

Project Wingspan: Golden State

Landscape Enhancement for Imperiled
Pollinators



Seed Collection Manual

**POLLINATOR
PARTNERSHIP**

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Acknowledgements

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Introduction

Thank you for participating in Project Wingspan: Golden State (PWGS). PWGS is a multi-year project sponsored by grants from the National Fish and Wildlife Foundation (NFWF) through the non-profit Pollinator Partnership.

This training manual presents information that will help standardize the seed collection process to ensure sustainable, responsible collection and data integrity. Please use this manual as a reference to meet the needs of your level of responsibility (Team Lead, Seed Collection, or Data Entry Volunteer) as indicated by Pollinator Partnership.

See the accompanying training webinar for more detail: (<https://www.pollinator.org/project-wingspan-golden-state-seed-collection-training>)

Program Objective

This program is designed to increase the quality, quantity, and connectivity of monarch butterfly and other imperiled pollinator habitat and to increase interest and skill in seed collection. Project Wingspan has historically occurred throughout the Midwest and Great Lakes region, but this program expands the effort into California, focusing on eight counties in Northern California. All seed generated from this project will be used to support the development of geographically appropriate native plant materials for the enhancement of pollinator habitats.

Project Goals

To successfully meet program objectives, the following tasks will be performed:

1. Facilitate a regional seed collecting program to help meet increased immediate needs for regionally specific pollinator-supporting plantings.
2. Provide training to volunteers and technical assistance to public and private land managers.
3. Enhance and establish long-term monarch butterfly habitat.

Partners

Project Wingspan is currently partnering with Heritage Growers located in Colusa, CA for nursery operations. Heritage Growers is responsible for processing collected seed, growing a portion of the cleaned seed in amplification plots into live plants, and distributing the seed and plug awards to habitat enhancement efforts across our active counties. We are also working

with the Gold Ridge Resource Conservation District, Mendocino County Resource Conservation District, and the Sonoma Resource Conservation District to collect source-identified native seed

Pre-Collection Protocols

1. Complete the online training and submit a Volunteer Waiver form

All forms should be submitted to James Hart, james@pollinator.org

It is extremely important that groups and individuals collecting seed for PWGS are well trained so that plant species are properly identified, plant populations are not harmed during the collection process, and the protocol is followed to ensure data integrity. Before becoming a Team Lead, seed collection volunteer, or data collector, it is highly recommended that you participate in the [training course](#).

2. Obtain “Permission to Collect” documents

With appropriate permission, seed collection may take place on:

- Private lands
- Public lands managed by a federal agency or state, county, or municipal agencies
- Right-of-way areas

You will not get a permit overnight. A right of entry permit must be obtained as well as notification of your presence regarding date, time and total number of people that will be on site. Right of entry permits can be obtained from the managers of the site you want to collect at. Generally, Pollinator Partnership staff will handle the permit application process and will provide the applicable permit to the collection team. Alternatively, [Sample Right of Entry Permit and Notification Documents](#) can be found here.

If you are a collection lead and have arranged for the Project Coordinator to obtain your collection permit, you will need to have a copy of the permit on hand when you visit the site. Additionally, you will need to sign a [Volunteer Waiver Document](#) that will release the Project Coordinator and Pollinator Partnership from any damages that may inadvertently occur while you are utilizing the permit in the name of a third party.

3. Conduct preliminary site visits

Preliminary site visits are often necessary to:

- Identify populations of target species
- Confirm the previous identification/location of specimens

- Estimate a likely harvesting date for species present. It may be possible to make collections of multiple target species from the same site on the same day.

How to identify a plant population:

- A *population* is a group of individuals (of the same species) living within the same collection site, continuous in range, and generally uniform in appearance.
- Consider plants within a 3-mile radius around your main collection site to be the same population.
- To avoid collecting from the same population in two separate collections (of the same species), do not allow the 3-mile radius of two sites to overlap. There should be at least $\frac{1}{2}$ mile separation of the radii. If collecting different species from the sites, overlap is not an issue.
- To gain the most representatively balanced sample of seeds, collecting should be conducted in an even and random method from *a minimum* of 50 plants.

4. Prepare Field Documentation and Data Forms

- Prepare the necessary field data forms before entering the field. A [Field Data Form](#) is required for each collection at a site, marking all species collected on that day at that location.
- If entering data in the field, download the Survey123 App. Accessing the digital data form and entering data in this app will require a cell signal. If the site lacks sufficient signal, please take thorough notes and complete this form via computer or mobile device soon after the completion of the collection activity.
- Team Leads and/or Data Collectors for each team will be given a link by the Project Coordinator to use the Survey123 App to acquire specific data about the location of each seed collection, including latitude and longitude coordinates. Specific directions on how to download and use the GIS app can be found [here](#).

Seed Collection Protocol

1. Prepare your tools

Before you leave for your seed collection trip, you will want to make sure you have the following items:

- Collection containers such as paper bags (sandwich lunch bags or grocery paper bags work well), old pillow cases, plastic bucket, etc.
- Permanent black marker or pencil
- Pruners, heavy scissors, or garden clippers
- Heavy garden gloves
- Large storage container (to hold bags of harvested seed)
- Survey123 App or other tool pre-loaded on your mobile device to acquire latitude and longitude
- [Data forms](#)
- Permits (when applicable)

2. Collect your seeds!

In order to ensure genetically diverse collections, we will follow the guidelines recommended by Bureau of Land Management Seeds of Success Program (BLM-SOS):

- Collect no more than 20% of the available seed on the day of collection.
- Collect randomly from a diverse selection of plants regardless if characteristics are rare or common (do not select for only the plants with the largest blooms, unique colors, etc.).
- If genetics are unknown, collect as broadly (in an area) as possible to collect the most diverse selection of material.
- When populations are abundant, collecting from every fifth plant is a good way to randomize collection.
- Prioritize sites where populations are of wild origin.
- Do not collect in the early morning, if possible, before the dew has evaporated. Seed should be dry when collected.
- While collecting, keep track of the number of plants from which you have harvested seeds and report that number to the data collector.

A [list of target plant species](#) and their approximate bloom period may be found online, or later in this document.

3. Collect data during your collection

- A [Field Data Form](#) is required for each collection activity. You may enter multiple species on the same form, as long as they were collected at the same site on the same day. Fill in all sections of the field data form while in the field to assure accuracy. An example of a [complete field data form](#) can be found here.

- [Complete a Survey123/ GIS App entry](#)

Photos of the species being collected should always be taken while in the field. Data collectors can take photos with their smartphones and upload directly through the Survey 123 GIS app. At least three photos should be taken for each collection, as follows:

1. Landscape level / population
2. Individual plants
3. Material collected (seed)

When possible, also photograph the flower or leaf structure, depending on what is most helpful in identifying the plant. You may also wish to take a photo of your field data form or any field notes as a backup.

Seed Collection Considerations

Do not allow collections to overheat, and do not leave them in a vehicle or in full sun. Exposure to sustained high temperatures can damage seed collections. Always maintain ventilation around the collections. If making more than one collection on a field day, bring the existing collections outside of the car and leave in a shady spot with little to no wind exposure. Damp collections should be spread out on newspaper to dry naturally in a well-ventilated area immediately after collection.

Preventing the Spread of Noxious Weeds and other Hazards

Come Clean and Educated

- Before leaving home, inspect your gear and remove dirt, plants, and seeds from clothing, boots, gear, and vehicles. When possible, wear low-tread footwear that doesn't hold soils, seeds, plant parts, or invertebrates. Clothing, footwear, and materials that you bring into the field can bring unwanted seeds, pathogens, and pests into the collecting area, so ensuring these items are clean prior to visiting the site is important.
- Learn to identify the problem weeds you might encounter. There are many websites available to learn about your local problem weeds and invasive species such as the [California Invasive Plant Council](#), the [National Invasive Species Information Center](#), and the [UC Statewide Integrated Pest Management Program](#).

During the Collection

- Avoid parking in weed patches. Most weeds spread along roadways and corridors, as vehicles easily transport many types of weeds and seeds. If you are driving off the pavement, try to identify a course that will avoid weeds.
- Avoid walking through weed patches. Many weed seeds will cling to clothes, shoes, and even hair. Make sure that if weed seeds get on your sleeves while navigating the site, then you brush them off before putting your arms in your container.
- Avoid unintended seed dropping into your collection container by keeping it closed or covered when walking through the site.
- If collecting with two hands and setting the collection container on the ground, ensure nothing weedy is above you and could drop in the container if you bump it.
- If collecting from numerous sites in one day, clean all gear between each site.

Leave Clean

- If possible, clean your gear on-site at the end of your trip.
- Carefully inspect yourself and your equipment at the end of your trip. Weed seeds will cling to most materials so be sure to carefully check everything for seeds before you leave a site and throw the seeds in the trash. Pay special attention to pant cuffs, shoes (including laces), and socks and use a stiff brush, stick, or small screwdriver to help remove soils, seeds, plant parts, or invertebrates; use boot brushes and other removal devices when possible.
- Do not clean clothing, footwear, or gear in or near waterways – this may promote the spread of invasive species downstream.
- Use a 70% alcohol solution to sanitize boots and equipment.
- Don't let weeds hitchhike away from the site. If you are not able to clean before you leave the site, make sure to clean in a place where there is no possibility of anything getting away, and dispose of removed materials in the trash.
- If you have parked or driven through weeds, go straight to a car wash without any delay. As soon as you drive out of the weeds, the seeds will begin to spread. Make sure to spray the undercarriage of your vehicle with high pressure water to wash off any seeds.

Additional Precautions

Incorporate invasive species prevention into planning for the collection event.

- Place cleaning stations at entrance and exit points
- If necessary, plan travel routes to avoid areas of heavy infestation
- Identify species in the field to educate participants
- Provide a 70% alcohol solution to sanitize boots and equipment

Human Safety Concerns

- Bring plenty of water (minimum one liter)
- Wear bright clothes when working near roads
- Do not collect along busy highways
- Always check for ticks after leaving the field
- Wear comfortable, well-fitting shoes and socks, and bring gloves
- Watch out for poison oak
- Inform your team lead of any allergies, such as to latex
- Dress appropriately for the weather and season

Be careful when handling milkweed plants, as the sap may harm your eyes. The initial irritation can be painful, followed by a cloudiness of the cornea, which can take a week to clear up. Take the following steps to avoid transferring milkweed sap to yourself or your fellow volunteers:

- Wear gloves while collecting milkweed pods
- Avoid contacting your face with your hands or gloves
- Wash your hands carefully after handling milkweed pods. If milkweed sap gets into your eyes, seek medical attention immediately

Post-Collection Protocol

1. Label Your Seed Collection

Like the data forms, the information you record on your collection bag will aid in the tracking of the seed throughout its life until it is planted at its final habitat restoration site. Write the information listed below on the outside of your collecting bag. If using a cloth bag, write the information on a jeweler's tag (or similar) and tie it to the bag. It is imperative that this information is accurate so please label your seed collection bags in the field as you collect.

The following information should be clearly/legibly written on your collection container:

- Latin name
- Common name
- Collection date
- County
- Collector's name

- Unique collection team Seed Collection Reference Number which will be provided by the Project Coordinator.

- If multiple bags are needed to hold the seed from one collection, make sure to mark them 1 of 2, 2 of 2, etc.

2. Recommendations for Collection and Cleaning for Specific Target Plants

Estimated monthly collection periods for each species are detailed in the [Plant Profiles](#). This will vary based on the region, microclimate, weather, and annual growing conditions, but these periods can serve as an estimated timeline. Preliminary site visits will provide a more accurate indication of seed ripeness and will inform when collection should occur.

***Asclepias* spp., milkweed**

Collection Time: Late summer to fall

Collect seed pods as they turn yellow or greyish brown and begin to split. White fluff will likely be visible. Seed should be brown and plump when harvested. Do not collect pods with holes as these seeds are likely nonviable due to insect damage. Put the entire pod in the collection bag. Split open pod to remove seed and fluff. If you clean the seeds indoors, you will likely have the downy fluff floating around the room as it is quite buoyant.

***Lupinus albifrons*, silver bush lupine**

Collection Time: Spring

Seeds ripen in pods. Pods turn from green to greyish brown when they are ready for harvest. Split open some of the pods in the field to see if the seeds are brown and plump. If the pods and/or seeds are still green, they are not ready. It may easiest to collect the entire stem containing numerous pods and put it in your collection bag. However, if some pods are ripe while others on the same stalk are green, you can remove individual ripe pods by pulling them gently from the stem. Avoid squeezing them as the pods may split and release seed before they reach you collection bag. When indoors or in a sheltered place, peel the pods to release the seeds.

***Solidago velutina* spp. *californica*, California goldenrod**

Collection Time: Fall

Seeds ripen about a month after flowering and should be collected when the white fluff begins to dry and expand and the calyx and stem begin to brown. It is easiest to cut off the entire flower head and remove the chaff and fluff from the seed in an area where

you are sheltered from the wind. The white fluff acts as a parachute and the seeds will fly away even in light wind. Seeds should be brown and plump, as flat seeds indicate the embryo has not developed and the seeds are not ripe.

***Symphyotrichum chilense*, Pacific aster**

Collection Time: Late summer to fall

The seed is ready for collection when the white fluff begins to dry and expand and the calyx and stem begin to brown. It is easiest to cut off the entire flower head and remove the chaff and fluff from the seed in an area where you are sheltered from the wind. The white fluff acts as a parachute and the seeds will fly away even in light wind. Seeds should be dark in color and plump, as flat seeds indicate the embryo has not developed and the seeds are not ripe.

***Phacelia californica*, rock phacelia**

Collection time: Spring to summer

Collect when the flower spike has fully unfurled and dried to a brown color and papery texture. Flowers lower down on the spike will go to seed first, while those toward the end of the flower head will bloom last. It is easiest to cut off the entire flower head and place it in your collection bag, or you can try to strip the papery seed heads into your bag. Shaking the stem upside down will help dislodge the seeds. Seeds should be a medium brown color. Be sure to wear gloves when collecting this species, as the hairs that cover much of the plant can cause irritation if it comes into contact with bare skin.

***Clarkia purpurea*, winecup clarkia**

Collection time: Late spring to late summer

Seed can be collected when the thin, green, roughly 1-inch long seed pods dry to a light yellowish brown color and begin to split at the end. The sides of the pod will peel back like a banana and release the first seeds when it is ripe. It is easiest to cut off the entire stem containing numerous seed pods and shake it upside down into your collection bag.

***Achillea millefolium*, common yarrow**

Collection Time: Late spring to early fall

Seeds will be ripe when the small white flowers have dried into a brown, papery seed head. Small white seeds may be visible in the seed head. It is easiest to cut off the entire seed head, turn the stem upside down over your collection bag, and rub the seed head with your fingers to dislodge the seeds. Seeds are very small and light, and while they won't be blown away as easily as some wind-dispersed species, care should be taken to keep seed/seed heads out of the wind while removing seeds.

***Eschscholzia californica*, California poppy**

Collection time: Spring through early fall

California poppies form long skinny capsules that extend from the base of the flower after bloom. The green capsules will dry to a tan color, often with some darker splotches, with more pronounced ridges running lengthwise. A seam will open lengthwise along one side of the capsule to release the seeds. Ideal timing for collection is just before this seam opens, as it often will burst open, propelling the seeds up to a foot away (you may see or hear this happen while collecting!). To capture the seeds before they burst, cut off capsules when they are dry and brown and place them in your collection bag. They will open on their own, dropping their seeds to the bottom of the container. Seeds should be round and plump, dark brown to black.

***Sisyrinchium bellum*, blue-eyed grass**

Collection time: Spring to early summer

The seed is ready for collection when the seed pods have turned dark brown and hardened. If left on the plant, the capsule will split along several seams, releasing the seeds. To collect, cut the seed heads off directly into your collection bag. Allow them to open on their own or press them together to open them and release the seeds. Ripe seeds are plump, round, smooth, and very dark brown or black.

3. Store Your Seeds

After your collection, let the seed dry for three days in a cool, dark, dry location before shipping. The optimal method for drying seed material is to spread it out in a single layer on newspaper and place a fan nearby on the lowest setting. If space is a concern, leave the seed in the collection bag, but leave the bag open and stir the seeds at least once a day. Be sure not to store the seed in a sealed plastic bag, glass jar, or other non-permeable container at this stage as the moisture in the seeds will cause mold and spoil the batch.

Ship the seed immediately after drying and completing a preliminary cleaning. Leftover bits of plant material (leaves and stems) can promote the growth of mold which will ultimately affect the viability of the seed. While it is okay to hold onto seed for a couple weeks (in proper conditions) to allow for shipping collections in bulk, do not keep seed for long periods of time before shipping. Viability of seed can decrease quickly if improperly stored and delaying shipment of the seed also delays cleaning and processing.

Only ship seed Monday through Wednesday to ensure that it arrives to be cleaned before the weekend. If necessary, keep the seed in a cool, dark, and dry location until Monday morning. Do not freeze seed and never store or ship seed in plastic

4. Ship Your Seeds

Background

It is critical to the success of the seed that it is shipped immediately following drying, together with the completed field data forms. The collection lead should ship the seed directly to Heritage Growers in Colusa unless otherwise instructed by project staff. Do not mail seeds on Thursday or Friday so that they are not left in an uncontrolled (i.e., hot or humid) shipping center for a prolonged period over the weekend. Always check the estimated delivery date before mailing to make sure the seed will arrive before the weekend. Since no one will be available to receive mail over the weekend, the seeds may end up sitting for two days (or longer) in suboptimal conditions.

Note: Additional instruction on shipping seed via UPS can be found [here](#).

Packaging

- Ship each seed collection in its own bag, separated from other species/collections. However, if you have more than one species/collection ready to ship at one time and they fit in one box, please ship these items in the same box. Once again, do not store the seeds in plastic bags, including for shipping.
- Make sure that the seed bags are clearly labeled with your unique collection number
- The [field data form](#) must be shipped with the corresponding collection. Tape or staple it to the bag, or put it inside the bag. As an additional precaution, you can place a second label on top of the seed inside the bag.
- Ship in a sturdy cardboard box, either a box you already have or a UPS box. Boxes can be purchased at a local UPS Store, but other non-UPS boxes work just as well.
- Securely package the labeled paper bags for shipping (i.e., taped at the seams and padded with newspaper or loose bubble wrap inside the box). Paper envelopes can be used for smaller quantities of seed inside the box.
- Do not use any non-breathable bags (e.g. ziplock bag) or containers (e.g. tupperware with tight lid) for seeds as this may contribute to mold growth.
- If shipping multiple associated boxes at the same time, please include a note for staff letting them know, as boxes may not all arrive on the same day.

Shipping via UPS

1. To ship the seed, first go to the UPS website homepage (<https://www.ups.com/us/en/home>). On this page you will see a “Log In” button at the top right of the screen. This will bring you to the Log In page. Please enter the following information to log in to the Pollinator Partnership UPS account:

Username: **PollPartner**

Password: **Monarchs423!**

2. This will bring you to the main page of the Pollinator Partnership account. From here, select the yellow “Create a Shipment” button in the middle of the screen. This will open a tab with a new shipment page.

3. Under “Ship From / Return To”, you will need to select “Edit” in the top right corner, as the Pollinator Partnership office will be the default selected. This will allow you to enter the address that you are sending from.

On the “Edit” page, you will need to do two things. First, under “Choose an Account”, choose the “X4455C - Pollinator Partnership” option from the drop down menu. Next, under the “My Addresses” drop down, select “Enter New Address” and enter your address in the boxes below. Select “Send status updates on this shipment using the email provided above” if you would like, but do not select “Use this as my default return address”. If you will be shipping numerous shipments of seed for this project, you can select “Save As New Entry”. A nickname for the address is optional. When ready, hit “Continue”.

4. On the next page, you will enter the address for Heritage Growers (**580 Vallombrosa Avenue, Chico, CA 95926**) as the shipping address. Please enter River Partners and the Company Name and Mason Shorts as the Contact Name.

5. Next, you will need to enter some details on the package itself. If you are using your own box, select “My Packaging” under Packaging Type. If you are using a UPS-provided package, select the appropriate option. Then enter the weight under Weight of Package and the dimensions in the spaces below.

Below on the same page, you do not need to enter a value under “Total Package Value”. However, please do add a reference number below. Enter “Project Wingspan” under Reference #1. You do not need to select Signature Option for this shipment.

6. On this next page you will have a few options for shipment. First, you can select whether you will drop it off at a UPS Store, Access Point, or Drop Box. UPS has a number of stores, so if you have one nearby that is a good option. However, there are a few options that work just as well if there is not a UPS Store near you. UPS Access Points are other businesses such as pharmacies, grocery stores, or office supply stores that are authorized to accept UPS package drop-offs, which they then pass on to UPS for shipment. Finally, UPS has a number of Drop Boxes available. These are similar to USPS mail boxes and will work best for smaller packages. Larger boxes may not fit in the Drop Box slot. All types of drop off locations can be found on the [UPS website](#).

If you are going to drop the package off at a UPS location, simply select this option at the top of this shipment page. This is free, so it is the preferred option. **Important:** if you are unable to print your shipping label at home, you will need to go to a staffed UPS Store or Access Point.

However, if you cannot make it to a UPS drop off location, you can select to schedule a pickup where a UPS truck will stop by your location and take the package. If you choose this option, select the pickup date, location, time window, and specific location (front door, main office, etc.).

7. Next, select the shipping speed. Please choose the least expensive option, which should usually be between \$10-30.

8. On the next page, you do not need to select any of these options.

9. Next, you will be prompted to select the payment method for this shipment. For this, simply click “Bill My Account” and make sure the Pollinator Partnership account (X4455C) is selected under “Choose an Account”. Then click Review.

This will bring you to a page summarizing the details of your shipment. Please review this page before paying to ensure everything is entered correctly. When you are ready, click Pay and Get Labels. This will confirm your shipment label order and bring you to a page where you can download and print your label.

10. Finally, download and print your shipping label. By downloading the label, you will be able to open a document that has your shipping label as well as instructions for attaching the label to the package and dropping it off at a nearby location. There should be several recommended nearby drop off locations listed on this document. Simply print this label, fold it at the marked line, and tape it to the top of your package using shipping tape. Now you’re ready to drop it off at your preferred UPS location! If you have any questions about this process, please reach out to James Hart (james@pollinator.org).

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Links to documents

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