeds assessed in cut test]) * (Average total seeds per seed-containing structure) * (average # structures per plant) * (# plants in the population) * 0.2 (or the decimal percent of how much seed you are collecting from each plant, not to exceed 20%)

^*Add cut test viability into the equation when evaluating seed that is near its natural dispersal stage before collecting. If estimating PLS during flower or with very immature seed, change the average total seeds per seed-containing structure to be the number of healthy seeds you think will be produced, and skip multiplying by the cut test viability.*

Follow these steps to use this equation in the field:

1. Identify a target species population you believe is large enough for SOS.

2. Walk around the population and estimate the number of plants present. Are there at least 50 that will produce seed? If so, proceed to step 3. If not, keep searching for a bigger population.

3. Randomly select several seed-containing structures from at least 20 plants (small and large) throughout the population. While walking through the population, estimate the average number of seed-containing structures per plant and the average total number of seeds per structure.

    a. If your population is still in flower, do your best to estimate the number of seeds per structure – use your local flora if necessary.
    b. If your population is in fruit, you should easily be able to estimate the number of developing seeds per structure by breaking the fruit open and counting ovules.
    c. Do the math!
        i. **Estimated PLS** = ([Avg # seed-containing structures per plant * Avg # *seeds per structure * Estimated viability] * Decimal percent of seed you are planning on harvesting from each plant) * total plants in population*
            - This is an estimate of the number of seeds you can harvest from your population when only taking up to 20%. It should equal <u>well over</u> your target PLS to account for any unforeseen viability issues, excessive insect damage, etc. If the estimate is 10,000 PLS or less, the population is <u>not</u> appropriate for an SOS collection.

4. If your population is close to the natural ripening stage, perform a cut test to accurately estimate the number of viable seeds per seed-containing structure.
    a. In a cut test you're looking for seeds that are filled throughout the length of the seed and have a hard, waxy texture. It's important to know how many seeds per fruit, on average, may be empty or have insect damage. Do cut tests on multiple seeds per structure and multiple structures per plant from multiple plants per population. The more informed your estimates are, the better chances are for a successful SOS collection.
    b. To do a cut test:
        i. Randomly select 20 seed-containing structures from the batch you collected while initially walking around the site. Break those open and randomly select at least 20, ideally 50-100, seeds to assess.
        ii. Put a piece of masking tape sticky side up on a clipboard or cutting board and lay out the randomly selected seeds on the tape. Cut the seeds lengthwise with a scalpel or razor blade and examine seeds with a hand lens. Small seeds can be put on clear tape and held to the light

to see if they are filled or empty. Keep track of the number of filled healthy seed versus total seeds assessed. The ratio of healthy, ripe seeds to total seed cut is the estimated viability.

c. Do the math!

i. **Estimated PLS** = (Cut test viability [#ripe and healthy seeds from cut *test / total # seeds assessed in cut test]) * (Average total seeds per seed-containing structure) * (average # structures per plant) * (# plants in the population) * 0.2 (or the decimal percent of how much seed you are collecting from each plant, not to exceed 20%)*

- This is an estimate of the number of seeds you can harvest from your population when taking only 20%. It should equal well over your target PLS to account for any unforeseen viability issues, excessive insect damage, etc. If the estimate is 10,000 PLS or less, the population is not appropriate for an SOS Collectors can also use this equation to estimate how many plants they would need to harvest from to meet their target goal.

ii. The viability equation can also be modified to estimate the number of plants that would need to be collected from to reach a target PLS.

Estimate Number of plants needed = *Target # seeds / ([Avg # fruits per plant * Avg # seeds per fruit * Cut test viability] * Decimal percent of seed being collected from each plant)*

- This equation is useful when collecting across multiple days to assess whether there is still enough seed and individuals left in the population to meet your collection target.

Collectors must keep track of the total PLS when collecting over multiple days to prevent overharvesting. There are two ways to determine the total yield after each day.

1. Structures Method
   a. This method is what we recommend for the most accurate PLS estimation. Using the data and the equation provided above, change the total number of plants in the population to the number of plants that were sampled.
      i. Estimated PLS = *([Avg # fruits per plant * Avg # seeds per fruit * Estimated viability] * Decimal percent of seed taken from each plant) * **total plants collected from***
      ii. Example: 10 seeds per structure, 10 structures per plant, 0.8 viability (80% seeds healthy and ripe in cut test), 20% harvest (0.2 decimal

value). The target is 10,000 PLS. At the end of the day, the team sampled 700 plants.

*([10*10*.8]*.2)*700* = 11,200 PLS

2. Weight Method
    a. This method uses a subsample of a collection to estimate the total PLS at the end of each collection day. Depending on how much moisture the collection contains, the estimates could vary from collection day to after drying.
    b. For the weight method you need:
        i. Cut test viability information
        ii. A small scale (luggage scale, kitchen scale, etc.)
        iii. Weight of empty collection container (taped bag/bucket/pillowcase etc.)
        iv. Weight of an empty small subsample container or tray
    c. To calculate estimated PLS:
        i. Take a small representative sample of the collected material (seed, chaff, stems, leaves and all) and weigh it; subtract the weight of the empty subsample container
        ii. Count the total number of seeds, viable and non-viable, in the sample
        iii. Weigh the entire collection; subtract the weight of the full collection container
        iv. **Estimated PLS =** *([# total seeds in sample * decimal percent cut test viability]/weight of sample) * total collection weight*
        v. Example: 0.55 viability, 75 seeds in subsample, 2 grams sample weight, and 1,000 grams total collection weight.

([75.55]/2)*1000* = 20,625 PLS

8. Sampling Strategy to Capture Population Genetics

8a. How Many Plants Should I Collect?

Ideal collections include seeds from more than 100 individual plants (though 50 is the absolute minimum number). To capture a broad representation of a population's genetic variability, teams must maximize the number of alleles – or 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.

8b. 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:

a. Taking up to 20% of ripe seed from each plant
-OR-
b. Taking all the ripe seed from every 5th plant

Collecting up to 20% of ripe seed from each plant is a good strategy to reduce collector bias and ensure the entire range of genetics that are present in a population are represented in the seed collection.

Collecting seeds from every fifth plant is a good approach for clonal or rhizomatous species because collecting from widely spaced intervals increases the likelihood of capturing genetically distinct individuals. If collecting everything from every fifth plant, collectors should be careful not to artificially select certain traits, such as 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, then collect from the 5th plant regardless of how it appears.

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 so 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 "SOS Digital Data Collection Guide 2026" help document for a data collection workflow when collecting on multiple days.

9. Seed Collection Process

All SOS seed collections must follow the SOS process outlined in Table 6 below. 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 data on the SOS Digital Collection Form via a mobile device (Section 11a). Consult your regional GeoPlatform group's Help Documents for collecting workflows and assistance on filling out the collection form.

Table 6. 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; seeds are likely to be mature and 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 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 auto-filled information is accurate.
4	Use information from the cut test to estimate the viable seed production with this equation: *(Cut test viability [#ripe and healthy seeds from cut test / total # seeds assessed in cut test]) * (Average total seeds per seed-containing structure) * (average # structures per plant) * (# plavnts in the population) * 0.2* ≥ 10,000 seeds (or other collection target) Optional *(but required for some collectors)* – enter data on the Cut Test Tool page of the collection form.	Documents species seed biology; assesses the influence of collecting on the population; prevents collection from unhealthy, small, or unripe populations. Tracks 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 and 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 a cleaning facility ASAP. More information on collecting and shipping fleshy fruits is in Section 14b.	Fleshy fruits decompose rapidly; poor storage can lead to mold and seed death.
6	Collections may consist of seed, petals, chaff, pods, receptacles, short stems or some leaf	Maximizes available field time and allows seeds to be cleaned in controlled

	material. Detailed cleaning is done at cleaning facilities**. Do not collect large stems, woody material, rocks, or other non-target material.**	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 the population is not over-sampled and will be able to 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 multiple dates on the SOS data form.	Maximizes genetic diversity in the collection; captures early, mid, and late bloomers.
11	Clearly label all bags (inside and out) with the Seed Collection Reference Number, USDA PLANTS code, Bag X of Y *(Ex: Bag 1 of 2, 2 of 2)* and collection date.	Ensures this unique identifier is attached to each sample of a collection. All other data will be recorded on the field data form.
12	Make sure that you have all required photos, vouchers, and associated data collected (including soil color and texture) before leaving a collection site for the last time.	Maintains data integrity and collection completeness.
13	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.
14	Treat seeds for 72 hours with Terro Garbage Guard (NPS) or for 48 hours with HotShot NoPest strips (BLM, USFWS); 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; limits seed cleaners’ exposure to mites or other insects that could cause allergic reactions.
15	Once all collection data is entered on the data form, begin the data finalization/QC process outlined in Section 14a and detailed the	Ensures all scouting and collection data is accurate and complete before data sheets are exported and sent to

	document “SOS Digital Data QC Guide 2026.” 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.	cleaning facilities. Allows the SOS National Curator to assign a cleaning facility to a collection based on size and desired cleaning speed. Allows cleaning facilities to plan cleaning workflows to meet seed use deadlines.
16	Package seeds securely so that no seeds are lost or damaged during shipping. Include a copy of SOS data sheets 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 seed can be matched with data sheets at the cleaning facility and complete collections are cleaned together.
17	Submit a seed tracking form via mobile device or your regional GeoPlatform group’s Data Management site at the same time you ship seeds to a cleaning facility.	Allows the SOS National Coordinating Office to track which collections are shipped in real time and allows teams to track where seeds were sent to submit the correct clearance forms at the end of the season.
18	Send collections to designated cleaning facility. Collections larger than 3,000 viable seeds can be requested back if they are needed for a 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. Species 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 and photos and getting external verification of a species’ identification 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. Identify to sub species or variety whenever possible. In the field notes of the form record all key identifying characteristics and traits, like flower color, that could change when a plant is pressed for a voucher.

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(s) 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 forms.

5. If a target population is difficult to key out and confirm identification, collectors should not collect from the population until obtaining a second opinion confirming the species. In a case of 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, herbarium voucher, and/or in photos collectors must correct it as soon as they realize.

To correct a misidentification, follow these steps, according to the situation:

Current season collection and associated data

1. **You still have the seeds and voucher specimens on hand**
    a. If you have **not** begun editing data in the data management site, edit the species on the original scouting **and** collection Survey123 forms.
    -OR-
    b. If you **have** already begun editing data in the data management site, edit the species for both the scouting and collection records in the data management site. You will need to correct all instances of species, USDA PLANTS code, common name, duration, and habit.
    c. Change the species and USDA PLANTS code on all collection bags/boxes.
    d. Change the species and USDA PLANTS code on the herbarium sheet.

e. Change the species and USDA PLANTS code on all photo labels associated with the collection.
f. If you already exported the herbarium label and data sheet from GeoPlatform but have not sent them, correct the form and print new exports.
g. Confirm the annual report lists the correct species and USDA PLANTS code.

2. **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. Contact the SOS National Curator and your SOS Agency Coordinator and CC the SOS National Coordinating Office at BLM_HQ_SeedsofSuccess@blm.gov.
        i. 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 SOS National Curator will need to communicate with the herbarium and cleaning facility to make sure the species is updated.

Historic Scouting or Collection data

If you suspect a historic scouting point or collection site was misidentified in the past, please reach out to the SOS National Curator ASAP.

a. Take EXCELLENT photos of the key characteristics of the species that make you suspect a misidentification and collect a voucher. Share the photos and voucher with someone else who has a high degree of botanical knowledge in your area to confirm the ID change.
b. Provide the specialist ID information, the justification for the change, photos, and the scouting ID or collection number in your email to the National Curator.
c. After confirming the new ID, continue with entering scouting and collecting data as normal. Make sure to change the species ID on your collection form.
d. The National Curator will change all the historic collection data ID.

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 forms, photos, voucher specimens, and annual report. If a taxon is missing from 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 Survey123 form. If no Accepted or Synonym names exist for a species, enter the preferred name and name source into the Tricky Taxonomy page and contact the SOS National Curator and PCRP GIS Analyst. They will need to create a new species code on the backend to allow the system to accept the name and submit 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 species verification**. One mandatory *unmounted* voucher per collection will be sent to the U.S. 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 or agency to know whether additional voucher collection will be required and, if so, whether the vouchers will need to be mounted when sent to local or regional herbaria.

*Note for NPS/DOI Teams: For 2026, if collecting within NPS lands, **do not** send vouchers to the Smithsonian. Create the labels and transmittal notices, then contact Katie VinZant (*katharine_vinzant@nps.gov*) for storage instructions.

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

- **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 confirmed they will accept specimens, crews may collect additional sets of vouchers to be stored at those locations at the discretion of the acting field office or contracting agency.

- **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. The oldest known dried plant collection that survives today is from 1566!

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

- **Voucher specimens should include flowers and any plant parts necessary to confirm species identification.** Collect flowering voucher specimens prior to seed collection (during scouting). If the flowering stage is missed, document that on the collection form and plan a return to collect a voucher the next season. These specimens *must* be taken from the same population that seed is collected from, to ensure accurate identification and population monitoring.

Tips for collecting and pressing voucher specimens

Collecting good vouchers takes some skill and attention to detail. While this process is explained during SOS training, collectors are encouraged to seek more 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 Collector Resources 2026" document in your GeoPlatform group's 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/).

Collecting

- 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, fold it so it fits comfortably on the sheet.

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

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

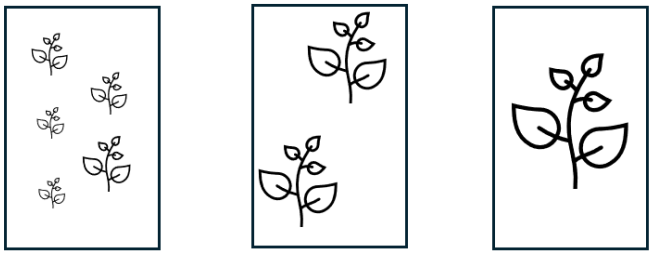
- Carefully select the individuals you will collect to minimize impact on the population. For example, if collecting perennials, leave the largest, oldest plants to continue providing seed for future generations. If bulblets, offshoots, or seeds are present, place those back in the ground.

- 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 the labels and notes clearly indicate which specimens belong to which collection.

- Leave space for a label when arranging the specimens on the sheet before pressing.

- Document key characteristics that might change after pressing such as scent, flower color, or hair texture and write it in the field notes on the data collection form. Field notes will populate on the herbarium label when it is exported after QC.

- Consider the plant size when collecting herbarium specimens. 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:



- Write key information on the newspaper it will be pressed in (species name, date, coordinates, site name, team name, scouting/collection ID, etc.) to keep track of vouchers.

Pressing

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

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

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

Fruits and their point of attachment are among the most delicate parts of an herbarium specimen, often breaking away during preparation or examination. To prevent this, note the bulky fruits on the newspaper containing the voucher and the herbarium 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.

- **Grass**
  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.

- **Seed**
  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 because 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 voucher.

- **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.

10e. Labeling and Packing Vouchers

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, location, and the

original collector. Local or regional herbaria may have specific label guidance that is different than the label used for the Smithsonian collection.

Follow these guidelines when labeling herbarium specimens:

1. Herbarium labels can only be exported from regional GeoPlatform groups AFTER the data finalization process is complete (Section 14a)

2. Export with the correct Agency template; refer to Table 1 in Section 2e for instructions on which template to use. Instructions for exporting labels are in the "SOS Digital Data Collection Guide 2026" help document.

3. Herbarium labels must be printed on acid-free paper.

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

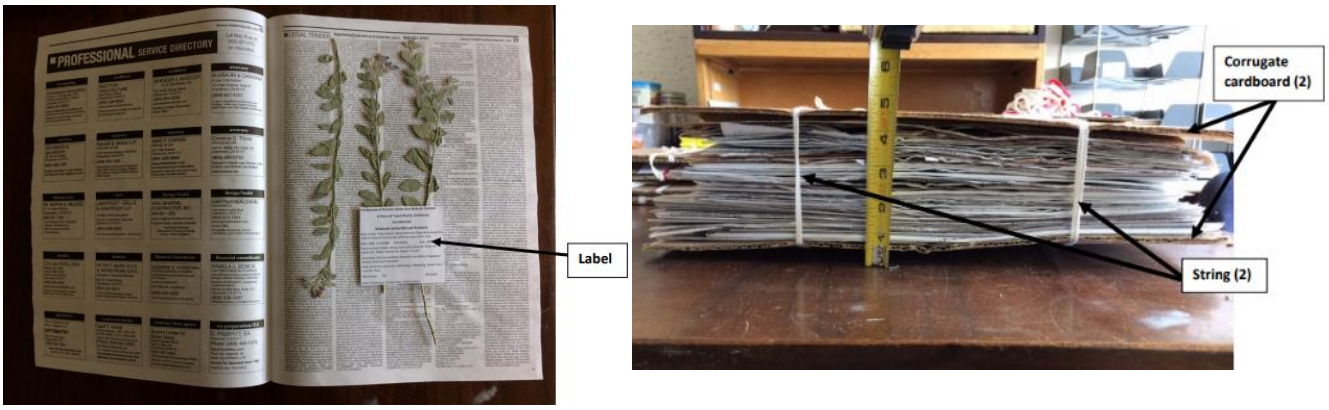
Packaging
Specimens may travel a considerable distance to the Smithsonian or their respective regional herbarium. Follow these guidelines to ensure the package's safe arrival:

- Do not mount voucher materials for the Smithsonian on an herbarium sheet. Material should be loose and sandwiched in between a section of newsprint.

- *Do not send SOS data forms with herbarium specimens.* Only include the herbarium labels exported from GeoPlatform with each corresponding specimen.

- Place each specimen and label in newsprint. Stack each individual specimen sandwich on top of each other adding additional layers of newspaper and cardboard as needed to avoid breaking plant materials. Place the entire bundle between two pieces of sturdy 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:



- Select a box that fits the bundle tightly to minimize movement and reduce the risk of damage. You can add extra newspaper as padding to fill in empty space if needed.

- **For Smithsonian vouchers, please include a Notice of Transmittal in the package.** A template Notice of Transmittal is available on the SOS website. The transmittal notice should indicate the sender (institution or agency) and the number of specimens being sent, and clearly state the purpose of the shipment. If the specimens are sent from a BLM office or affiliate, the transaction will be classified as a "transfer" of material. 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.
    - Submit a copy of the Notice of Transmittal to your SOS Agency Coordinator with your end of season materials.
    - A signature is required on all transmittal notices.
    - Shipping contacts and addresses can be found in Section 14e.

11. Data Collection

11a. Data Forms and Digital Data Collection

Detailed documentation is a key component of SOS seed collection. As of 2024, all SOS data collection is conducted through BLM-managed ArcGIS Online GeoPlatform groups using tablets or mobile devices with two applications: Survey123 and Field Maps. See Appendix L for more information on mobile device specifications. Partners collecting seeds from tribally managed lands remain the exception to this and can continue to use the process of collecting data on paper sheets and entering that information directly into BGBASE, the SOS long-term database. Partners who will be using this process must contact the SOS National Curator for more information on how to use the database. Regardless of the method used to collect data, **all data must be reviewed and finalized BEFORE seasonal collectors leave for the season, before any seeds are shipped, and no later than December 15th.**

SOS Data Collection Tools and 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 each 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 previous years (see Section 2d for more information about onboarding). All digital data users will receive training on how to use GeoPlatform and associated data collection tools 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 SOS Agency Coordinator.

Resources

Detailed guides are available on the SOS website and even more can be found in your regional GeoPlatform group's Help Documents. The documents below specifically focus on the data collection process; see Appendix R for a complete list of resources and help documents.

- **SOS Digital Data Collection Guide 2026**
  - 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.

- **SOS Forms Walkthrough 2026**
  - A walkthrough of the scouting and collection forms, with information on what data goes in each field, formatting, and other data collection tips.

- **SOS Digital Data QC Guide 2026**
  - Detailed overview of the data finalization and quality control (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.

- **Appendix O: Soil Texture Flowchart and Triangle**
  - Flowchart used to determine soil texture and type. Collectors can find tutorials on using this flowchart and soil texturing in general in the resources document.

- **SOS Landform Dictionary 2026**
  - Contains a list, definitions, and pictures of all landform terms available in the data collection form. Collectors should use this to assist in describing the

dominant landforms for the collection site, and guide which to select on the data form.

Data Forms

Collectors should keep backup paper copies available in case their tablets fail in the field. Paper copies are included in Appendix C and in your GeoPlatform group's Help Documents.

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 is opened. While it is possible to change this information manually, it can lead to errors if not done carefully.

There are four forms used to collect SOS data; two forms are required and two are optional.

1. **Scouting Form** (Appendix C) **– Optional**
    a. Scouting forms are used for pre-collection visits. The scouting form tracks a population's potential seed yield and phenology while providing space for gathering 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 current season scouting form will autofill onto the current season collection form.

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

3. **Seed Tracking Form – Required**
    a. 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.

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

11b. Seed Collection Reference Numbers and Collector Codes

The Seed Collection Reference Number is the unique identifier assigned to each collection and is a critical part of every SOS collection. The number connects the seed to who collected it, associated data, herbarium vouchers, photos, the annual report, tracks the collection through cleaning facilities, and through the NPGS/GRIN.

Seed Collection Reference Number Format
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 are never repeated. If the last collection under a specific crew code of the previous year was numbered 34, the following year's collection numbering should start with 35. Do not use leading zeros ("35" not "035"). These 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 was FWS0800-150, the first collection with that collector code in 2026 would be FWS0800-151.

Collector Codes by Agency
To maintain data 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 2026 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 SOS Agency Coordinator.

BLM Teams (by 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 codes.

NPS Teams
NPS teams will receive a unique number associated with the state they are collecting in; these typically begin with "NP." For example, a team collecting in a national park in California

could have the code NPCA00, while a team in another California national park would be assigned NPCA01.

USFWS Teams
USFWS teams will also be assigned a unique number based on the USFWS region they are collecting in; these typically begin with "FWS." 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 amongst DOI agencies. 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.

Teams Not Associated with an Agency
If a team is not associated with a federal agency, the SOS National Coordinating Office will typically assign a collector code using the acronym of the organization. If the team is affiliated with a botanical garden or university and not collecting for a specific agency through an agreement or contract, the corresponding acronym may be used (e.g., Chicago Botanic Garden = CBG, Southern Utah University = SUU).

11c. Non-SOS Collections

With the transition to digital data collection tools in 2024, the SOS National Coordinating Office began providing an optional form for active teams to 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 and prevent having to switch data collection accounts or methods in the field. ***Only active SOS teams for the current season can use the non-SOS form for data collection.*** If a team will only make non-SOS collections for the season, they cannot be added to GeoPlatform or use Survey123.

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

- ***Non-SOS collections CANNOT share the same collector code 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 for these, with “RC” standing for “Research Collections.”

- ***Data integrity and review is the responsibility of the collection team*.** The SOS National Coordinating Office is not responsible for reviewing or managing non-SOS data. Teams must ensure data accuracy, as the SOS National Coordinating 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 collection maps. These points will not interact with SOS data, forms, dashboards, or reports.

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

- Non-SOS collections are not covered by the SOS 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.

- 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.

- The non-SOS data 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 a collection’s identification. Digital photos of the species being collected should always be taken while in the field and, ideally, when individuals are in flower. 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 and reference 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.

A minimum of three photos is required for each collection; additional photos are welcome and encouraged.

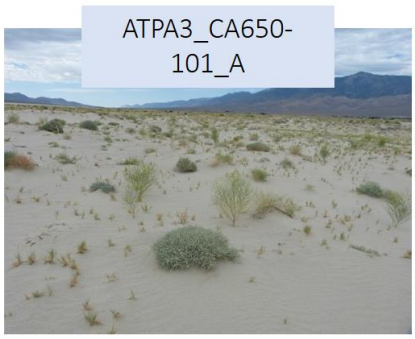
1. Landscape Level/Population – Shows the broader habitat and population density
2. Individual Plant – Captures key features of a single plant
3. Material Collected (Seeds) – Displays seeds and seed heads

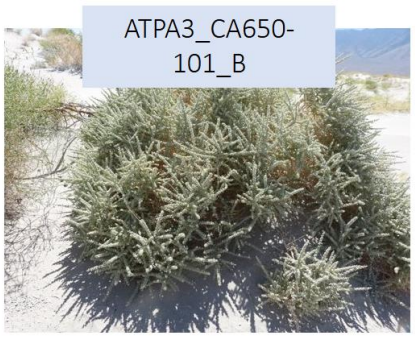
Photo Labeling
SOS photos follow a specific naming convention that must be applied to all photo files. The naming convention allows for quick querying if there is a question about a collection as well as easy searching by location or species on the SmugMug site.

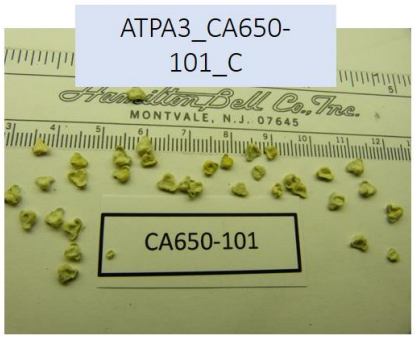
The following naming convention should be used for all SOS photos:

- USDA Plants Code_Collector Code-Collection Number_Letter (A, B, C, etc.)
    - A – Landscape
    - B – Plant
    - C – Seeds
    - D, E, F… – Any additional photos of the plant (key identifying characteristics), habitat (invasives or evidence of disturbance), seed (microscope view), etc.

Example of photos from an *Atriplex parryi* (ATPA3) collection in California, with collection reference number CA650-101:







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. *Examples: CA650_2026_1, CA650_2026_2_Collecting, CA650_2026_3_VoucherCollection.*

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 explained 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 SOS Agency Coordinator electronically using either a link to a folder in a shared cloud file 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 being sent to a cleaning facility.

Keep these guidelines in mind while storing seeds:

- ***Do not expose seed to high temperatures***. Avoid leaving the collections in a vehicle under direct sunlight, as sustained heat can damage the seeds. 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, protect the seed containers from wind, rain, and wildlife.

- ***Do not freeze seed,*** even fleshy fruits. Freezing seed – especially those with high moisture content – will kill them. See Section 14c for more on shipping fleshy fruit.

- Dry seed as soon as possible after collection, ensuring adequate ventilation and airflow around the containers. If collections are damp, spread them out on newspaper or a tarp to dry naturally, either outdoors in the shade and protected from wind or indoors in a well-ventilated area. If collections are left in paper bags or laid out in a thick pile, stir the material regularly so it dries evenly and does not have damp pockets.

- Do not dry too rapidly. Drying seed too quickly, particularly by exposing it to prolonged high temperatures, can kill the seed. Slow, steady drying can also allow for almost ripe seed to mature if still attached to parent material, and can increase seed yield.

- Collections must be dry and treated before being shipped to the assigned cleaning facility. 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 container 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 facility capacity.

Some approaches to drying and transporting seed:

A. Spread out in a box lined with newspaper.
B. Latching plastic bins, each with a cut out in the lid covered by a 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.

The possibilities are endless, and we encourage you to experiment with additional creative methods. If you find another method that works, let the SOS National Coordinating Office know – we'd love to share your success stories with the rest of the collecting community!

13b. Pest Treatment

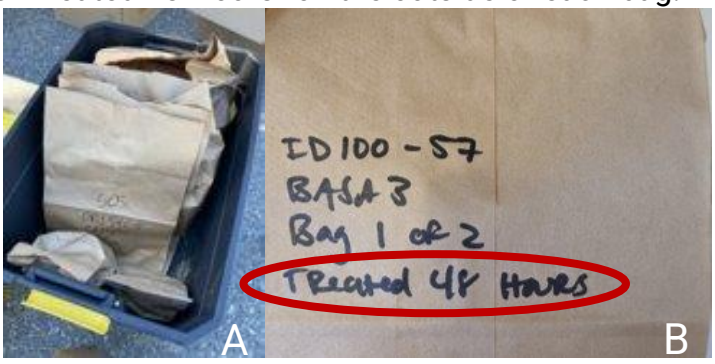
All SOS collections must be treated with insecticide before being sent to a cleaning facility. Seed treatment is crucial to minimize insect predation of seeds and to protect the staff and contractors who handle the seed. Even collections that show no visible signs of insects may harbor larval-stage pests that can damage the seeds, so all collections must be treated.

Different protocols are in place for teams working with different federal agencies.

BLM/USFWS Teams

- HotShot No-Pest Strips: 48-hour treatment
    - These contain and emit a harmful vapor that kills insects; <u>always wear a mask and gloves when conducting seed treatments</u>.
    - One 16-gram strip is sufficient for treating 100 to 200 cubic feet.
    - ***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 <u>not</u> use the strips in kitchens or areas where food is stored or prepared or where unwrapped food may be exposed.
    - Place strip inside of a sealable container like a large plastic tote. Place seed in open paper bags inside the container with the strip for at least 48 hours (or until no insects are alive).
    - Move the container 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.
    - After seeds are treated, write “Treated 48 Hours” on the outside of each bag.

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



NPS/DOI Teams

- Terro Garbage Guard (EPA #5481-348-149): 72-hour treatment
    - This product emits the same harmful vapor that kills insects but at a lower concentration than the HotShot strips, so a longer treatment period is needed.
    - <u>Always wear a mask and gloves when conducting seed treatments</u>.
    - Place the seed container(s) and treatment product in an outdoor garbage can (*not a plastic tote*) and ***store it outside in a non-natural area***, preferably in a

developed area like a maintenance yard or adjacent to a building, to limit potential impact on native insects.
    - Ensure the can is in the shade and will not be subject to excessive heat, or else the seeds will die.
    - After treatment for 72 hours, open and "air out" the garbage can for at least 2 hours before retrieving the seeds.
    - Write “Treated for 72 hours” on the outside of each bag of treated seed.
    - 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.

- 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 single use of this product each year).

- Each park that intends to use this product is required to send an email to IPM@nps.gov each year after submitting the required permit(s), 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:

- Seeds can only be shipped after passing data QC.
- Collectors will be assigned a specific cleaning facility. Assignments will be made through each GeoPlatform group’s Data Management site after data finalization.
- Senders are responsible for all shipping costs related to seed and voucher transport.
- Accurate data sheets must accompany all seed shipments to cleaning facilities.
- 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 SOS National Coordinating Office will not cover the cleaning and processing costs for these.

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

Data Finalization

The data finalization process consists of five steps (Figure 4). For a detailed walkthrough, refer to the “SOS Digital Data QC Guide 2026” help document.

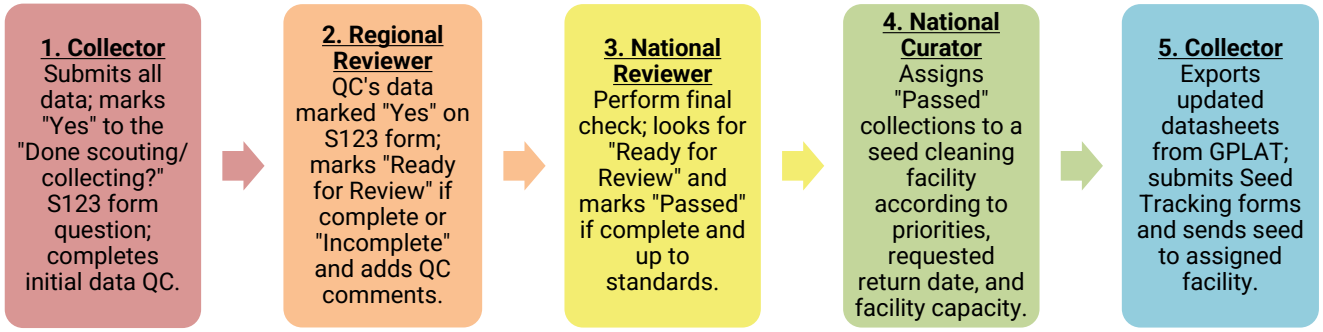


Figure 4. Steps for finalizing data and preparing for seed shipment

Collectors, Regional Reviewers, and National Reviewers are all responsible for checking and finalizing SOS collection and scouting data. Following the data finalization process ensures that data sheets and/or herbarium labels are not created too early with incomplete/incorrect information.

If seeds are shipped with incorrect or incomplete data sheets, the National Office must reach out with the necessary information to have the records corrected by the seed cleaning facilities. Corrections after seeds are shipped decrease the capacity of the seed cleaning facilities AND can incur extra charges to the program.

The data review process occurs through each regional GeoPlatform group’s Data Management site (Figure 5). The Data Management Site is also where finalized data sheets are exported. *If anything is incorrect in GeoPlatform, it will be incorrect on the exported data sheet, and incorrect data will travel with the seeds to the seed cleaning facilities.*

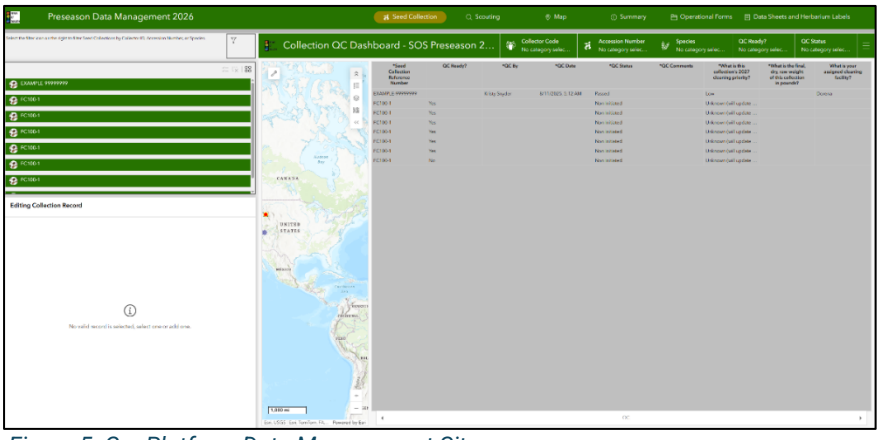


Figure 5. GeoPlatform Data Management Site

Follow these general steps to review collection and scouting data. For a detailed walkthrough, refer to the "SOS Digital Data QC Guide 2026" help document.

1. Ensure the latitude and longitude coordinates, point location on maps, and associated location data are correct.
2. Check the QC Dashboard for auto-flagged errors and alerts.
3. Review all other data tabs for accuracy, completeness, and common errors.
4. Add final raw weight and cleaning priority (Everyone except Alaska crews)
5. Check for matching data and tracking forms.
6. Update the QC status and comments as appropriate.

Seed Cleaning Facility Assignment

Once data has been reviewed and "Passed" by the SOS National Curator, a seed cleaning facility will be assigned to each collection according to multiple factors.

- Alaska Collections
    - Once data is "Passed" by the SOS National Curator, collectors may export their data sheets, pack up collections, ship them to the Palmer Plant Material Center, and fill out a seed tracking form. They do not need to wait to be assigned a facility.

- Lower 48 Collections
    - Once data is "Passed" by the SOS National Curator, collections will be assigned a seed cleaning facility based on the species, size, timing, and cleaning priority.
        - *All collections in the lower 48 need to have an assigned cleaning priority (Low, Medium, or High) and have their bulk collection weight in pounds recorded before they can be assigned a cleaning facility.*

Cleaning Priority

Priorities can be assigned by a collector if they are involved in determining the end use of the seed; otherwise, they should select "Unknown" and a Regional or National Reviewer will follow up on collections with an unknown priority during the QC process.

- Unknown: Collector does NOT know and is not involved in planning the end use of this seed. Status must be updated through the Data Management site during data finalization before the collection can be assigned to a cleaning facility.
- Low: Collections that are ***not needed*** back for use in 2027. This seed will be cleaned, tested, and stored at cleaning facilities, remaining in the SOS inventory for future use.
    - *Examples: Conservation collections, collections that are too small to use for a project this year, or collections that do not have an anticipated use in 2027.*

- Medium: Collections that ***might*** need test results or seed returned before the fall of 2027. These will be considered along with high-priority collections based on monthly capacity. If requested by May 1st, submit a clearance form by January 30th. Otherwise, seed and test results will remain at a cleaning facility in SOS inventory for future use.
    - *Examples: Collections that depend on final PLS results for use in 2027 or collections you may de-prioritize if too many others are considered higher priority.*
- High: Collections with ***strong likelihood*** of needing test results or seed returned by May 1st, 2027. Cleaning space for high priority collections is limited each month; the SOS National Curator, Sarah Hill, will help coordinate priority needs across partners.
    - *Example: You have a confirmed 2027 project for the seed and plan to submit a seed clearance form by January 30th, 2027.*

14b. Packaging Seed

To ensure the successful conservation of seeds, collectors should complete seed treatment and data QC requirements promptly to ship seeds as soon as possible. Each seed shipment must include complete and accurate field data forms. Waiting until the very end of the season causes a bottleneck at cleaning facilities and strains support staff who are assisting with data QC.

Labeling Bags

1. Whenever possible, ship each collection in a single bag. Clearly label the bag with the unique Seed Collection Reference Number, collection date(s), location details, and collector name(s).
2. 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.
3. Write “Treated for 48 or 72 Hours” on the outside of the bag.

Packaging Seed for Shipping

Ensure the labeled bags are securely packed for shipping.

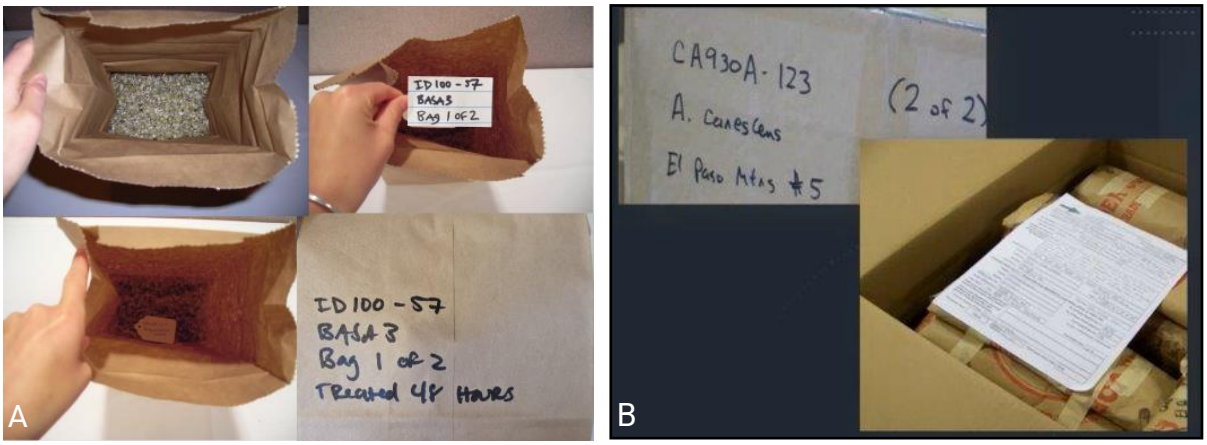
1. Test the packaging by shaking the bag vigorously. Secure any areas where seed comes out by taping the outside of the leaky sections. Never tape inside a bag.
2. Roll down the tops of paper bags and securing the OUTSIDE of the bag with tape to prevent seed loss. Never tape the inside of the bags.

3. Put all the bags of an entire collection in the same box. Multiple collections can be in one box as long as the collections are completed and all the bags are in the same box, and associated bags are clearly labeled.
4. If shipping a collection in multiple boxes, label the outside of the boxes with the collection number, species, and Bos 1 of 2, 2 of 2, etc.
5. Add the data sheets for all collections in a box to the very top.
6. Add contact information for the collections in case a cleaning facility has questions.
7. If seeds could cause irritation when opened, write a note on the outside of the box to open carefully.

DO NOT USE:

- Non-breathable bags or containers
- Bags made from plastic or PVC-backed fabric

Examples of properly labeled (A) and packed seed (B):



14c. Fleshy Fruits

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

1. Inform your SOS Agency Coordinator you will be making a fleshy fruit collection so they will be ready to assist with the QC data process ASAP.

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

3. 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 shipping late in the week.

4. When preparing to ship fleshy fruit, pack the entire fruits in sturdy plastic bags. Write the Seed Collection Reference Number, collection date(s), species, location details, collector name(s), and number of bags ("1 of 2," "2 of 2" etc.) on an index card then put it in a small zip-top bag and place it in the larger bag with the fruits. Wrap the bags with cold packs and newspaper. Make sure newspaper completely fills the shipping container and add the SOS data sheet on top.

5. Ship overnight immediately after collection is complete, and never on a Friday. Notify the seed cleaning facility in advance 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 7 below has a cleaning facility contact list and their respective notification requirements.

Shipping reminders:

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

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

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

- 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.

- Refer to Section 14b for guidance on how to properly package collections.

- **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 7. 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. **NO USPS. Packages could get lost.**	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
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 SOS 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	Southeastern Grasslands Institute, Attn– Gus Rasich 15 Govs Lane #4394 Clarksville, TN 37044
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

*Note for NPS/DOI Teams: For 2026, if collecting within NPS lands, **do not** send vouchers to the Smithsonian. Create the labels and transmittal notices, then contact Katie VinZant (*katharine_vinzant@nps.gov*) for storage instructions.

Sending Vouchers to US National Herbarium at the Smithsonian
All SOS teams must collect and send **one unmounted** herbarium voucher per collection to the U.S. National Herbarium at the Smithsonian Museum of Natural History. For more on labeling and packaging herbarium vouchers, see Section 10e.

Smithsonian Point of contact:

- Erika Gardner, gardnere@si.edu

If shipping with **USPS**:

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

If shipping with **FedEx**:

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

Sending Vouchers to Local or Regional Herbaria
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 herbarium. 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 3,000 PLS submission to USDA-ARS seeds for research, restoration, or partner projects. Seed may be requested through two separate forms: either a Clearance Form (for collections that will be requested back immediately after they are cleaned) or a Seed Order Form (for collections that 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 sent directly from teams. Depending on where seeds are being cleaned and stored, shipping and handling fees may be charged to the requestor (Table 8).

**Requests for SOS seed in Alaska should go through the BLM Alaska State Plant Conservation and Restoration Program Lead. Contact the SOS National Coordinating Office for more information on Alaska-specific processes.*

Clearance Form (to request seed 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 know which collections to clean first. The SOS National Coordinating Office reviews the requests and assigns clearance numbers after approval; forms are then sent to the facility for processing. Facilities can ship or test up to 25 seed lots per month, so teams should plan accordingly and coordinate urgent requests with their SOS Agency Coordinator and the SOS National Coordinating Office.

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

Clearance forms should be submitted **no later than January 30th**. All collections with a "Return By" date later than May 1st will be moved into storage and submitting a seed order form will be necessary to request them in the future.

Follow these steps to submit a Clearance Form:

1. Download the most recent "All Facilities SOS Clearance Form" from the SOS website. Follow directions on the form to title the file properly and indicate which cleaning facility it will be sent to.

2. Submit the form once all SOS collections have been sent for the season. The sooner the form is submitted, the better the chances are of getting seed cleaned and returned by the desired date.

3. Send the Clearance Form via email to your SOS Agency Coordinator, who is responsible for reviewing and forwarding it 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 (to request seed from storage)
The SOS National Coordinating Office maintains an annual inventory and tracks the storage and use of SOS seed collections. SOS partner agencies and offices may email their SOS Agency Coordinator for more information about the SOS seed inventory. All seeds not returned via a Clearance Form remain at the cleaning facility until a Seed Order Form is submitted. Seed Order Forms may be submitted at any time throughout the year.

The original coordinating agency or office has the first right to all seed they coordinated collecting. If a different agency/office wants to use that material, they must obtain permission to use the collection and send documentation of the seed's release in with the Seed Order Form. Requestors can contact the SOS National Curator for more information on the appropriate point of contact for a particular collection. Forms will not be processed without permission documentation.

Follow these steps to submit a Seed Order Form:

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

2. If seed is stored at **any other SOS Partner cleaning facility**:
    a. Download the most recent "NON-BEND SOS Seed Order Form" 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*.

3. The requested weight MUST be entered in pounds. If it uses PLS or another unit of measurement, the form will not be processed.

4. The planned use(s) for the seed MUST be entered on form. If it is missing, the form will not be processed.

5. If seed is being requested by an entity other than the original coordinating agency/office, send documented record of the original collection office's permission to release the material along with the Seed Order Form.

6. Email the Seed Order Form to your SOS Agency Coordinator. The SOS Agency Coordinator will review the request and forward the form to the SOS National Curator, who will work with the appropriate seed cleaning facility.

Table 8. Shipping and Handling Costs for seeds at each seed cleaning facility*

Facility	Clearance Form	Seed Order Form	Return Shipping	Notes
Alaska Plant Materials Center	No fee	No fee	No fee	N/A
Bend Seed Extractory	No fee	$35/collection handling fee	Charged to requestor	Requestor needs FedEx or UPS account for return shipping.
National Seed Lab	No fee	No fee	No fee	N/A
University of Nevada, Reno	No fee	No fee	Charged to requestor	Requestor needs FedEx or UPS account for return shipping.

Note: these fees are subject to change. Check in with your SOS Agency Coordinator for the most current information.

15. Appendices

Appendix A: SOS Contacts and Agency Coordinators

BLM	USFWS	NPS
Fred Edwards Restoration Coordinator • Bureau of Land Management • fsedwards@blm.gov **Sarah Hill, SOS National Curator and BLM Coordinator** • Bureau of Land Management 1387 S. Vinnell Way Boise, ID 83709 • sehill@blm.gov **Liz Enoch, BLM Agency Coordinator** • eenoch@blm.gov **Kristy Snyder, PCRP GIS Analyst** • ksnyder@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 • patricia_deangelis@fws.gov **Kelly Thomas, USFWS Agency 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	**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 **Katie VinZant, NPS Agency Coordinator** Restoration Ecologist • National Parks Service 1201 Oakridge Drive Fort Collins, CO 80525 • 720-701-0737 • katharine_vinzant@nps.gov **Jonathan Chase – NPS Agency Coordinator** • Jonathan_Chase@nps.gov

Appendix B: SOS 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 an off-center 10-mile buffer around the collection and/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. Current Season Data Requests

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 Coordinating 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/YYYY)**:**		**Collector Name(s):**	
		Collection Number:	
		Alt. Collection Number:	
	Recollection: Y N (circle)	**If yes Recollection, Original Seed Reference #:**	

COLLECTION DATA

Phenology = 100%	Dormant__% Vegetative__% Bud__% Flower __% Unripe 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:** (circle)	*Plants Ground Both Unknown*
Plant Habit: (circle)	*Tree Shrub Forb Grass/Grasslike Succulent*	**Avg Plant Height** (ft)**:**	
Field Notes to assist in identification of pressed specimen: (e.g., flower color)			
Collection Method: (circle)	*Hand stripped Cut stalk/stem Beat into tarp/container Bagged individual structures Plucked individual structures Other (describe):*		
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: (field office, park, etc.)		**Area within Subunit** (trail name, etc.):					
Landowner:		**Non-BLM Permission Filed:** (circle)	Y N				
Location Details:							
Source Used: (circle)	*GPS Survey123 Other:*	**Accuracy:**	*Meters*				
GPS Datum: (circle)	*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)**:**					

HABITAT DATA

Associated Species (Scientific Name)**:**	
Habitat Type, Ecological Site Description, and/or National Vegetation Classification:	

Modifying Factors: (circle)	*Fire – unknown origin Flooded Grazed Invasive Species Mowed Prescribed Fire Flooded Seeded Trampled Wildfire Other:*		
Landform:		**Avg Slope** (degrees)**:**	
Land Use:		**Aspect:** (circle)	*N NE E SE S SW W NW*
Geology:			
Soil Texture: (circle)	*Clay Silt Sand Other:*	**Soil Color:**	

HERBARIUM VOUCHERS

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

SPECIALIST IDENTIFICATION

Identified by (name and organizational affiliation):			
Material Identified (circle):	*In Field From Pressed Specimen on Day of Collection From Pressed Specimen on Another Date From Photograph*	**Date Identified** (MM/DD/YYYY):	

CUT TEST AND SEED YIELD TOOL *Fields in this section with an * are required. The rest are "optional" though may be required for some teams. All teams may use this section to track estimated PLS. This section should be filled out each collection day.*

***Total # seeds cut:**		***# viable of seeds cut:**		***Estimated viability = #viable/total #cut** (decimal percent):	
Seed collection method (circle):	All seed from every fifth plant (20%) *OR* _____% of each plant (can't exceed 20%)				
Avg # seed containing structures/plant:		**Avg # seeds/structure:**		**Target # seeds you want to collect:**	
# plants needed for target:					
Total # plants collected from today:		**Estimated PLS from today:** *(structures method)*			
Weight (g) of sub-sample: (*including seed/chaff*		**Number of all seeds in sub-sample:**		**Total weight of collection (g):**	
Estimated PLS from today *(weight method):*					

Use the following equations to calculate answers for some of the fields above.

Structures Method: *Example data: 10 seeds per fruit, 10 fruits per plant, .8 viability, 20% harvest. 10,000PLS target amount. At the end of the collection day, the team sampled 700 plants.*

Number of plants needed = Target # seeds / ([Avg # fruits per plant * Avg # seeds per fruit * Estimated viability] * Decimal percent of seed taken from each plant)

10,000/([10*10*.8]*.2) = 625 plants needed

Estimated PLS = ([Avg # fruits per plant * Avg # seeds per fruit * Estimated viability] * Decimal percent of seed taken from each plant) * total plants collected from

([10*10*.8]*.2)*700 = 11,200 PLS

Weight Method: *Example data: .55 viability, 75 seeds in subsample, 2g sample weight, 1000g total collection weight.*

Estimated PLS = ([# total seeds in sample * decimal % cut test viability]/weight of sample) * total collection weight

([75*.55]/2)*1000 = 20,625 PLS

SEEDS OF SUCCESS SCOUTING AND RESCOUTING FORM

Scouting ID		**Collector Code:**	
Scouted in Previous Years? (circle)	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?** (circle)	Y N
NRCS PLANTS Code:		**Is this species a target for 2026?** (circle)	Y N
Common Name(s) of Plant:			
Collection Potential: (circle)	*Standard (3,000-8,000)* *Operational (>80,000)* *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: (field office, park, etc.)		**Area within Subunit** (trail name, etc.):	
Land Owner:		**Non-BLM Permission Filed:** (circle)	Y N
Location Details:			
Source Used: (circle)	*GPS* *Map* *None*	**Accuracy:** (circle)	*GPS* *Within 5m* *6-20m* *More than 20m*
GPS Datum: (circle)	*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)	

COMPLETE FOR EVERY DAY OF SCOUTING AND RESCOUTING:	
Date:	
Phenology:	Dormant:___% Vegetative:___% Bud:___% Flower:___% Unripe Seed:___% Seed:___% Post-Seed:___%
Scouting Notes:	
Date:	
Phenology:	Dormant:___% Vegetative:___% Bud:___% Flower:___% Unripe Seed:___% Seed:___% Post-Seed:___%
Scouting Notes:	
Date:	
Phenology:	Dormant:___% Vegetative:___% Bud:___% Flower:___% Unripe Seed:___% Seed:___% Post-Seed:___%
Scouting Notes:	
Date:	
Phenology:	Dormant:___% Vegetative:___% Bud:___% Flower:___% Unripe Seed:___% Seed:___% Post-Seed:___%
Scouting Notes:	
Date:	
Phenology:	Dormant:___% Vegetative:___% Bud:___% Flower:___% Unripe Seed:___% Seed:___% Post-Seed:___%
Scouting Notes:	
Date:	
Phenology:	Dormant:___% Vegetative:___% Bud:___% Flower:___% Unripe Seed:___% Seed:___% Post-Seed:___%
Scouting Notes:	

Appendix D: SOS Clearance Form Instructions and Example

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 (YYYYMMDD)
    b. *Example: 2026_Bend_Clearance_MT050_20260402*
3) Send to your SOS 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 SOS 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. SOS Annual Report Example

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

Organization *(Agency, Field office, or org name):* BLM Mother Lode Field Office	**Team Code:** CA180
Location: El Dorado Hills, California	
Number of species collected: 18	**Number of SOS collections made:** 25
Number of people on collection team: 6	**Names/roles of people on collection team:** 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).

Collecting Season Summary (accomplishments and challenges):

**Note – missing photos for CA180-277, Missing voucher CA180-275*

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

SOS Collections *(include information for collections that have been shipped out of your office to any seed cleaning facility for inclusion in the SOS program)*:

**all 25 collections should be 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	Notes
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	*Was renumbered from CA180-274*
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 use, 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 SOS Agency Coordinator one week before the crew leaves, no later than December 15th.

BLM: Liz Enoch, eenoch@blm.gov
NPS: Katie Vinzant, Katharine_Vinzant@nps.gov AND Jonathan_Chase@nps.gov
USFWS: Kelly Thomas, kelly_thomas@fws.gov

Appendix F: Offices and Regional Herbaria

Contacts may be out of date, and the list does not reflect all SOS crew assignments. Teams 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 by the New York Botanical Garden (https://sweetgum.nybg.org/science/ih/).

Office/ Team Code	Statewide or Regional Herbaria	Index Herb Code	Contact Info	Designated or Assigned Local Herbaria	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 575-646-373		
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 no longer accepts SOS specimens. Reach out to SOS Agency Coordinator to discuss options.	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.ed u
WY930	Western Wyoming College				
WY930	Rocky Mt. Herbarium University of Wyoming	RM			

Appendix G: Historic BLM Offices and Mail Stop Codes

AK020 - Northern Field Office	MT923 - Montana/Dakotas State Office
AK025 - Fairbanks District Office	NM010 - Albuquerque Field Office
AK040 - Anchorage Field Office	NM011 - Cuba Field Office
AK050 - Glenallen District Office	NM012 - Grants Field Station
AK930 - Alaska State Office	NM018 - Taos Field Office
AZ030 - Kingman Field Office	NM030 - Las Cruces District Office
AZ010 - Arizona Strip Field Office	NM040 - Tulsa Field Office
AZ020 - Phoenix Field Office	NM050 - Socorro Field Office
AZ040 - Safford Field Office	NM060 - Roswell Field Office
AZ050 - Yuma Field Office	NM070 - Farmington District Office
AZ060 - Tucson Field Office	NM080 - Carlsbad Field Office
AZ061 - San Pedro Project Office	NM930 - New Mexico State Office
AZ070 - Lake Havasu Field Office	NV010 - Elko Field Office
AZ930 - Arizona State Office	NV020 - Winnemucca Field Office
CA067 - El Centro Field Office	NV030 - Carson City Field Office
CA068 - Barstow Field Office	NV040 - Ely Field Office
CA160 - Bakersfield Field Office	NV050 - Las Vegas Field Office
CA170 - Bishop Field Office	NV060 - Battle Mountain Field Office
CA180 - Folsom Field Office	NV065 - Caliente Field Station
CA190 - Hollister Field Office	NV065 - Tonopah Field Station
CA320 - Alturas Field Office	NV930 - Nevada State Office
CA330 - Arcata Field Office	OR010 - Lakeview District Office
CA340 - Ukiah Field Office	OR014 - Klamath Falls Resource Area
CA350 - Eagle Lake Field Office	OR020 - Burns District Office
CA360 - Redding Field Office	OR030 - Vale District Office
CA370 - Surprise Field Office	OR035 - Baker Resource Area
CA610 - California Desert District	OR050 - Prineville District Office
CA650 - Ridgecrest Field Office	OR054 - Central Oregon Resource Area
CA660 - Palm Springs-South Coast Field Office	OR056 - Deschutes Resource Area
CA690 - Needles Field Office	OR080 - Salem District Office
CA930 - California State Office	OR086 - Tillamook Resource Area
CO100 - Little Snake Field Office	OR090 - Eugene District Office
CO110 - White River Field Office	OR091 - West Eugene Wetlands
CO120 - Kremmling Field Office	OR100 - Roseburg District Office
CO130 - Grand Junction Field Office	OR110 - Medford District Office
CO140 - Glenwood Springs Field Office	OR115 - Butte Falls Resource Area
CO150 - Uncompahgre Field Office	OR116 - Ashland Resource Area
CO160 - Gunnison Field Office	OR117 - Grants Pass Resource Area
CO172 - San Juan Field Office	OR118 - Glendale Resource Area
CO200 - Royal Gorge Field Office	OR120 - Coos Bay District Office
CO210 - La Jara Field Office	OR130 - Spokane District 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)
ID310 - Upper Snake Field Office
ID300 - Idaho Falls District 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
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
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: 2026* Collector Codes and Coordinating Agencies

**Confirmed Collector Codes as of 3.15.2026. Additional collector codes will be added throughout the season as new teams begin. Contact your SOS Agency Coordinator with any questions about collector codes.*

Collector Code	Description	Agency Coordinator
AK930	University of Alaska, Anchorage	BLM
AK930A	Salcha Delta SWCD	BLM
AK930B	Kawerak Inc.	BLM
AK930C	Copper River Watershed Project	BLM
AK930D	Kodiak SWCD	BLM
BLR	Blue Lake Rancheria	BLM
CA067	SDBG, BLM El Centro FO	BLM
CA180A	BLM Cosumnes River Preserve	BLM
CA190B	BLM Ft. Ord National Monument	BLM
CA320	Applegate FO, BLM Staff	BLM
CA330	BLM Arcata FO	BLM
CA340	BLM Ukiah FO, BLM Staff	BLM
CA360	BLM Redding FO	BLM
CA370	Applegate FO, BLM Staff	BLM
CA930A	Mojave Desert, BLM	BLM
DAK930	Homer SWCD	BLM
DAK931	Alaska Village Initiatives	BLM
DAK932	Fairbanks SWCD	BLM
DAZ00	DOI Ecoregion 81, Sonoran	NPS
DCA01	Whiskeytown NRA, Sacramento NWR Complex	NPS
DCA03	SEKI, Ash Mountain	NPS
DCA03A	SEKI, Grant Grove	NPS
DCA04	Mojave National Preserve	NPS
DCA04A	Death Valley National Park	NPS
DCA05	DOI Southwest California	NPS
DCA067	SDBG, BLM El Centro FO, BAR funded collections	BLM
DCA067A	GBI, BLM El Centro FO	NPS
DCA160	BLM Bakersfield FO	NPS
DCA170	BLM Bishop CA	FWS
DCA340	GBI, BLM Ukiah FO	NPS
DCA350	BLM Eagle Lake FO	FWS
DCA370	GBI, BLM Applegate FO	FWS
DCA660	SDBG, BLM Palm Springs FO	BLM
DCA660A	GBI, Palm Spring FO	NPS
DCO00	Rocky Mountain National Park	NPS
DCO01	Durango, CO (GRSA, MEVE, S. CO BLM)	NPS

DCO150	BLM Uncompaghre FO	BLM
DCO160	BLM Gunnison FO	BLM
DFWS0400A	SGI, Mid Alabama, Ketona Glades	FWS
DFWS0400B	SGI, Southern Alabama, Blackbelt, Longleaf Pine, Coastal	FWS
DFWS0407	SBGG, Georgia	FWS
DFWS0408	The Nature Conservancy, Florida	FWS
DFWS0502	MARSB, PA, NY	FWS
DFWS0800	BLM Winnemucca DO; Sheldon-Hart NWR	FWS
DFWS0801	Stillwater NWR; BLM Mt. Lewis FO	FWS
DFWS0802	Pahranagat and Moapa Valley NWRs	FWS
DID00	Craters of the Moon NM	NPS
DNPNV00	Great Basin National Park	FWS
DNV01	DOI Southern NV, NW AZ, Ecoregion 14, Lake Mead NRA	NPS
DNV010	BLM Elko DO	FWS
DNV030	BLM Stillwater FO	FWS
DNV040A	BLM Bristlecone FO	FWS
DNV060	BLM Tonopah FO	FWS
DNV065A	BLM Caliente FO	FWS
DNVBRM	Basin and Range NM	FWS
DOR020	BLM Burns DO	FWS
DOR030	BLM Vale DO	FWS
DUT020	BLM West Desert DO	FWS
DUT030	BLM Grand Staircase Escalante	BLM
DUT052	BLM Richfield FO	BLM
FWS0100	Understory Initiative, Rogue/Umpqua Basins	FWS
FWS0101	GBI, Coastal Oregon	FWS
FWS0203	Kofa NWR, AZ	FWS
FWS0400	SGI, Northern Alabama, Tennessee, Kentucky	FWS
FWS0403	SGI, Georgia	FWS
FWS0404	SGI, South Carolina, North Carolina	FWS
MD1	Eastern Mojave	BLM
MT923A	BLM MT Natural Heritage	BLM
NPAK00	Main Seeds of Success Crew	NPS
NPAK01	EDRR Traveling Crew	NPS
NPAK02	Traveling Crew 2	NPS
NPAK03	Katmai National Park	NPS
NPAK04	Denali National Park	NPS
NV052	Southern Nevada DO	BLM
OR010	BLM Lakeview DO team 1	BLM
OR010A	BLM Lakeview DO team 2	BLM
OR110	BLM Butte Falls FO, Medford DO	BLM
TYT	The Yurok Tribe	BLM

Appendix I: CPC National Collection of Endangered Plants

The SOS program does **NOT** collect seeds from threatened or endangered species. The SOS 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. It 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 management organizations to assist their efforts to recover imperiled plants in the wild. CPC participating institutions have been involved in restoring more than 60 of America’s rarest plants in their natural habitat.

Visit their website (https://saveplants.org) for more information about the CPC.

For more information, contact:

- Center for Plant Conservation
- info@saveplants.org
- (760) 796-5686

Appendix J: References

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Appendix K: Glossary

***** *= required field on collection data forms*
^=filled in weekly by the National Coordinating Office for all data submitted to GeoPlatform via Survey123 form.

Accepted Taxa in USDA PLANTS – For taxonomic data, the SOS program uses the USDA NRCS PLANTS Database which has a code system for plant names in the United States. In this field, you can find a species by typing either the full Latin scientific name or, if you know it, the USDA PLANTS code.

Accession Number – A number representing a unique germplasm or collection, associated with a Seed Collection Reference Number. This number is consecutive and never to be reused. Collections made in different growing seasons from the same population are unique collections and assigned unique accession numbers (*see also* Seed Collection Reference Number *for the numbering format required in the SOS protocol*).

Alt. Collection Number – A secondary means of identifying a collection. This is <u>not</u> required for the SOS program and is usually assigned by a project partner. This may represent another organization or individual involved in the collection, a batch number, or other numbering system previously employed by an institution.
Examples: MSB378585, CH-101, or 2014-16.

Agency Coordinator – The SOS coordinator for the BLM, NPS, or USFWS; the primary point of contact for a collection team throughout a season. Teams will send this person all end-of-season materials. This person will also lead a corresponding agency breakout session during monthly collector calls.

***Approximate Number of Plants Found** – The estimated total number of individuals at a scouting or collection site, regardless of seed ripeness. If estimating on the day of a collection, this number includes those that were not collected from.

***Approximate Slope in Degrees** – The degree of steepness at the site; a number between 0 and 90, where 90 would indicate something completely vertical, such as a sheer cliff face. This is measured with a clinometer. An area with a slope of 0-3 degrees is considered “Flat.”

***Area within subunit** – The geographic area where a collection or scout point is made. A physical or logical area, beyond the geopolitical areas defined in the State, County, or Subunit fields. This may be a mountain range, river valley or trail name.
Examples: Marigold Trail, Red Rocks Canyon, or Maroon Bells.

***Aspect** – The cardinal direction of the slope of the site. Measure this using a compass. *Examples: S, NW, SW, or N/NE.*

***Associated Species** – The scientific names of five or more of the most dominant species found coexisting with the collected species, and can be native or non-native. Do not include the species that was collected. Include any additional invasive or non-native species that are present in the collection area.

Average number of seed-containing structures per plant – This is estimated by counting the number of fruits, seed heads, capsules, pods, or other seed-containing structures on multiple individuals within a population.

Average number of seeds per structure – This is estimated by counting the total number of all seeds (including ripe, unripe, viable, and not viable seeds) per fruit, seed head, capsule, pod, or other seed-containing structure on multiple individuals within a population.

***Average Plant Height in Feet** – The estimated average distance (in feet) from the ground to the top of any given individual within a population.

***Collection Area Sampled in Acres** – The size of the area in which a seed collection was made (in acres).

***Collector Code** – The code assigned to your collection team to denote your specific collections for the season. These are assigned by the SOS National Coordinating Office, see the Technical Protocol for more details on how codes are formulated. *Examples: AK930, NPMI00, NCBG or CP2.*

***Collector Name(s)** – All active contributors who participated in a seed collection. Collector names should be entered as Last Name, First Initial.
Example: Dawson, C., Howard, M., Haidet, M.

***Collection Number** – The unique number assigned to a given collection and is the second part of the Seed Collection Reference Number. Collection numbers are sequential, continuing from season to season if under the same collector code. If UT030 ended the 2025 season with UT030-100, their first collection of 2026 would be UT030-101.

Common Name(s) – The vernacular or trade name(s) of the collected species. This field is automatically populated based on what is entered as the Accepted Taxa.
Examples: short bluegrass, Iowa tall grass, or creeping Jenny.

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

***Cut Test** – A test performed by splitting seeds in half to analyze the viability of a seed (or by other methods, species-dependent). Collection potential is evaluated by estimating the number of viable seeds per seed-containing structure across a population (*see also* Viability Equation). Immature seeds are usually green and soft, while ripe seeds are usually brown and hard with a notable live embryo.

Dashboard – A GeoPlatform application within the Data Management Site that allows you to work with multiple data entries at once. For SOS, dashboards are used to highlight fields that may have been incorrectly entered, summarize seasonal statistics, or view data points on a map.

***Data Entered by** – The first and last name of the person filling out the digital data form.

Data Management Site – An immersive GeoPlatform page that can be used to QC submitted data, plan collections using a web map, view summary statistics, create reports, create herbarium labels, and submit seed tracking forms.

***Date 1 and 2** – The first two dates a collection was made from the same population within the same growing season. Use the pop-out calendar that appears on the Survey123 form or use the MM/DD/YYYY format.
Example: August 4, 2021 would be recorded as 08/04/2021.

Date range – If you indicate in the Survey123 form that the collection continued beyond the first two dates, this field will appear. Use the MM/DD/YYYY format and separate multiple dates with a comma.
Example: If the collection took place on August 4, 5, 7, and 9 of 2021, enter the first two dates in the first two fields and "08/07/2021, 08/09/2021" as the "Date range."

Duration – The length of the life cycle of the plant species. This field is automatically populated based on what is entered as the Accepted Taxa.
Examples: annual, biannual, or biennial.

^*Ecoregion – Areas with generally similar ecosystems as well as type, quality, and quantity of environmental resources. This field is automatically populated and appears on the Data Management Site and final data forms but not in Survey123. The SOS standards are Omernik Level III and IV Ecoregions (https://www.epa.gov/eco-research/level-iii-and-ivecoregions-continental-united-states)

Elevation – The distance above or below sea level. While there are separate fields to record this in meters or feet, the SOS standard is to use feet. Elevation of a source population

is an essential data point for using native seeds. It is critical that accurate elevation is recorded.

***Family** – The taxonomic family to which the species belongs. This field is automatically populated based on what is entered as the Accepted Taxa.

Field Maps – A mobile application teams use to view, interact with, and download maps for offline use. SOS maps are created with layers that aid in collection efforts.

***Field Notes** – The noteworthy characteristics of a species and site. Include key plant features that might fade with time or when plants are pressed such as flower color, odor, or leaf texture. Anything entered in this field will automatically populate onto the herbarium label when it is generated through GeoPlatform.

***First and last name of the individual who identified the species** – The name of the botanist or plant specialist who confirmed the taxa of the collection.

Geology – The mineral structure of a collection site; either a formation type or specific rock which makes up the parent material. This field is automatically populated and appears on the Data Management Site and in the final data form, but not in Survey123.

GeoPlatform – An Esri ArcGIS Online product; a geospatial platform that allows users from federal agencies and non-federal organizations to collaborate.

GPS Datum – A GPS device setting. The SOS standard is WGS84. When using a separate GPS device and digital map, check the datum in the margin or metadata of the map and adjust the GPS settings as needed.

Habitat Type – A description of the site as a community. Ecological site descriptions and/or national vegetation classifications are also accepted for this field.
Examples: oak savanna, Pinyon-Juniper stand, prairie, or sagebrush steppe.

Herbaria – A herbarium (plural: herbaria) is a collection of preserved plant specimens and associated data used for scientific study.
Examples: Smithsonian Institution, Oregon State University, or Price Field Office.

Historic Scouting (or Collection) Point – A scouting or collection data point made in prior seasons following the SOS protocol. These datasets are included as layers in SOS maps and should always be searched for a historic point of the same species being scouted or collected from in the current season.

Landform Category – The category in which the overall topography of the area fits best. This field is supplementary and serves to narrow down the options in the required Landform field, based on the selection(s).

***Landform** – The overall topography of the area. A landform dictionary (with images) is available on the SOS website and in each GeoPlatform group's Help Documents. *Examples: moraine, foothills, alluvial fan, or summit.*

Land Managers – The agency, municipality, tribe, or organization responsible for managing and permitting the land on which a collection is made. Private lands should be marked 'private', with names omitted in the dataset. Prior to collecting you must obtain permission and keep the permit or other documentation on hand while in the field as well as stored digitally in anticipation of submitting it as part of end-of-season reporting. While official permits are not required for BLM land collections, you must still check in with the corresponding field office manager as they may issue a free use permit.

***Land Use** – All the ways the area of land being collected from is used by humans. *Example: recreation, grazing, and multiple use.*

***Latitude** – The direction from the equator (N or S), measured in decimal degrees. This field is automatically populated based on the location where the Survey123 form was first created.

Layer(s) – An individual geographic dataset on a map.

Legend – A "key" that shows what each symbol, color, or graphic on a map represents.

***Location Calculations** – Location based data that is calculated by the SOS National Office on Fridays for all data submitted to the GeoPlatform. Data is sourced from the mapped point location of scouting and collection points. If the mapped point is incorrect, the location calculations will also be incorrect. The following fields are completed during location calculations:

- State, County, Level 3 and 4 Ecoregion, Geology, all Seed Transfer Zones, BLM State/District Office/Field Office

***Location Details** – The driving and hiking directions from a recognizable point to the collection site. Be detailed enough that someone could retrace these steps without a GPS and find the population using cardinal directions, mileage, and permanent landmarks. At minimum, write notes on the population extent and on-foot directions while in the field and then complete the rest back in the office.

Example: Starting at the intersection of Fifth St and Cole Ave in Harrington, 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 continues off to the right when facing the lake (N).

***Longitude** – The direction from the Prime Meridian (E or W), measured in decimal degrees. This field is automatically populated based on the location where the Survey123 form was first created.

Long-term storage portion – The first 3,000 viable seeds from any SOS collections are stored in long-term storage conditions for conservation purposes.

***Method used to collect seeds** – A field on the data form to indicate how seed was harvested, by selecting the option with the closest matching description. *Examples: hand stripped, cut entire stalk or stem, or plucked individual structures.*

***Modifying Factors** – Any known event that has altered a site. If a species was seeded and is now a cultivated population, that species can no longer be considered for collection at that site. However, naturally occurring populations within a seeded area may be considered suitable for collection.

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 wildland collected species to be used for restoration, rehabilitation, and reclamation.

Natural Dispersal Stage – The point in a population's growing cycle where seeds would be distributed without human interference. This is the best time to collect seed.

***Number of Plants Sampled** – The exact number of unique individual plants that seed was collected from. SOS protocol has a minimum of 50 plants sampled. Do not count any individual more than once, even if it is sampled across multiple days.

***Number of pressed specimens** – The number of herbarium voucher plant specimens that were collected and pressed according to the SOS protocol.

Operational Collection – A seed collection made following the SOS protocol that is over 80,000 estimated PLS. The purpose of these collections is for restoration, particularly for seed increase via grow-out.

***Organizational affiliation of the person who identified the species** – The organization or agency where the botanist or plant specialist who confirmed the taxa of the collection is employed.
Examples: BLM, NPS, Brigham Young University, or Chicago Botanic Garden.

Habit – The way a species grows. This field is automatically populated based on the USDA PLANTS code that is entered.
Examples: tree, shrub, forb, succulent, or grass/grasslike.

Paper Data Forms – Paper versions of the scouting and collection data forms. Fields on the paper forms correspond to required fields in the Survey123 forms. If a team has an issue with their digital data collection device, they should collect on the paper forms, and enter the data onto a Survey123 form shortly after.

PLS – Pure Live Seed; the number of viable seeds in a collection.

***Phenology** – The life cycle stage of plants within a population. SOS protocol requires a new estimate of the percentage of the population in any given stage for every date you return to the same site to inspect or collect that species.

Population – A group of individual plants of the same species living within the same area, continuous in range and generally uniform in appearance. Geographic features such as roads, ridges, and rivers inhibit gene flow between populations, and elevation, soils, aspects, moisture gradients and other environmental factors can influence population traits. Consider multiple factors when identifying separate populations. See section 7a in the protocol for more information about how to determine the extent of a population.

QC (Quality Control) – The process of assessing data for potential errors and quality.

Recollection – A seed collection made from a population that has previously been collected from following the SOS protocol. If making a recollection, make a note by starting the Field Notes with "RECOLLECTION." See the technical protocol for additional considerations for designating recollections.

***Scouting ID** – A unique identifier for SOS scouting data points. These are automatically generated the first time a Survey123 scouting form is created.

Scouting Notes – This field is used to record any relevant and useful information observed during scouting; it could be about the area, site, species, population, road conditions, wildlife, or any other aspect that is worth remembering later.

***Seed Collection Reference Number** – The collector code followed by the collection number; a consecutive and chronological number representing the unique collection or accession, never to be reused.
Example: CA170-42, OR110-347 or CBG-2481.

***Seeds Collected From** – A field on the data form to indicate where seed was sourced from: the plant, ground, or both. Collecting seed directly from a plant is best.

Seed Tracking Form – Provides real-time tracking for where each collection is sent for cleaning. Forms can be submitted via Survey123 or on the Data Management Site. Seed tracking forms can only be filled out after the QC process is complete, and only when seeds are shipped out, not before.

^*Seed Transfer Zones (STZ) – Geographic areas used to determine where seeds can be sourced and moved to within a region. These fields are automatically populated and appear on the Data Management Site and on collection forms, but not in Survey123.

- Provisional STZ – Defined by annual temperature and aridity.
  Source: Bower et al. Provisional Seed Zones 2014. https://research.fs.usda.gov/pnw/products/dataandtools/seed-zone-gis-data
- Eastern States STZ – Specific to the Eastern United States.
  Source: Pike et al. New Seed-Collection Zones for the Eastern United States: The Eastern Seed Zone Forum, 2020. https://academic.oup.com/jof/article/118/4/444/5811314
- Desert Southwest STZ – Specific to the Southwestern United States.
  Source https://research.fs.usda.gov/pnw/products/dataandtools/seed-zone-gis-data
- Empirical STZ – Climate matched, common garden, or landscape genetic for specific species which have been specifically researched.
  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 are kept in short-term storage conditions by the facility until requested. The original collection team has the right to first use or can make the seed available for other partners and projects.

Soil Color – The SOS standard is to use a Munsell Soil Color Chart. The abbreviated notation is "Hue Value/Chroma," where the Hue is the number and letter combination found on the page tabs, the Value is the number of the vertical row of the best match, and Chroma is the horizontal. If a Munsell Soil Color Chart is unavailable, describe it in as much detail as possible.
Examples: 7.5YR 3/3 or "Light brown with a yellowish tint."

Soil Texture – The SOS standard is to use the USDA NRCS Soil Texture "Feel" Method. This is done by wetting a sample of soil and performing various tests, including rolling a small subsample between your finger and thumb to analyze the "grittiness" of it. See the

flowchart in the SOS Technical Protocol Appendix O, and videos tutorials in the "SOS Collector Resources 2026" help document for more information.

Source of Coordinates – The GPS used to obtain the latitude and longitude of the site. This will automatically populate on the form if they are obtained from Survey123. *Examples: Avenza, MapX, Google Maps, Trimble, or InReach.*

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

Standard Collection – A seed collection made following the SOS protocol that is under 80,000 estimated PLS.

***Subspecies** – If possible, subspecies is the ideal level of identification for SOS collections. Subspecies is the taxonomic designation below the species level to which the collection belongs. *Example: Brickellia longifolia var. multiflora.*

***Subunit** – The given name of a geopolitical area in which a collection or scout point is made. This may be a city, field office, park, forest, refuge, or other specifically defined area. *Examples: Antelope Island State Park, Ridgecrest Field Office, Shawnee National Forest, Blue Mountains.*

Survey123 – The mobile application used to complete scouting and collection forms and submit data to GeoPlatform. Even after sending, surveys may be reopened, edited, and resubmitted as many times as is necessary. Data flows one way, from the Survey123 form to the GeoPlatform Data Management Site. During the QC process, any changes made to a field on the GeoPlatform Data Management Site do NOT transfer back to the corresponding Survey123 form; however, changing data and resubmitting the Survey123 form will override any changes made in the Data Management Site.

***USDA PLANTS Code** – For taxonomic data, the SOS program uses the USDA NRCS PLANTS Database which has a code system for plant names in the United States. The codes or "symbols," as they're called in the PLANTS database, 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 often a number to differentiate it from others. Visit http://plants.usda.gov/ and query a scientific name to find that species' unique code/symbol. *Example, BASA3, POSE.*

Viability Equation – The equation used to determine whether collecting only 20% of the ripe seed available on a given day, as is required by SOS protocol, will result in a collection greater than 10,000 estimated PLS. Use cut tests to determine the average viability of seeds per seed containing structure before using the equation.

Equation: (#ripe and healthy seeds from cut test / total # seeds assessed in cut test)(Average seeds per seed-containing structure) * (average # structures per plant) * (# plants in the population) * 0.2 = # estimated PLS*

Appendix L: Device Specifications 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 January 20th, 2026):

- 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.
- Supports the use of Field Maps and Survey123.
- 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 the National Operations Center (NOC). As long as the device meets the requirements above, **it does not have to be from the list below**. The list has a variety of devices, so you could investigate the most current models of those listed.

Device Focus

- Samsung Galaxy S Line (Phones)
- Samsung Galaxy Xcover (Rugged Phones)
- Samsung Galaxy Tab Active Line (Rugged Tablet)
- Samsung Galaxy Tab S Line (Tablet)
- iPhone
- iPad, iPad Air, iPad Mini (Cellular Equipped Only, plan not needed)

Notices:

- Note there are no rugged versions of the iPhone or iPad, and that only iPad models designed for cellular use come with a GPS capability. If you are ordering an iPad for data collection, **DO NOT order a Wi-Fi only version**. A data plan is not required for GIS collection.

Table: Mobile devices approved by BLM as of 2026

Model	Rugged	Form	Size
Samsung Galaxy S25	No	Phone	6.2"
Samsung Galaxy S25+	No	Phone	6.7"
Samsung Galaxy S25 Ultra	No	Phone	6.9"
Samsung Galaxy S24	No	Phone	6.2”
Samsung Galaxy S24+	No	Phone	6.7”
Samsung Galaxy S24 Ultra	No	Phone	6.8”
Samsung Xcover6 Pro	Yes	Phone	6.6”
Samsung Xcover7 Pro	Yes	Phone	6.6”
Samsung Tab Active5 Pro	Yes	Tablet	10.1”
Samsung Tab Active5	Yes	Tablet	8”
Samsung Tab S9	No	Tablet	11”
Samsung Tab S9+	No	Tablet	12.4”
Samsung Tab S9 FE	No	Tablet	11”
Samsung Tab S10+	No	Tablet	12.4"
Samsung Tab S10 Ultra	No	Tablet	14.6"
Samsung Tab S10 FE	No	Tablet	10.9”
Samsung Tab S10 FE+	No	Tablet	13.1”
Juniper Archer 4 (Unit Only)	Yes	Phone	6.26"
iPad (10th Gen) – Cellular Only	No	Tablet	10.9”

Appendix M: End of Season Checklist

A copy of this checklist is also available to download from the SOS website (blm.gov/sos).

For more details on any item, refer to the corresponding section above or the associated help documents and guides available on the SOS website and/or in each GeoPlatform group.

Final Deliverables: Due before collectors leave **and** NO LATER than December 15th

- □ Data (Section 14a)
  - Scouting and collection data submitted in Survey123 and reviewed in GeoPlatform (GPLAT); passed quality control (QC), no more comments or questions to resolve

- □ Data sheets (Appendix C)
  - Complete and accurate Survey123 collection forms exported from GPLAT
    - Printed **AFTER** passing QC and shipped with corresponding seed collections
    - If collected on paper and then submitted in Survey123, send scanned original paper copies **AND** exported Survey123 forms all in PDF format
    - File Name: Collector Code-Collection Number_Plants Code

- □ Photos (Section 12)
  - 3 per collection *minimum*; one of the landscape (A), one of the plant (B), and one of the seed (C)
    - JPG/JPEG format **ONLY** with location metadata removed
    - Additional photos welcome – scenery, plants, wildlife, seed, crews, etc.
    - File name: Plants Code_Collector Code-Collection Number_Letter

- □ Annual Report (Section 2f and Appendix E)
  - Includes details about anything that future collectors or people reviewing collections and data would need to know, including:
    - Highlights and challenges
    - Any collections that were renumbered
    - Missing photos or vouchers
    - Collections that were made but not submitted (lost to mold, too small, used for another purpose, etc.)
    - Any other unusual or notable thing about the collections and season

- □ Herbarium vouchers (Section 10d)
  **Note for NPS/DOI Teams: For 2026, if collecting within NPS lands, do not send vouchers to the Smithsonian. Create the labels and transmittal notices, then contact Katie VinZant (katharine_vinzant@nps.gov) for storage instructions.*

- 1 per collection *minimum*, **unmounted**, sent to the Smithsonian Institute; additional vouchers vary by crew
    - Verify the number of vouchers and other destinations with your manager
    - Export labels from GPLAT and edit for readability; print on acid-free paper
    - Packaged and shipped according to protocol (Section 10e)
- Smithsonian Transmittal Notice printed and shipped with vouchers
    - Email a copy to SOS Agency Coordinator and and Smithsonian point-of-contact and CC the SOS National Coordinating Office at BLM_HQ_SeedsofSuccess@blm.gov

□ Permits/permissions for all collections on non-BLM managed land (Section 6b)

- Submit a digital copy of permission documentation (permit, email, letter, etc.) after keeping a physical copy on hand throughout the season for verification if requested
- File name: Year_Landowner_Permit (*Ex. 2026_RockyMtnNationalPark_Collection_Permit*)

□ Seeds (Section 14)

- Treated (method varies by agency; Section 13b)
- Securely packaged with both bags and boxes clearly labeled
    - Include printed data sheets, exported **AFTER** passing QC and sent in the same container as the corresponding seed collections
- Seed Tracking forms submitted on GPLAT
    - If sender cannot access forms, follow up with SOS Agency Coordinator
- Shipped to assigned facility; notify appropriate contacts if required (Section 14d)

Submission Details

□ Email everything in a compressed (.zip) folder to your SOS Agency Coordinator and CC the SOS National Coordinating Office at BLM_HQ_SeedsofSuccess@blm.gov **BEFORE** collection crews leave and **NO LATER** than December 15th

- Example folder structure for Collector Code ID931:
    - *ID931_Final_Deliverables*
        - *ID931_YEAR_Photos*
            - *Individual photos, not sorted into subfolders*
        - *ID931_YEAR_Permits*
            - *Individual documents, titled Year_Landowner_Permit*
        - *ID931_YEAR_Data sheets*
            - *Individual data sheet files for all collections*
        - *ID931_YEAR_Transmittal_Notice*
        - *ID931_YEAR_Annual_Report*

Appendix N: Landform Dictionary

This is a dictionary of landforms used in SOS. A pictorial guide with supplemental images available on the SOS website and in each GeoPlatform group's Help Documents. If the landform you need is not listed, contact the SOS National Coordinating Office.

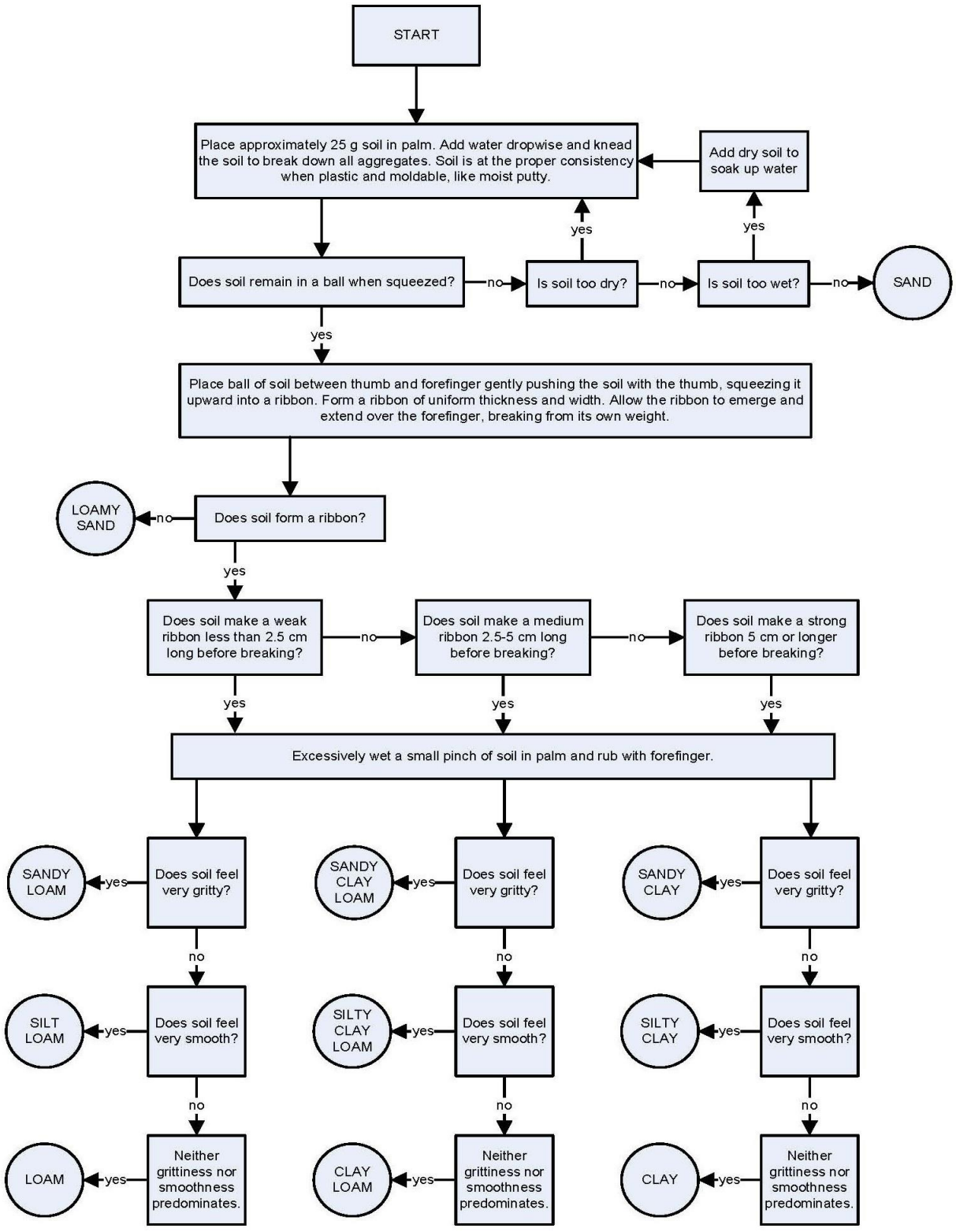
RIVER/STREAM-RELATED	
Alluvial Fan	Outspread mass of loose rock material deposited by a stream where it issues from a narrow mountain valley
Alluvial Valley	Elongate, relatively large, externally drained depression of the Earth's surface that is primarily developed by stream erosion or glacial activity and has accumulated alluvial material since its formation
Arroyo	Small, deep flat-floored channel or gully of an ephemeral or intermittent stream; predominately used in the Southwest region to refer to a Wash or Runoff Channel (a dry channel that temporarily or seasonally fills and flows after sufficient rain)
Badlands	Intricately stream-dissected topography, characterized by a very fine drainage network with high drainage densities and short steep slopes with narrow interfluves
Bajada	series of alluvial fans along a mountain front; broad alluvial slope extending from the base of a mountain range into an inland basin
Drainage	Drainages tend to develop along zones where rock type and structure are most easily eroded; various types of drainage patterns can develop and reflect the type and structure of the rock
Drainage Basin	Area of land in which all flowing surface water converges to a single point, such as a river mouth; or flows into another body of water, such as a lake or ocean
Floodplain	Smooth land adjacent to a river channel, constructed by the present river and covered with water when the river overflows
Stream Reach	Section of a stream or river along which similar hydrologic conditions exist, such as discharge, depth, area, and slope; can also be a length of river for which the characteristics are well described by readings at a single streamgage
Stream Terrace	One of a series of platforms in a stream valley, flanking and relatively 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
Wash	Broad, gravely bed of an intermittent stream, often situated at the bottom of a canyon, occasionally filled by a torrent of water; also known as an Arroyo in arid and semi-arid regions
CANYONS/VALLEYS/CUT FEATURES	
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
Depression	Relatively sunken part of the surface drainage area, as an interior basin or a karst sinkhole; also called a doline
Draw	Deep, narrow cleft between escarpments, cliffs, or mountains that resulted from weathering and river erosion; often a small stream channel, more open and with a broader floor than a gulch
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	Small channel with steep sides cut by running water and through which water ordinarily runs only after a rain, ice, or snow melt
Ravine	Small, narrow, steep-sided valley larger than a gully, smaller than a canyon, and usually carved by running water
Rift Valley	Valley that has developed along a rift, which is a long, narrow continental trough that is bounded by normal faults
Swale	Slight depression, sometimes swampy, in the midst of generally level land

Trench	Narrow, deep, steep-sided depression eroded by a stream, river, or created by geological movement of tectonic plates
Valleys	Elongate, relatively large, gently sloping depression, commonly situated between mountains or ranges of hills and often containing a stream with an outlet
ERODING FEATURES	
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
Colluvial Fan	Typically loosely consolidated angular material located at the base of a steep hill slope or cliff; colluvium accumulates either at the base of or within gullies and hollows within hillslopes
Scour	Feature resulting from the powerful, concentrated clearing and digging action of flowing air, water or ice
Scree	Collective term for an accumulation of coarse rock debris or a sheet of coarse debris mantling a slope; not a synonym of talus, as scree indicates loose, coarse fragment material on slopes without cliffs
Talus	Rock fragments derived from and lying at the base of a cliff or very steep, rocky slope
LOWLANDS	
Basin	Depressed area with no surface outlet that slopes downward from all sides towards a central point, often resembling a bowl
Bottomland	Low-lying, level land, usually highly fertile; an alluvial plain or a flood plain; the floor of a valley
Coastal plain	Area of low-lying land, flat or gently sloping toward the water, adjacent to a seacoast
Floor	Bottom of a depression, such as the floor of a crater or valley floor
Footslope	Inner gently inclined surface at the base of a slope; surface profile is generally concave and a transition between back and toe slope
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
Toeslope	Outermost gently inclined surface at base of a slope; surface profile commonly gentle and liner and characterized by alluvial deposition
INTERMEDIATE ELEVATIONS	
Bench	Level, or nearly level, strip of land that dissects a generally steeper slope
Backslope	Hillslope position that forms the steepest and generally linear, middle portion of the slope; may include cliff segments
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
Foothills	Region of relatively low rounded hills at the base of or fringing a mountain range
Hillslope	Part of a hill between its crest and the drainage line at the foot of the hill
Saddle	Low point in the crest of a ridge, commonly between the heads of streams flowing in opposite directions
Shoulder	Uppermost inclined surface at the top of a slope; transition zone from backslope to summit, with a dominantly convex surface profile
UPLANDS	
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
Cliff	High, very steep to perpendicular or overhanging face of rock; a precipice
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

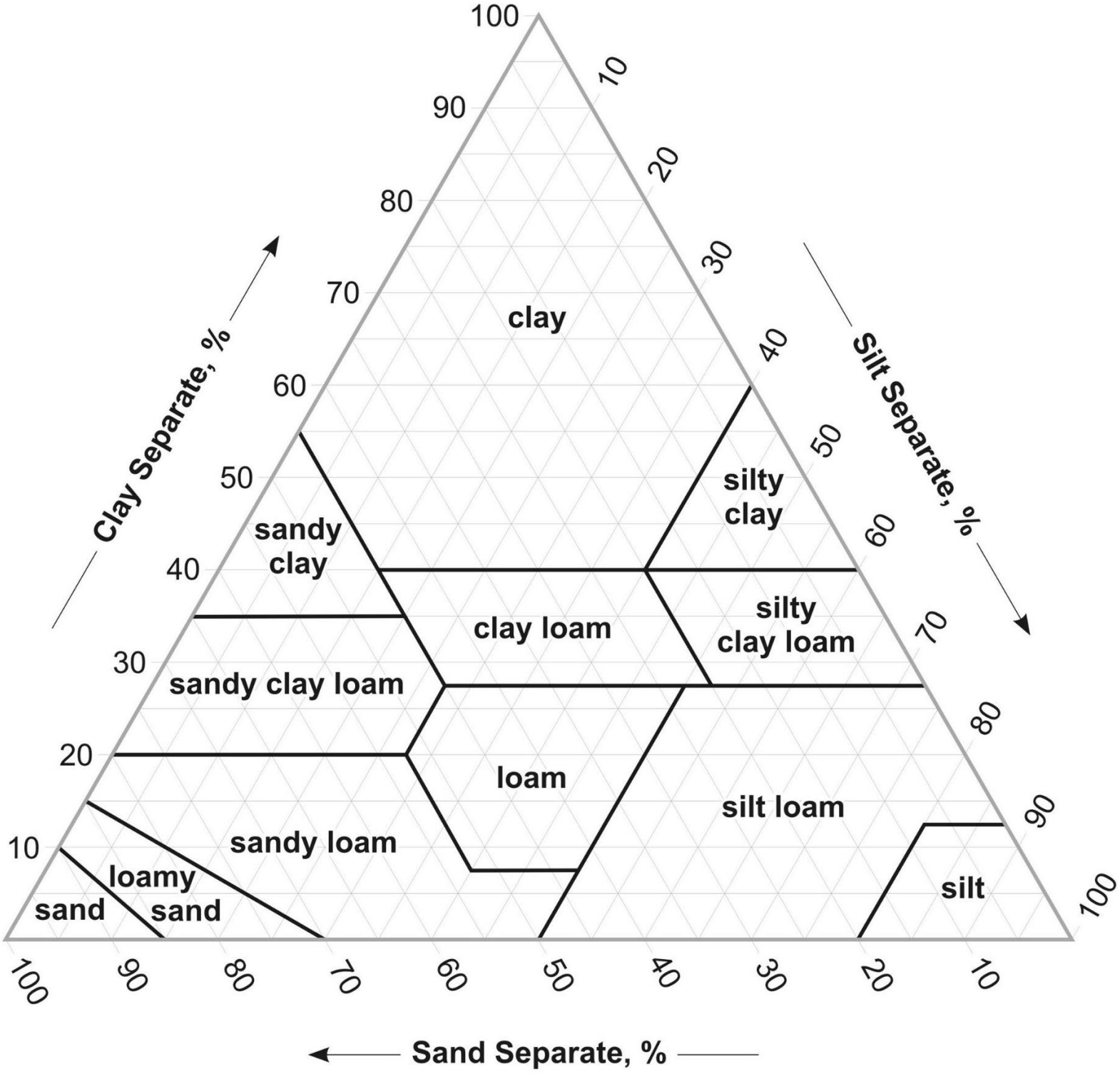
Plateau	Extensive upland mass with a flat summit area that is considerably elevated above the adjacent lowlands, separated by escarpments
Ridge	Long, narrow elevation of the land surface, usually sharp crested with steep sides
Rim	Border, margin, edge or face of a landform such as the curved brim surrounding the top part of a crater caldera, or the rimrock of a plateau or canyon
GLACIAL	
Drift	All sediment transported by glaciers or glacial meltwater
Drumlin	Elongated hill formed by glacial ice acting on underlying unconsolidated till or ground moraine
End moraine	Feature consisting of accumulated rocks, dirt, and other debris that have been deposited by a glacier; also called the terminal moraine
Esker	Meandering narrow ridges of stratified drift deposited at the edges of a glacier's path
Glacial lake island	Exists above water level in a glacial lake (depressions made by a glacier that are filled as the ice melts); typically bedrock or a moraine
Kame	Irregularly shaped hill or mound that was created by debris falling through and accumulating in glacier crevasses
Kettle	Depression or hole in an outwash plain formed by retreating glaciers or draining floodwaters
Lacustrine (lake) plain	Plain formed due to the past existence of a lake and its accompanying sediment accumulation; can be formed through one of three major mechanisms: glacial drainage, differential uplift, and inland lake creation and drainage
Moraine	Created from deposited, unstratified drift and debris that was accumulated on the glacier surface before it retreated
Outwash plain	Flat areas at the end of a glacier, made by meltwater outwash (water flowing through and away from the glacier) carrying the drift and sediment picked up by during glacial flow
River island	Accumulation of sediment and drift formed by an obstruction in or redirection of a proglacial river; also called braid bars
Till plain	Extensive flat plain of glacial till that forms when a sheet of ice becomes detached from the main body of a glacier and melts in place, depositing the sediments it carried
MISCELLANEOUS	
Blowout	Hollow or depression formed by wind erosion on a preexisting dune or butte, especially in an area of shifting sand or loose soil, or where protective vegetation is disturbed or destroyed
Beach ridge	Wave-swept or wave-deposited ridge running parallel to a shoreline
Break	Marked variation of topography or a tract of land distinct from adjacent land, or an irregular and rough piece of ground
Drumlin field	Landscape characterized by swarms of closely spaced drumlins (hills of sediment in the shape of half buried eggs, generally a quarter mile or more in length), commonly separated by small marshy tracts
Dune field	Expanse covered by dunes (hills of loose sand built by aeolian processes or the flow of water)
Flat	Level surface or small area of land marked by little or no relief
Hummock	Rounded or conical knoll, mound, hillock or other small elevation
Intermontane basin	Sediment-filled depressions that developed adjacent to and between uplifts or mountain ranges
Knob and/or mound	Rounded hill or mountain, generally composed of soil
Lakeshore	Land bordering or touching a lake
Seep	Small area where water or oil percolates slowly to the land surface

Appendix O: Soil Texture Flowchart and Triangle

Guide to Texture by Feel: Modified from S.J. Thien. 1979. *A flow diagram for teaching texture by feel analysis.* Journal of Agronomic Education. 8:54-55., Accessed 3.15.2026 from NRCS.USDA.gov .



Soil Textural Triangle



Appendix P: Recollection Decision Matrix

The purpose of this decision matrix is to assist Seeds of Success (SOS) teams with determining whether a plant population should be classified as a recollection or a new population. It summarizes the SOS Technical Protocol criteria - such as distance, habitat continuity, landscape barriers, and ecological context – into a structured guide that supports consistent field decisions and accurate documentation of seed collections.

The matrix is a decision aid, not a substitute for professional judgment. Population boundaries can be complex, and criteria should be applied as guidelines rather than strict rules. Teams should consider the full ecological context and document their reasonings, as well as consult regional coordinators and field office managers when uncertainty remains.

Step 1: Quick Field Screening Matrix
Use this matrix in order. Stop as soon as a decision is reached.

Decision Question	Yes	No	Field Guidance
1. Is this the same species as a nearby historic collection? Search for a species match within 1 km. If habitat is clearly continuous, extend the search range to 5km.	→ Go to Q2	New population	Search the species name in Field Maps or on the Data Management Site to examine nearby historic scouts and collections. In the field, confirm Species ID with Dichotomous key
2. Is the population within a **possible** collection footprint of the historic SOS collection? If uncertain, consult your SOS coordinator or field office manager for guidance.	→ Go to Q3	Likely new population	Look at field notes, acres collected, number of plants found, and number of plants collected to determine if the population falls within a previous collection area.
3. Is the habitat continuous between sites (no major barriers)?	→ Go to Q4	New population	Barriers: highways, rivers, ridgelines, habitat breaks, habitat conversions, large unsuitable vegetation zones, urban areas
4. Do the sites share the same ecological characteristics? (Elevation, slope, aspect, soils, etc)	→ Go to Q5	Likely a new population	Observe for uninterrupted gene flow potential and similar ecological conditions Major ecological shifts suggest separating populations
5. Are the ecoregions and seed zones the same as the historic collection?	→ Go to Q6	Likely a new population	Look through historic SOS records and layers in Field Maps/Data Management Site
6. Is there evidence of genetic or geographic isolation?	New population	→ Go to Q7	Isolation suggests fragmentation or significant distance preventing gene flow

7. Has the population been collected from 2 times in the last 3 years?	**Do not collect.** You can scout to gather phenology data	→ Go to Q8	Ideally, populations would have a three-year rest between collection events. Collecting two years within a three year period is allowed in special circumstances AND the population is still producing ample seed. Check the harvest dates of all connected seed collections to make sure you are not collecting more than 2 years in a three year period, and that sites have had 3 years to recover after multiple collections.
8. Is the population still healthy enough to sustain a harvest?	Recollection	**Do not collect.** You can scout to gather phenology data	Factors like drought, disturbance, disease, predation, and land use changes could make a population that was previously suitable for collection vulnerable. Only recollect from areas that still have healthy, robust seed production to avoid causing harm to the population.

Step 2: Scoring Matrix for Complex Cases

When unsure, assign the following scores:

Criteria	Recollection Signal (+1)	New Population Signal (-1)	Score Interpretation
Distance from prior collection	< 1 km	> 1 km	Score ≥ +4 → Recollection Score ≤ -4 → New population -2 to +2 → Requires expert review; please consult your SOS coordinators / field office managers
Habitat continuity	Continuous	Fragmented/discontinuous	
Landscape barriers	None	Major barrier present	
Population distribution	Continuous plants	Distinct patches	
Ecological setting	Same habitat type	Different habitat type	
Watershed/slope/aspect	Same	Different	
Ecoregion/Seed Zone	Same as historic collection	Different	
Prior SOS boundary overlap	Yes	No	

Appendix Q: Suggested Materials

Safety

- ☐ InReach / SPOT
- ☐ Walkie talkies to communicate without cell service
- ☐ First aid kit
- ☐ Fire Extinguisher
- ☐ Giant tarp for parking on grass
- ☐ Shovel
- ☐ Airhorn or whistle for bears/general safety
- ☐ Permits/permission letters
- ☐ Traction boards for vehicle

Data collection

- ☐ GPS enabled mobile device. See Appendix L in the Technical Protocol for more information about device specs.
- ☐ Backup paper data sheets (scouting and collecting)
- ☐ Munsell soil color book
- ☐ Clinometer (slope)
- ☐ Compass (aspect)
- ☐ Paper notebook/pen
- ☐ Help docs downloaded onto tablet
    - Technical Protocol
    - Digital Data Guide
    - Pictorial Landform Dictionary
    - USDA soil texture flowchart
    - Data Form Walkthrough

Seed Collection

- ☐ Collection container - Paper lunch sacks, grocery store paper bags, lawn/leaf paper bags, cloth bags, buckets
- ☐ Sharpie / pen / binder clips / tape
- ☐ Gloves
- ☐ Clippers
- ☐ Carabiners
- ☐ Clicker/counter

Voucher Collection

- ☐ Ziplock bags/paper towels
- ☐ Hori hori / trowel
- ☐ Cooler
- ☐ Plant press

Marking populations

- ☐ Pin flags
- ☐ Flagging

Cut tests

- □ Cutting boards/clip boards
- □ Razorblades/scalpel
- □ Masking tape

Plant ID

- □ Relevant Flora
- □ Loupe/hand lens
- □ Tweezers
- □ Small ruler

Seed treatment

- □ Plastic tote with gasket lid
- □ Latching garbage can
- □ HotShot NoPest Strips or Terro Garbage Guard
- □ Masks
- □ Gloves

Misc.; collectors have found these helpful in the past

- □ Jackery/battery pack for charging tablets
- □ Brute Totes with screened tops for organizing collections during a hitch
- □ Roll of duct tape
- □ Leg gaiters for weedy areas
- □ Powdered electrolytes
- □ Frozen bandanas for afternoon neckwear, keep in an insulated lunch bag in a Ziploc until needed
- □ Shade umbrellas
- □ Sunscreen
- □ Hats/sunglasses/long sleeve shirts
- □ Kitchen or luggage scales, and lightweight sample container if calculating PLS using the weight method

Appendix R: List of Resources and Help Documents for Collectors

Available on the SOS website:

Guides and Protocols

- SOS Technical Protocol 2026
  - Guide to the entire SOS program; policies, procedures, considerations, and resources when conducting scouting, seed collecting, data collection, seed shipping, and reporting
- SOS Protocol Quick Guide and Glossary 2026
  - Abbreviated SOS protocol (not to be used in place of full protocol); includes full glossary
- SOS Guide to Taking Quality Photos 2026
  - Tips for taking required SOS photos and end-of-season photo file format, naming convention, and submission
- SOS Guide to Shipping Materials 2026
  - Reviews basics of pre-shipping data finalization process and where to send all end-of-season SOS materials including seeds, vouchers, and data
- SOS End of Season Checklist 2026
  - Reviews all necessary tasks to finalize collections and reporting
- SOS Landform Dictionary 2026
  - Contains a list, definitions, and pictures of all landform terms available in the data collection form; collectors should use this to assist in assessing the dominant landforms for the collection site
- SOS Paper Data Forms 2026
  - Scouting and collection data forms to print and keep as backups
- Example Completed Data Forms
  - Correctly filled out paper scouting and collection forms to refer to if there are data entry questions
- Soil Texture Guide
  - Flowchart to assist in classifying soil texture at a collection site
- Seed Yield Tool
  - Commonly collected SOS species, their average raw weight and cleaned seed yield
- Bend Collecting Recommendations
  - Recommendations from the Bend Seed Extractory for collecting Great Basin-specific target species
- Guide to Herbarium Specimens for SOS
  - Reviews best practice for collecting and submitting herbarium vouchers

for the Smithsonian National Herbarium.

Forms and Templates

- Smithsonian Transmittal Notice
  - Fillable version of the letter that must accompany all vouchers sent to the Smithsonian Institution
- Herbarium Label Template
  - Editable template for Vouchers destined for the Smithsonian. This is the same template that is exported from GeoPlatform, to be used as a backup if there are technical issues with exporting
- Target Species List Template 2026
  - Spreadsheet each team must have, documenting the species they are targeting for the season; sent to the SOS National Curator
- Annual Report Template
  - Editable document each team must fill out at the end of the season
- SOS Authorization Letter Template
  - Editable document teams can use when requesting collection permission from a landowner who does not have a standard permit/permission process
- All Facilities SOS Clearance Form 2026
  - Used to request seeds immediately after cleaning from all SOS seed cleaning facilities in the lower 48
- Non-Bend SOS Seed Order Form 2026
  - Form to request older seed that is in freezer storage at all SOS cleaning facilities (except collections at the Bend Seed Extractory)
- Bend SOS Seed Order Form 2026
  - Form to request older seed that is in freezer storage at the Bend Seed Extractory only

Available in regional GeoPlatform groups' Help Documents (including all of the above):

Written and Pictorial Guides

- SOS Digital Data Collection Guide 2026
  - Tutorials on completing various digital data collection tasks
- SOS Digital Data QC Guide 2026
  - Guide for end of season data review and editing
- SOS Forms Walkthrough 2026
  - Field by field explanation of the SOS scouting and collection forms, and what data goes in each field

- SOS Operations Manual 2026
    - Reviews SOS processes, including scouting, collections, and data management; outlines key roles and responsibilities, provides structured workflows for scouting and collecting, and includes checklists to ensure efficiency in the field
- SOS Collector Resources 2026
    - National and ecoregional-specific resources to supplement collector knowledge
- USDA PLANTS accepted/synonym list
    - Downloadable excel sheet of the most current USDA PLANTS list to assist in selecting the correct accepted name without service
- State Noxious Weed Lists
    - Compiled list of noxious weeds in each state; collectors should familiarize themselves with the list for their collection area
- Examples of cut seeds and TZ
    - Images of cut seeds across a variety of genera and families that show what cut seed and embryos can look like; any red staining is from a seed viability lab test and will not be noticeable in fresh cut seeds in the field

<u>Recordings and Other Videos</u>

- Recordings of the SOS Virtual Training
    - Streamable (not downloadable) recordings of a 2026 SOS training to refer to throughout the season
- Short video tutorials
    - GeoPlatform onboarding
    - Setting up your mobile device: downloading Survey123, Field Maps, and creating offline areas in Field Maps
    - More will be added throughout the season
- Supplemental videos
    - Bend Seed Extractory Overview
    - Why Location Descriptions Matter for Research
    - USDA-ARS SOS Partnership and GRIN Overview
    - Estimating Population Size with Quadrats
    - More added throughout the season