V. 2.0

IDAHO PANHANDLE

BEES TO BEARS

CLIMATE ADAPTATION PROJECT

WILDFLOWER SEED LIBRARY COLLECTION MANUAL

Prepared For:

Idaho Department of Fish & Game, Panhandle Region, Wildlife Diversity Program

2885 W. Kathleen Ave, Coeur d'Alene ID 83815

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Acknowledgements:

TEXT & LAYOUT: Kristina Boyd

EDITING: Michael Lucid, Evan DeHamer, Lynn Bush

ILLUSTRATION: Katherine Begalke

CONSULTATION: Britta Petersen, Robert Wilson, Jennifer Costich-Thompson, Derek Antonelli, Lora Merz, Kenneth Thacker, Richard Hatfield, Jason Smith

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INTRODUCTION

The Wonderful World of Wild Seed Collection

We all love wildflowers! They trumpet in the summer with bright blues and yellows and reds, and vibrate with life as bees, butterflies, moths, flies, and beetles collect their nectar and pollen. But we often forget about the amazing cycle of life that continues after the blooms fade. Seed collection is an opportunity to connect with the world through a different kind of beauty, quiet and unadorned. It offers another reason to walk or bike or paddle, to get out for the day or just for an hour, to share time with friends or in solitary contemplation, to look closely at things that might otherwise get a passing glance, and to learn new things about the ancient practices of plants and people. If you are intrigued, read on and contact us to volunteer, because we all love wildflower seeds!

The Bees to Bears Climate Adaptation Project

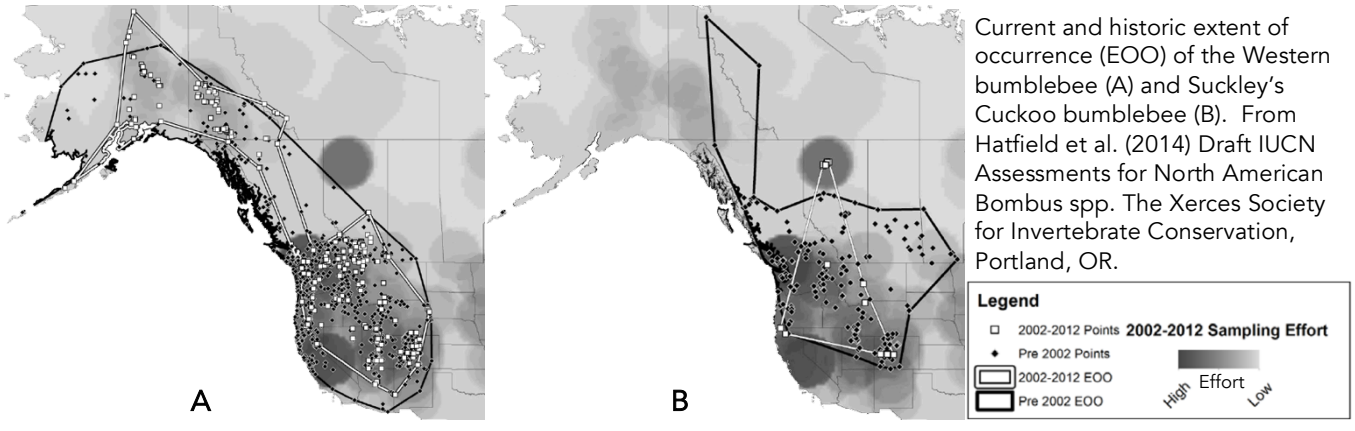
This project is a collaborative effort led by the Idaho Department of Fish & Game (IDFG) and the Yellowstone to Yukon Conservation Initiative. Funding is provided by the U.S. Fish & Wildlife Service and the Wildlife Conservation Society (Climate Adaptation Fund supported by the Doris Duke Charitable Foundation).

From 2018-2022 this project will focus on restoring forested lowland habitat on IDFG's Boundary-Smith Creek Wildlife Management Area (WMA). The project will implement climate-focused habitat restoration actions designed to benefit six climate-sensitive Species of Greatest Conservation Need identified by Idaho's State Wildlife Action Plan. Western toads, northern leopard frogs, pale jumping slugs, Western bumblebees, Suckley's cuckoo bumblebees, and grizzly bears will all directly benefit from the actions, as well as many other native species including waterfowl and big game.

Bumblebees in Decline

A quick note: Did you know honeybees are not native to North America? They are more livestock than wild animal. So honeybee decline is an agricultural issue separate from native bee decline. Native bee conservation is a wildlife conservation issue.

This habitat restoration project will benefit many native bees, but we are targeting the Western Bumblebee (*Bombus occidentalis*) and Suckley's Cuckoo Bumblebee (*Bombus suckleyi*) because they are identified as Species of Greatest Conservation Need in Idaho's State Wildlife Action Plan. Current and historic surveys of native North American bees indicate that the area across which these species are found is shrinking.



Current and historic extent of occurrence (EOO) of the Western bumblebee (A) and Suckley's Cuckoo bumblebee (B). From Hatfield et al. (2014) Draft IUCN Assessments for North American Bombus spp. The Xerces Society for Invertebrate Conservation, Portland, OR.

Factors related to their decline may include 1) Widespread use of neonicotinoid insecticides (which may be labeled as: acetamiprid, clothianidin, dinotefuran, imidacloprid, nitenpyram, thiacloprid, or thiamthoxam), 2) Increasing mismatches in timing of spring and fall flowering with bumblebee emergence and hibernation, due to climate change, and 3) Loss of flower diversity, due to intensive grazing, monoculture-based agriculture, and fire suppression.

What Can We Do? Restore Habitat with Local Native Seed!

Up at the Boundary-Smith Creek WMA, IDFG is restoring the area's natural connection to the river by re-establishing ponds, wetlands, and rolling terrain to support diverse environments for native flowers, trees, and shrubs to grow. This work will provide abundant food and shelter for north Idaho's wide array of wildlife including ducks, geese, frogs, snakes, deer, elk, bears, coyotes, bees, and slugs.

Native wildflower seed sourced from the Idaho Panhandle will be an important part of the habitat restoration seed mix on the Boundary-Smith Creek WMA. Local native seeds are important for wild bee conservation because they are more adapted to local soil and weather conditions, and native pollinators are more adapted to local native flowers. Bumblebees in particular need a diversity of flowers that offer a continuous supply of nutritious pollen and nectar from morning through evening, and early spring through fall.

You Can Help!

There are two ways you can help bumblebees and other pollinators in northern Idaho. First, you can collect seeds from our target wildflower list and submit them to our Wildflower Seed Library. In addition, while you are out monitoring your chosen wildflower collection sites, you can look for and catalog the different bumblebees in the area.

To learn more, contact our Bees to Bears Citizen Science Coordinator:

Kristina Boyd

kristina.boyd@idfg.idaho.gov

(406) 890-4353

THANK YOU FOR YOUR PARTICIPATION IN THE BEES TO BEARS CLIMATE ADAPTATION PROJECT WILDFLOWER SEED LIBRARY!

NOTES ON WILD SEED COLLECTION

COLLECTION ETHICS

Wild seed collection and propagation are rewarding ways to restore native diversity to an area. Please keep these points in mind while helping achieve this goal:

Identifying Plants

Knowing your plants is important. Look for plants during flowering and if you are unsure of a species identification, take lots of pictures with a good macro (close-up) lens, and/or take a sample with good examples of the stems, leaves, and flowers. Then consult a professional botanist at a local land management agency or educational facility. Key equipment to have: Plant identification books, phone/tablet plant identification apps (not an equal replacement to a good plant key), hand lens, camera/phone with macro capability or lens attachment, plant press.

RESOURCES

- 🕮 How to Identify Plants. Harrington, H.D., L.W. Durrell. (1957). Athens, OH: Swallow Press. A thorough little guide to botanical science and general plant identification. Line drawings. Terms defined in an illustrated glossary. A good introduction to deeper study for enthusiasts.
- 🕮 Trees, Shrubs, and Flowers to know in Washington and British Columbia. Lyons, C.P., B. Merilees. (1996). Vancouver BC: Lone Pine Publishing. This is older, but a classic. No color photos, just line drawings, but contains a wealth of information from an early regional botanist.
- 🕮 Plants of Southern Interior British Columbia and the Inland Northwest. Parish, R., R. Coupé, D. Lloyd (1996). & Plants of the Pacific Northwest Coast: Washington, Oregon, BC, and Alaska. Pojar, J., A. MacKinnon. (1994). Vancouver, BC: Lone Pine Publishing. These books have color photos arranged by plant family. They contain plant identification keys and very detailed descriptions, including similar plant species, and are probably the best guides for our region!
- 🕮 Manual of Montana Vascular Plants. Lesica, P. (2012). Fort Worth, TX: Botanical Research Institute of Texas. Northern Idaho and western Montana share many plant species. This is an excellent, detailed key for those already steeped in taxonomic identification and who want to dig deeper.
- 💻 Idaho Wildflowers. www.highcountryapps.com. Uses search criteria to identify plants based on your answers. A good resource focused on the local region.
- 💻 PlantSnap. www.plantsnap.com. Uses algorithms to identify plants based on your pictures. Fast, comprehensive, but not 100% accurate.
- 💻 FlowerChecker. www.flowerchecker.com. Uses search criteria and actual botanists to identify plants based on your pictures and answers. Answers may not be instantaneous.

Avoiding Weeds

Become familiar with the noxious weeds in your area and be sure these seeds are not collected, either by mistaken identification or as inadvertent passengers in your collection bag. Care was taken in this manual to choose flowering plants that are not easily confused with current noxious weeds in Idaho.

RESOURCES

- 💻 Selkirk Cooperative Weed Management Area Noxious Weed Handbook. Holzer, K., P. Roads, R. Old. (2018). Boise, ID. This and other resources are available for free download online at http://boundarycountyid.org/site-page/noxious-weed-control

Maintaining Populations

Restoring native plants to an area should not come at the cost of removing native plants from another. Always collect seeds intentionally. Look around the area to understand how many target plants there are. ***Collect no more than 25% of the seeds available in the area***, and leave the rest to regenerate the local plant population and feed wildlife.

RESOURCES

- Native Plant Handbook: A Guide to Re-vegetation with Native Species. (1995). Missoula, MT: USDA Forest Service - Northern Region. Available for free download online at www.fs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb5441766.pdf
- Seed School Online. www.rockymountainseeds.org. Focused on saving seed from food plants, the Seed School offers a lot of technical information about collecting and processing seed. Includes a native seed component.

Growing Relationships

Be mindful of where you are when collecting native plant seeds, and make sure you have permission from private landowners or public land caretakers.

In 2018 and 2019, project volunteers have permission to collect seeds on our target plant list only from these public land agencies:

- Idaho Panhandle State Wildlife Management Area managers
- Idaho Panhandle National Forest Service managers

If you own, or know of, a piece of private property where you would like to collect seed, please consider talking with the landowner or letting the project's Citizen Science Coordinator know. Sharing interest in this project may be a great way to grow neighborly relationships. And we would like to foster relationships with private landowners who want to cultivate native plant populations!

COLLECTION TECHNIQUES

Monitoring Seeds

Ensure you have correctly identified plants from our target plant list by looking for the plants during their flowering season. Flower characteristics are often vital for correct plant identification. Once you have adopted populations of plants to monitor for seed collection, please visit your sites frequently after bloom (each week or so) to determine when seeds are ripe.

Seeds from flowering plants are collected in summer and early fall, when seeds are mature. The window for collection can be a few days to several weeks. Generally, a mature seed is tan or brown, not green or yellow-green. It feels hard to a thumbnail.

Many native plants produce seeds that ripen unevenly. When a plant produces flowers all along the stem, seed matures first at the bottom of the stem and then progressively toward the top. Optimal amount of mature seed can be gathered when the lowermost seeds are starting to shatter or disperse.

For seeds enclosed in fleshy fruit, collect when one-half or more of the fruits or berries are mature. Mature fruit usually is fully colored and soft, not greenish and hard. You can open a fruit and inspect the seed for maturity, using the criteria above.

For each particular plant species, please refer to this manual and other resources to help you gauge whether your seeds are mature and ready for collection.

Tools for Collection and Processing

Seed Collection Depots - You can pick up printed copies of the collection manual, marking flags, and collection labels, as well as turn in your bags of seeds at one of our depots. Labeled plastic totes for this purpose can be found at:

- Boundary County Library, 6730 Kootenai Street, Bonners Ferry ID
- East Bonner County Library, 1407 Cedar Street, Sandpoint ID
- Waterlife Discovery Center, 2100 Lakeshore Drive, Sagle ID
- Lincoln County Troy Branch Library, 207 N 3rd St, Troy MT

Marking Flags - Plants may be apparent in the spring, but when shrubs and grasses are in leaf during summer they may be hard to relocate. NOTE: For this reason, we have 36" tall marking flags available for you at a depot!

Collection Labels - The information you write on these collection labels is important to us! Please put the labels deep down in your collection bag so they are not lost. NOTE: Water-resistant labels are available for you at a depot, or you can print your own from the back of the manual in a pinch.

Side Bin - Experienced seed and berry collectors prefer a bin attached to their side or chest. This leaves both hands free, and you never forget where you left your bag! From a milk jug on a belt to an ergonomic bucket on a padded harness, you can find many ideas and resources online.

Paper Bags - Moisture is the enemy of seed storage. Try to collect seed in dry weather. You can collect seeds in paper bags. But if you want or need to use a side bin, transfer the heads to dry in paper sacks or paper grocery bags as soon as possible.

Gloves - Cloth or rubberized gardening gloves will protect your hands from irritation or small cuts when stripping seed from heads by hand or using a hand sickle.

Gardening Shears - It is best to be cautious and gentle with the seed heads, so that precious seeds are not lost during collection. Shears or scissors are well used on delicate or sparsely distributed seed heads.

Hand Sickle - When there is a large, dense population of ripe seed heads, a hand sickle can be used. Grasp multiple stems, just below the seed heads with a gloved hand, then pull the sickle through the collected stems below. For safety use a firm, but gentle, motion. The best sickle is a sharp one, so safety is important. Never hack or swing a sickle.

Tarp / Newspaper / Tubs – Seed heads or pods may need to be gently crushed to release seeds, or you may wish to winnow excess debris off your seeds. Using tubs or floor coverings makes it easy to gather the seeds or chaff up after processing.

Circular Fan - To remove excess debris from larger seeds by winnowing, you may use a circular fan set on low. Working on a covered floor, place the circular fan on a small box facing a wide tub. Place another tub just beyond the first tub. Working above the first tub, slowly pour the seed and debris through the airflow. Heavier good seed will drop into the first tub, while lighter infertile seed and debris will be carried into the second tub. It may take some practice to get everything set properly.

GENENRAL SEED COLLECTION PROTOCOL

1. Become a Volunteer with IDFG

The time you spend on this program is valuable and important! Please contact the project's Citizen Science Coordinator and fill out a volunteer form so that we document the time and miles you invest. We also have seed collection items to give you!

2. Identify Your Plants and Sites

Seeds can be collected on Panhandle Region State WMAs, Federal Forest Service lands, or private lands with permission. You can find plants yourself to monitor, or seek advice from the project's Citizen Science Coordinator. If you adopt sites yourself, be sure you have correctly identified your plant species. Mark your plants with project flags for ease of monitoring, and let the project's Citizen Science Coordinator know the location of your sites with GPS coordinates (in Decimal Degrees please) or with a dot on a map, or both.

3. Prepare for the Field

When seeds are mature, and you are preparing to go to your collection site, gather your collection equipment:

Necessary Items
Clean side bin and/or paper bags
Collection labels
Pen or pencil
Garden shears / scissors / hand sickle
Map or GPS, for location information
Plant Identification resource

Additional Items
Camera to document plants and habitat
Personal safety gear: gloves, kneepads, sturdy shoes, sunglasses
First aid kit
Mosquito protection

4. Collect and Process the Seed

In general the collection protocol is simple, although there may be variations depending on the species, so please refer to the manual before you go to collect your seeds.

1. Make sure there is seed in the seed heads. Seeds may not set properly, or they can disperse early.
2. Complete your collection label(s). If possible, do this at the start so as not to forget any important information about the site. See the back of the manual for an example of a filled out label.
3. Clip the mature seed heads from the plant. Sometimes seeds can be stripped by hand or shaken into your collection container, although clipping the head carefully is most reliable. ***Please collect no more than 25% of the seeds at each site.***
4. Dry your seed. Once you have returned home from your collection site, place your seeds in a protected area that will be warm, shady, and dry, with good air circulation - like under a porch roof, in a warm room with a circular fan, or in a covered shed. Avoid temperatures above 90°F. You may place the seed heads in a paper bag (to contain tiny or floating seeds) or hang them in bundles - head down, or lay them flat on newspaper or screen. Airflow is important for seed drying, so pack bags loosely or spread seed heads out widely. Let the seeds dry for 1 - 2 weeks. Thoroughly drying seed will help prevent loss from moisture or mold, and will also improve germination rates.

5. Harvest seeds from the seed heads. If using a bag, ensure it is closed and shake it gently to release the seeds. For small seed heads or pods, you can roll them in your fingers in the bag or a tub. For large seed heads or pods, spread a tarp or use a large tub, and gently step on them with a rubber-soled shoe to release seeds. Or you may have to scrape seeds out with your fingers.
6. Clean the seeds. Please do this as well as is reasonably possible. You may shake the seeds in a bowl so that lighter, larger stems and leaves settle on top for removal. Or you may shake it in a mesh colander, screen box, or window screen over a bowl or tarp to catch falling seeds or chaff. For larger seed you may choose to winnow the chaff with a circular fan, as described in the 'Tools for Collection and Processing' section.
7. Put the seeds back in a paper bag with their collection label(s). Please use a new bag if the original bag has any holes in it. Fold the end of the bag several times to securely close it, and fold the extra amount of bag over to make a packet. Then tape it shut.

8. Deposit your seeds at a collection depot. Please let the project's Citizen Science Coordinator know that you have dropped seeds off. Thank you!

5. Give Us Feedback - This Manual is a Work in Progress!

If you have information to add about seed maturity, collection or processing technique, or anything else that may be useful, please add it as a comment on your collection label or contact the project's Citizen Science Coordinator.

OPTIONAL BUMBLEBEE SURVEY PROTOCOL

All of your time spent on this project is valuable, so please let the project's Citizen Science Coordinator know that you will also be looking for bumblebees while you monitor your flowers for seeds! The Bumble Bee Watch citizen science program is designed to allow you to submit sightings with pictures either directly from your mobile device or downloaded from a camera onto a computer.

1. Create an account at Bumble Bee Watch. You can download the **Bumble Bee Watch app** to your smartphone or tablet OR go to **www.bumblebeewatch.org**. In the app, go to settings ⚙, Manage Account, and Create a Bumble Bee Watch account. On the website, click Sign Up in the upper right hand corner. Make sure your password is max 16 characters. And please register to participate in the PNW Bumble Bee Atlas.
2. Familiarize yourself with the process. Look through the tutorials on the app, and the sighting submission form on the website. Browse the website's Resources section to learn the traits used to identify bumblebees and how to highlight these in good identification photos.
3. Head to your seed sites ready to photograph. If you do not have a camera/phone with a macro (close-up) function, you may want to purchase a clip-on macro lens for your smartphone or tablet, or a digital camera with a macro function.
4. If you want to get more deeply involved…The Bumble Bee Watch protocol is a simple, quick way to participate in bumblebee surveys for the PNW Bumble Bee Atlas. But if you find that you like looking for bumblebees and would like to participate in a more in-depth way, you can adopt a grid cell with the PNW project to help with structured scientific sampling of bumblebees in our region. To learn more about it, go to **www.pnwbumblebeeatlas.org**.

TARGET PLANT LIST

Bumblebees and other native pollinators collect pollen from a wide variety of flowering plants, so many plants in this list are identified down to family or genus. When collecting on public land, please stay with the suggested species listed in this manual. When collecting on private land, you can use flexibility to collect a variety of species from **meadow, wetland, riparian, and lowland forest areas**.

Species within a suggested group that are either rare or commonly invasive are noted, so that you can avoid collecting them. Please also avoid collecting seed from dry or high elevation locations, as they likely will not grow in the low wet areas targeted by the Bees to Bears project.

Seed maturity dates - like flower blossom dates - will vary according to the amount of sun and moisture the site receives, its elevation, and its position on the land (whether in the bottom of a draw, on a hillside, or atop a rise.) The following seed maturity dates are a general guide. Your records can help to improve this information!

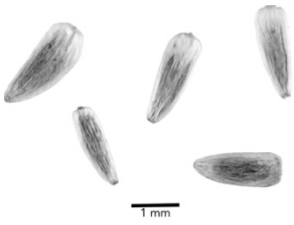
Habitat Symbols: Meadow Wetland Riparian Lowland Forest

SUNFLOWER FAMILY Asteraceae

Plants in the sunflower family are a numerous and diverse group that are very important in both our ecological and agricultural economies. Another name for this family is Compositae, because their flower heads are actually a composite of many tiny flowers that can come in two varieties.

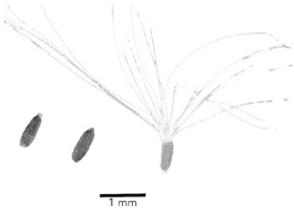
Disk flowers, usually in the center of the head, are shaped like tubes. *Ray flowers*, usually lining the edges of the head, have a single conspicuous petal that juts out from the head. Leaves come in a huge variety of shapes with no particular common characteristic.

We have many invasive species in the region, such as Oxeye daisies and various types of hawkweed, knapweed, and thistle. They still hold value for pollinators but can outcompete native Asteraceae and grasses. So please take care and collect only native seeds.



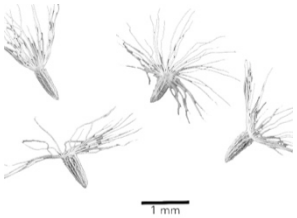
Western Yarrow *Achillea millefolium*

Bloom timeframe**:** Late spring – Mid summer (May – July)
Seed maturation: 8-10 weeks
Maturation signs**:** Flower head and stem brown, dry
Mature seed traits: 1 mm wide x 2 mm long; Tan, flattened, smooth
Seed collection**:** Clip seed heads into bag then gently roll/shake.



Pearly Everlasting *Anaphalis margaritacea*

Bloom timeframe**:** Early summer – Mid fall (June – October)
Seed maturation: 8-10 weeks
Maturation signs**:** Bracts remain white, while inner flower turns dry dull tan; Seed tufts may emerge
Mature seed traits: 0.25 mm wide x 1 mm long; Brown with small tuft of white hair on one end
Seed collection**:** Clip seed heads into bag then gently roll/shake.

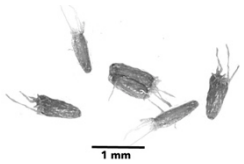


Canada Goldenrod *Solidago canadensis*

Bloom timeframe: Late summer – Early fall (July – September)
Seed maturation: 4-6 weeks
Maturation signs: Flower head and stem brown, white tufts replace flowers
Mature seed traits: 0.5 mm wide x 1 mm long; Tan to tawny, ribbed, slightly hairy with small tuft of white hair on one end
Seed collection: Gently run seed heads through fingers or roll/shake in paper bag.

Western Showy Aster *Eurybia conspicua*

Bloom timeframe: Mid summer – Mid fall (July – October)
Seed maturation: 3-4 weeks
Maturation signs: Flower head and stem brown, white tufts replace flowers
Mature seed traits: 0.5 mm wide x 3 mm long; Brown, hairy with long tuft of white hair on one end
Seed collection: Clip seed heads into bag then roll/shake them or run them through your fingers.



Showy Daisy *Erigeron speciosus*

Bloom timeframe: Late spring – Mid summer (May – July)
Seed maturation: 2-3 weeks
Maturation signs: Flower head and stem brown, white tufts replace flowers
Mature seed traits: 0.25 mm wide x 1 mm long; Brown, hairy with long tuft of hair on one end
Seed collection: Clip seed heads into bag then roll/shake them or run them through your fingers.

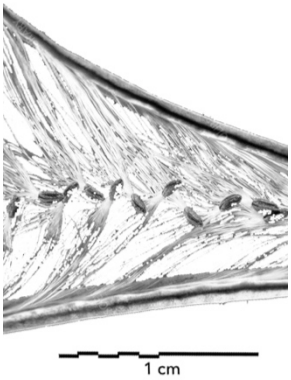
Beggartick *Bidens spp.*

✓ Potential species: Devil's beggartick *B. frondosa*
Nodding beggartick *B. cernua*
✗ Rare species: Beck's water-marigold B. Beckii – Below-water leaves opposite and divided into thread-like segments. Above-water leaves ~3 cm long with sharp-toothed edges
Bloom timeframe: Late summer – Early fall (July - September)
Seed maturation: 3-4 weeks
Maturation signs: Dry, brown spiked seed head
Mature seed traits: 2 mm wide x 5 mm long; Brown to black, V-shaped, flat, slightly hairy with 2-4 long awns on wide end
Seed collection: Gently roll seed heads between your palms or roll/shake them in paper bag.

EVENING PRIMROSE FAMILY Onagraceae

Primroses are a popular garden plant, and native species are found commonly in the wild. They are also a popular family with honeybee keepers. Fireweed honey is prized for its light color and buttery taste. Bumblebees also prize the nectar and pollen of this later-blooming family of flowers. This can lead to resource competition and disease exchange between native and agricultural bees in certain areas. You can give native bumblebees in your area a boost by planting native species of primrose in your garden.

Flowers generally have parts in multiples of 4, i.e. 4 petals and 8 stamens. Leaves are generally long and smooth.



Fireweed *Chamerion angustifolium* (aka. *Epilobium sp.*)

Bloom timeframe: Late spring – Early fall (June – September)

Seed maturation: 6-8 weeks

Maturation signs: Long, narrow, reddish green capsules, turning to light-brown and begining to split open to reveal abundant light, fluffy seed

Mature seed traits: 0.5 mm wide x 1 mm long; Grey to black, tiny, ribbed, with long tuft of white hair on one end

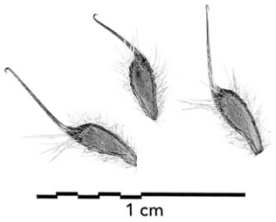
Seed collection: Fireweed seed pods will mature in a graduated fashion, with mature seed pods opened and releasing seed at the bottom of the stem, while green pods can be found further up the stem, also open flowers and closed flower buds are located at the tip of the stem. Harvest seed when the lower seed pods are mature. Clip the stem length to include mature and nearly-mature capsules. Trim off the upper flowering portion of the stem, since it will not likely set. Gently roll capsules in paper bag to split pods and shake bag to release seeds. If needed, run fingers through capsule to extract seeds.

ROSE FAMILY Rosaceae

Roses come by many other names, and not only do they smell as sweet but can taste sweet too! The Rose family is wide-spread and agriculturally-important, encompassing diverse plant forms from small herbs to formidable shrubs and trees. They bloom throughout spring and summer, providing ample and consistent food sources for pollinators.

Flowers generally have parts in multiples of 5, i.e. 5 petals and 10 stamens. Leaves come in many shapes, but generally have edges that are minutely to largely serrated.

Avens *Geum spp.*



✓ Potential species: Largeleaf geum *G. macrophyllum*
Prairie-smoke *G. triflorum*

✗ Rare species: Ross' avens *G. rosii* - Found in subalpine to alpine habitat, leaves fern-like

Bloom timeframe: Late spring – Early summer (May – June)

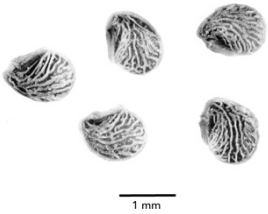
Seed maturation: 6-8 weeks

Maturation signs: Clusters of seeds on heads. Flower stamens persist as hard, brown protrusions from seed, occasionally white hairy. Seeds fall off readily with light fingertip pressure.

Mature seed traits: 1 mm wide x 3 mm long; Brown, long, with stiff awn at one end, occasionally with a tuft of white hair depending on species.

Seed collection: Clip seed heads into bag then roll/shake them in the bag or roll them between your fingers.

Cinquefoil *Potentilla spp.*



✓ Potential species: Brook cinquefoil *P. rivalis*
Fanleaf cinquefoil *P. gracilis*

✗ Invasive species: Sulphur cinquefoil *P. recta* – Few basal leaves but many stem leaves, stems have 6 mm long horizontal hairs, seeds have net-like pattern

Bloom timeframe: Early summer – Late summer (June – August)

Seed maturation: 6-8 weeks

Maturation signs: Clusters of seeds on heads. Flower stamens persist as hard, brown protrusions from seed, occasionally white hairy

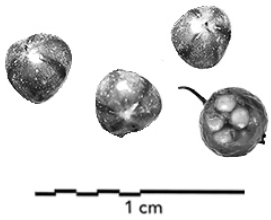
Mature seed traits: 1 mm wide x 1 mm long; Brown, long, with stiff awn at one end occasionally with a tuft of white hair depending on species

Seed collection: Clip seed heads into bag then roll/shake them in the bag or roll them between your fingers.

LILY FAMILY Liliaceae

Lilies are a family of beautiful flowers that tend to grow in shady, moist environments. Their flowers range from large and showy to tiny star-like clusters. They are often spring bloomers, and are important early sources of nectar and pollen.

Flowers generally have parts in multiples of 3, i.e. 3 petals and 6 stamens. Leaves are smooth-edged and have veins that distinctly run parallel to each other.



False Solomon-Seal *Maianthemum spp.* (aka. *Smilacina spp.*)

✓ Potential species:	False Solomon's-seal *M. racemosum* Starry false Solomon's-seal *M. stellatum*
✗ Rare species:	False lily-of-the-valley *M. dilatatum* – Leaves heart-shaped, flowers parts in 4s
Bloom timeframe:	Early spring – Early summer (April – June)
Seed maturation:	10-14 weeks
Maturation signs:	Red to green-red, round, smooth berries
Mature seed traits:	1 mm wide x 1.5 mm long; Light tan-colored, round, smooth
Seed collection:	Berries are eaten by a variety of animals, so truly ripe berries may not be abundant. Berries may be picked before peak ripeness, if one-half of the berries appear to be fully mature (or eaten) and as long as they are allowed to mature before removing pulp. Clip seed heads and, when ripe, remove mature fruit pulp as soon as possible. Mash fruit with hands or a rolling pin. Transfer to a tub of water and agitate with hands to release pulp. Mature seeds will drop to the bottom of tub. Pour pulp off the top. Add more water, agitate, and pour as needed to remove as much pulp as possible. *Extracted seeds must be stored moist and cold*. Keep seeds covered with clean moist sand in a fairly airtight glass jar, wrapped in a paper bag and set in the back of the refrigerator where it is coldest. Contact the project's Citizen Science Coordinator to arrange seed submission.

PEA FAMILY Fabaceae

Peas are another amazingly diverse family, rivaling the Asteraceae. They are also referred to as Leguminaceae, and grow worldwide as small herbs, enormous shrubs, and regal trees. They are agriculturally important, but also lovely to behold. Bees and butterflies forage for nectar and pollen in these early-bloomers.

Flowers have 5 petals that are bilaterally symmetrical (the left side mirrors the right side, like our body). One petal, called the banner, sits on top showing off. Two petals, called wings, reach out to the front. And two other petals, called the keel, come up from the bottom and are fused together like the keel of a boat. Inside are 10 stamens and a style. Leaves are generally compound, having many small leaflets radiating from the leaf stem.

Lupine *Lupinus spp.*

✓ Potential species: Bigleaf lupine *L. polyphyllus*
Pursh's silky lupine *L. sericeus*

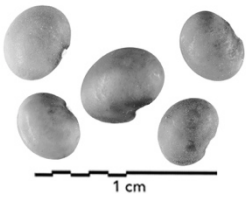
Bloom timeframe: Mid spring – Mid summer (May – July)

Seed maturation: 4-8 weeks

Maturation signs: Light grey to brown, dry "pea" pods that are silky to hairy

Mature seed traits: 4 mm wide x 5 mm long; Tan to tawny with darker speckles, bean shaped, smooth

Seed collection: Seed pods will open and release seed when dried in a paper bag. If they remain closed, gently break open with hands.



Sweetvetch *Hedysarum spp.*

✓ Potential species: Yellow sweetvetch *H. sulphurescens*
Western sweetvetch *H. occidentale*

Bloom timeframe: Late spring – Mid summer (June – August)

Seed maturation: 4-8 weeks

Maturation signs: Tan, papery, flattened seed pods with winged edges and constrictions between seeds, like beads on a string

Mature seed traits: 10 mm wide x 15 mm long; Red to brown, flat, smooth

Seed collection: Gently roll seed pods in paper bag or hands to release seed. Or break pod sections apart and leave seed wrapped in pod sections.

PLANTAIN FAMILY Plantaginaceae

The botany world was rocked early this century with the genetic analysis and subsequent shakeup of several plant families, and this small family suddenly found a whole lot of long-lost relatives. But not to worry! The bumblebees and butterflies have not let this hubbub sully their relationship with this family. If anything, there are just more flowers to love.

Some members of this family appear very similar to those in the mint family, with 5 petals fused at the base with two lobes on top and 3 below. The big differences between plantains and mints are 1) the lack of a square stem, and 2) 4-5 stamens that conspicuously sit at the front of the flower.

Beardtongue *Penstemon spp.*

✓ Potential species:	Wilcox's beardtongue *P. wilcoxii* Yellow beardtongue *P. confertus* Small-flower beardtongue *P. procerus* Taper-leaf beardtongue *P. attenuates*
Bloom timeframe:	Mid spring – Late summer (May – August)
Seed maturation:	5-8 weeks
Maturation signs:	Small, brown, teardrop shaped, awned capsules
Mature seed traits:	1 mm wide x 1.5 mm long; Brown to black, irregular or boat shaped
Seed collection:	*Monitor and collect carefully! Capsules may spit and seed can fall or be blown out.* Gently roll/shake capsules in paper bag.

MINT FAMILY Lamiaceae

Whether fragrant or fusty, you can often smell members of the mint family from a distance. For this reason, many species have been adopted by agriculture as culinary cultivars. Another name for the Lamiaceae family is Labiatae, which refers to their characteristic fused petals that are reminiscent of lips.

Flowers have 5 petals that are completely fused at the base but separate further out to form 2 lobes on the top and 3 lobes on the bottom. There are often 2 conspicuous stamens and a style at the top, and 2 inconspicuous stamens inside the petals. The stems of mints are characteristically square. Leaves are opposite one another on the stem and typically have serrated to scalloped edges.

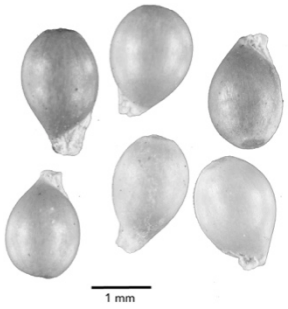
Beebalm *Monarda fistulosa*

Bloom timeframe:	Mid summer – Late summer (July – August)
Seed maturation:	1-3 weeks
Maturation signs:	Petals fallen off flower heads
Mature seed traits:	1 mm wide x 1.5 mm long; Brown, oval shaped, smooth
Seed collection:	Gently shake seed head in paper bag.

VIOLET FAMILY Violaceae

Violets are often thought to be reclusive and understated, and people with such noble characteristics have been bestowed the label "shrinking violets." But in truth, many tropical members of this family are larger vines, shrubs, or trees. In northern climates, the herbaceous *Viola* genus is popular in garden cultivars (often called pansies) and common in the wild. Like lilies, they are often spring bloomers, and are important early sources of nectar and pollen.

Flowers generally have 5 bilaterally symmetrical overlapping petals, with 2 petals on top, 2 on the sides, and 1 at the bottom. Stamens and styles are inconspicuous. Leaves generally have scalloped edges and are typically, but not exclusively, heart-shaped.



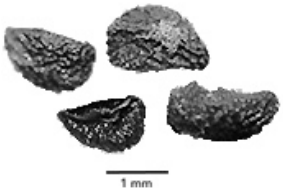
Violet *Viola spp.*

✓ Potential species:	Pioneer Violet *V. glabella* Roundleaf Violet *V. orbiculata*
✗ Rare species:	Many, which tend to have purple flowers. Collect only the species above, which have yellow flowers
✗ Invasive species:	Garden Pansy *V. tricolor* – Often seen in urban settings and have showy bi- or tri-colored flowers
Bloom timeframe:	Early spring – Early summer (March – June)
Seed maturation:	6-12 weeks
Maturation signs:	Nodding green to purple-mottled capsules bend upwards
Mature seed traits:	1.5 mm wide x 2 mm long; Tan to brown, teardrop shaped, smooth
Seed collection:	*Capsules will pop open and fling seeds out, so monitor pods carefully!* When pods are nearing full maturity, clip them off with ample amount of stem and place in paper bag. Allow pods to finish maturing and eject seed inside bag. Shake pods gently in paper bag to release any clinging seeds.

FORGET-ME-NOT FAMILY Boraginaceae

Forget-me-nots live up to their name as a lovely family of flowers. They are a diverse family of herbaceous flowers, usually hairy and fairly sturdy, and a favorite summer resource for bumblebees.

Flowers have 5 petals that are generally fused at the base, but can spread out into a star shape or remain fused further up to make a bell shape. Leaves are generally oval to long and minutely to largely serrated.



Bluebells *Mertensia spp.*

✓ Potential species: Tall bluebells *M. Paniculata*
Streamside bluebells *M. ciliata*

✗ Rare species: Oregon bluebells M. bella

Bloom timeframe: Mid spring – Mid summer (May – August)

Seed maturation: 3-4 weeks

Maturation signs: Stems droop, flowers replaced by 4 small seeds within green sepals

Mature seed traits: 1 mm wide x 1.5 mm long; Brown to black, teardrop shaped, wrinkled

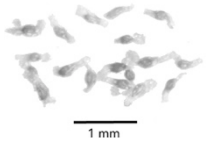
Seed collection: *Seed heads droop and seeds will drop when ripe, so monitor plants closely!* Shake heads gently in paper bag.

HEATH FAMILY Ericaceae

If you've ever eaten a huckleberry, you've tasted the fruits of the Heath family's labor. Bumblebees also love the flowers of this family, and the flowers love them back because wild bees are uniquely efficient at pollinating them.

In Heath family flowers, the pollen-producing part of the stamens, called anthers, hold their heavy pollen deep inside their structure, inaccessible to most pollinators. Wild bumblebees have evolved a behavior called buzz pollination, where they clutch the anther and vibrate their flight muscles at just the right frequency, sending pollen flying from the anthers like no other insects can!

Flowers generally have 5 fused petals that form a bell or urn shape. There are generally 10 stamens housed inside the petals.



Wintergreen *Pyrola spp.*

✓ Potential species: Pink wintergreen *P. asarifolia*
Lesser wintergreen *P. minor*
Green-flower wintergreen *P. chlorantha*

Bloom timeframe: Mid spring – Late Summer (May – August)

Seed maturation: Unknown, estimate 4-8 weeks

Maturation signs: Tan to brown, spherical, smooth, slightly lobed seed capsules

Mature seed traits: 0.2 mm wide x 0.3 mm long; Brown to black, tiny, round

Seed collection: Collect capsules, as well as some soil from around the base of the plant, which may contain fungi that assist in seed germination. Cut open capsules with knife or scissors, or gently break with soft rubber shoe sole. Shake capsules in paper bag to release seed. Store seed with collected soil.

WATER-PLANTAIN FAMILY Alismataceae

This family loves the water, and can be found in marshes and at the margins of ponds and lakes. The flowers offer nectar and pollen to bumblebees, and most species also offer food to ducks, muskrat, and beaver via their starchy roots, leaves, or flower buds.

Flowers generally have parts in multiples of 3, i.e. 3 petals and 9 stamens. Leaves are often long and thin when young or submerged, while emerged leaves can be oval or arrowhead shaped.

Arrowhead *Sagittaria latifolia*

✓ Potential species: Common arrowhead *S. latifolia*
Northern arrowhead *S. cuneata*

Bloom timeframe: Mid summer – Late fall (July – September)

Seed maturation: 4-6 weeks

Maturation signs: Large green to brown-colored, round shaped seed head, which falls apart easily when squeezed with fingertips

Mature seed traits: 3 mm wide x 4 mm long; Tan to brown, flat seed in a papery sheath

Seed collection: Living in the deeper edges of lakes and ponds, arrowhead seeds must be collected using chest waders or watercraft that is navigable in shallow waters (e.g. canoe, kayak, paddleboard). Clip heads and dry them in a warm, ventilated, out-of the way room as they have a pungent smell. Gently roll/shake seed heads in paper bag.

Northern Water Plantain *Alisma triviale*

Bloom timeframe: Early summer – Late fall (June – September)

Seed maturation: 4-6 weeks

Maturation signs: Small brown-colored, round shaped seed head

Mature seed traits: 1.5 mm wide x 2.5 mm long; Tan to brown, flat seed

Seed collection: Living in the shallower edges of lakes and ponds, northern water plantain seed can be collected in late summer using chest waters or watercraft that is navigable in shallow waters (e.g. canoe, kayak, paddleboard), or in fall by foot. Roll heads between fingertips or roll/shake in paper bag.

DOGBANE FAMILY Apocynaceae

Whether herb, shrub, or tree, milky latex and an upset stomach are characteristics of this family. They are also characteristically important nectar resources for butterflies, and in the north our species of milkweed in this family are key forage for monarch butterflies.

Flowers generally have parts in multiples of 5, i.e. 5 petals and 5 stamens. The sepals, which sit behind the petals, can be green, as in many other flowering families, or brightly colored as in the milkweeds.

Milkweed *Asclepias spp.*

✓ Potential species: Showy milkweed *A. Speciosa*
Swamp milkweed *A. incarnata*

✗ Invasive species: Tropical milkweed *A. curassavica* (commercially available)

Bloom timeframe: Late spring – Mid fall (May – September)

Seed maturation: 8-10 weeks

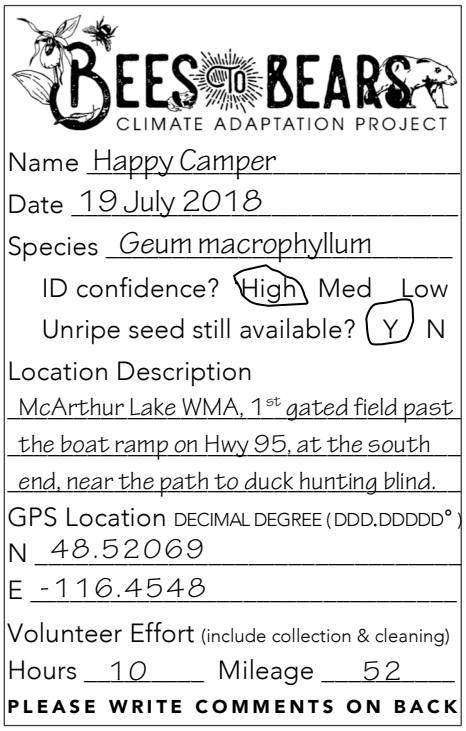
Maturation signs: Mottled green to tan, long, thick seed pod that, when compressed, pops open

Mature seed traits: 5 mm wide x 8 mm long; Brown, flat, oval seeds with long tuft of white hair

Seed collection: *Wear gloves while collecting milkweed pods and avoid contacting sap contacting your face*. If you popped the pod open, reach into the pointed end of the pod, hold firmly to the center and seed hairs, and pull out seeds in one bunch. Scrape seeds into paper bag without fluff. If pod has already opened, put a few coins or smooth rocks into the bag with the emerging seeds and shake. Seeds will fall to the bottom of the bag and the fluff will float on top.

EXAMPLE COLLECTION LABEL

FRONT



BACK

Lots of mature seed, but still a lot that can be collected. I will probably return in a couple of weeks.
Noticed that seeds are ripe when the awns are very stiff. Just squeeze the seed head to feel if they're ready to collect!

BEES TO BEARS
CLIMATE ADAPTATION PROJECT

Name ______________________
Date ______________________
Species ______________________
ID confidence? High Med Low
Unripe seed still available? Y N
Location Description
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GPS Location DECIMAL DEGREE (DDD.DDDDD°)
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E ______________________

Volunteer Effort (include collection & cleaning)
Hours ________ Mileage ________

PLEASE WRITE COMMENTS ON BACK

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Hours ________ Mileage ________

PLEASE WRITE COMMENTS ON BACK

BEES TO BEARS
CLIMATE ADAPTATION PROJECT

WILDFLOWER SEED LIBRARY
COLLECTION MANUAL

QUICK GUIDE

Blooms ▬ Seeds ▬

SPRING | SUMMER | FALL

M | A | M | J | J | A | S | O | N

COMMON NAME	SCIENTIFIC NAME	MATURATION SIGNS	MATURE SEED TRAITS
Western Yarrow	*Achillea millefolium*	Head brown & dry	Small, tan, flat, smooth
Pearly Everlasting	*Anaphalis margaritacea*	White bracts, center dry brown	Tiny, brown, tufted
Canada Goldenrod	*Solidago canadensis*	Head brown, fluffy tufts	Tiny, tan, ribbed, tufted
Western Showy Aster	*Eurybia conspicua*	Head brown, fluffy tufts	Small, brown, tufted
Showy Daisy	*Erigeron speciosus*	Head brown, fluffy tufts	Tiny, brown, tufted
Beggartick	*Bidens spp.*	Head brown, dry, spiked	Large, brown, 2-4 long awns
Fireweed	*Chamerion angustifolium*	Long reddish capsules	Tiny, black, long tuft
Avens	*Geum spp.*	Head brown, spiked	Small, brown, w/ stiff awn
Cinquefoil	*Potentilla spp.*	Brown sepals around head	Small, brown, round
False Solomon's Seal	*Maianthemum spp.*	Red to green-red berries	Light tan, round, smooth
Lupine	*Lupinus spp.*	Grey or brown pea pods	Large, tan-mottled, smooth
Sweetvetch	*Hedysarum spp.*	Tan, flat, segmented pods	Large, flat, brown, smooth
Beardtongue	*Penstemon spp.*	Brown, teardrop capsules	Small, brown, irregular
Beebalm	*Monarda fistulosa*	Petals fallen from head	Small, brown, round, smooth
Pioneer Violet	*Viola glabella*	Green capsules bent upwards	Small, tan, round, smooth
Roundleaf Violet	*Viola orbiculata*	Green-purple capsules bent up	Small, tan, round, smooth
Bluebell	*Mertensia spp.*	Stems droop, sepals curl in	Small, black, round, wrinkled
Wintergreen	*Pyrola spp.*	Tan, round, lobed capsules	Miniscule, yellow to black
Arrowhead	*Sagittaria spp.*	Green to brown, round head	Small, tan, papery-sheathed
Northern Water Plantain	*Alisma triviale*	Brown, round head	Small, brown, flat
Milkweed	*Asclepias spp.*	Long, thick, green to tan pod	Large, brown, flat, teardrop