

Project Wingspan: Landscape Enhancement for Imperiled Pollinators of the Midwest



Photo Heath Hamilton



Photo Amber Barnes



Photo Kim Mitchell, USFWS



Photo Heath Hamilton

Seed Collection Manual



Special Thanks to:

Additional Core Partners: Michigan State University, Michigan DNR, and Pennsylvania DOT

Satellite Partners: Tyson Foods, Inc., Chicago Botanic Garden, Patoka River NWR, Big Oaks Muscatatuck NWR Complex, Ottawa National Wildlife Refuge, Energy Resources Center of University of Illinois at Chicago, Southwest Michigan Land Conservancy, Pleasant Hill Acres, Ohio Prairie Nursery, Ernst Conservation Seeds, Applied Ecological Services, and Ohio State University.



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1. Introduction

Thank you for agreeing to participate in Project Wingspan: Landscape Enhancement for Imperiled Pollinators of the Midwest (PW or Wingspan). Wingspan is a two-year project sponsored by a grant from the National Fish and Wildlife Foundation (NFWF) through the non-profit Pollinator Partnership.

This training manual is a comprehensive collection of the information, protocols, and forms related to the Project Wingspan and will help standardize the seed collection process to ensure responsible collection and data integrity. Please use this manual as a reference in part, or in total, to meet the needs of your level of responsibility (State Coordinator, State Lead, Team Lead, and Collection Volunteer) as indicated by the Pollinator Partnership and its associated core and satellite partners. See the accompanying training webinar for further assistance.

1a. Program Objective

This short-term seed collection project is designed to increase the quality, quantity, and connectivity of monarch, rusty patched bumble bee (RPBB), and other imperiled pollinator habitat and to increase interest and skill in seed collection. PW builds on the success Pollinator Partnership (P2) and its team of core partners have had in building a regional seed collection program in Ohio, Illinois, and Indiana through a previously funded NFWF project, Monarch Wings Across the Eastern Broadleaf Forest (MWAEBF).

Wingspan targets six states located within the Midwest for seed collection and distribution: Illinois, Indiana, Michigan, Ohio, Pennsylvania, and Wisconsin, as well as two states (Missouri & Arkansas) for habitat enhancement through P2's online technical training webinars focusing on best management practices for public land managers and private land stewards. All seed generated from this project will be used to support the development of geographically appropriate native plant materials for the enhancement of 10,000 acres of monarch, RPBB, and other imperiled pollinator habitat.

1b. Project Goals

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

Facilitate a regional seed collecting program for the Midwest to help meet increased immediate needs for regionally specific monarch & RPBB-supporting plantings.

- Regionally-specific milkweed and forage plant seed is generally commercially unavailable in large quantities within the Midwest. In order to successfully enhance monarch, RPBB, and other imperiled pollinator's habitat, a temporary coordinated regional milkweed and forage plant seed collection and distribution network will be established.
- Seed collecting protocols across the region for this project will be standardized. Seed collectors will be recruited and trained according to the protocol. All

collectors will work off a single plant species target list. Seed will be processed out of a single cleaning center, inspected for weeds, tested for viability, and then used for seedling propagation or reseeding efforts at project sites for imperiled pollinator habitat establishment.

- Any seed collections found to be contaminated by weeds, or of low viability, will be removed from the inventory and destroyed.
- A total of 1,000 seed collections (approximately 167 per state) will be completed over the span of the project and a portion of the seed from each state will be grown out to generate a total of 10,000 seedlings.
- Seed collection and distribution zones within each state have been identified utilizing a mixture of ecoregional and provisional seed zone boundaries. All native plant materials generated from the seed collecting efforts will be redistributed within the same state collection zone in order to maintain genetic variability and resilience across milkweed and forage plant populations and assist with the goal of enhancing of 10,000 acres across the Midwest.

Provide training to volunteers and technical assistance to public and private land managers in the Midwest.

- Technical assistance for the various land use types (private lands, private working lands, public lands) will be provided through promotion of a P2 webinar series focusing on pollinator habitat enhancement and maintenance best management practices and techniques, including: seeding, plug planting, invasive plant removal, seedbed preparation, controlled burning, and plug planting preparation.
- 6 in-person seed collection workshops will be held in addition to the development of an online training module with the goal of training at least 100 volunteer seed collectors across the 6-state project area.

Long-term monarch & RPBB habitat establishment and enhancement.

- A preliminary online habitat survey will be used to identify existing habitat areas, along with areas that are seeking further enhancement, and those with near future planned establishment.
- The acres included and reported in the program will be secured through a letter of long-term commitment (minimum of 5-years), signed by the land manager or landowner. The letter will include enhancement and/or management actions that qualify habitat areas for inclusion in the program.
- The agreements will be made through Pollinator Partnership as well as the U.S. Fish and Wildlife Service - Partners for Fish and Wildlife Program.
- The Pollinator Partnership will track all the acres counted towards the 10,000 acre goal.
- The agreements will ensure that monarch & RPBB habitat activities take place on lands that have a landowner or manager committed to imperiled pollinator conservation and long-term habitat management and maintenance.
- The combined total of acres secured through letters of commitment for monarch and RPBB habitat will meet or exceed 10,000 acres across the Midwest.

2. Partners

All partners and associated activities operate within the 8-state focus area, and the outcomes of this project will be applicable across other states in the region with similar plant communities and growing conditions. Utilizing seed collection and distribution zones within our target states complements efforts of the U.S. Forest Service's seed transfer zones and other native plant materials programs, including the National Seed Strategy for Rehabilitation and Restoration. The core group of partners includes:

- Pollinator Partnership
- U.S. Fish and Wildlife Service's Partners for Fish and Wildlife Program
- Illinois Department of Natural Resources - Mason State Nursery
- Indiana and Michigan Departments of Natural Resources
- U.S. Forest Service
- Holden Forests and Gardens
- Ohio Pollinator Habitat Initiative
- Michigan State University
- Kettle Moraine Land Trust
- Pennsylvania Natural Heritage Program
- Pheasants Forever
- University of Arkansas – Center for Advanced Spatial Technologies (CAST)

The following organizations throughout the Midwest have been confirmed and secured as satellite partners to help support the activities of the proposed project:

- Tyson Foods, Inc.
- Chicago Botanic Garden
- Patoka River NWR
- Big Oaks Muscatatuck NWR Complex
- Ottawa National Wildlife Refuge
- Energy Resource Center of University of Illinois at Chicago
- Southwest Michigan Land Conservancy
- Pleasant Hill Acres
- Ohio Prairie Nursery
- Ernst Conservation Seeds
- Applied Ecological Services
- Ohio State University

3. Target Plant Species List

All species listed below were cross-referenced with the USDA PLANTS Database and BONAP (Biota of North America Program) to ensure nativity within each target state throughout the Midwest. All plants are generally considered common, but may vary in abundance across the collection states and 4 otherwise abundant species *will not be collected in Pennsylvania* (noted with a *). To address this, the plant list includes 29 host plant and forage species to ensure that collection teams in each state have numerous options from which to collect. The target plant list has been reviewed, collaborated on, and vetted across the region.

Many of these species have similar characteristics to other plants and proper plant ID is crucial.

Detailed plant profiles can be found in Appendix A. Laminated copies will be distributed to the State Leads by the Pollinator Partnership and will be available for use in the field.

Target Plant Species List	
Botanical Name	Common Name
<i>Asclepias exaltata</i>	poke milkweed
<i>Asclepias incarnata</i>	swamp milkweed
<i>Asclepias syriaca</i>	common milkweed
<i>Asclepias tuberosa</i>	butterfly milkweed
<i>Asclepias verticillata</i> *	whorled milkweed*
<i>Cephalanthus occidentalis</i>	buttonbush
<i>Chamaecrista fasciculata</i>	partridge pea
<i>Cirsium discolor</i>	field thistle
<i>Coreopsis tripteris</i>	tall coreopsis
<i>Echinacea purpurea</i> *	eastern purple coneflower*
<i>Eupatorium perfoliatum</i>	common boneset
<i>Eutrochium purpureum</i>	sweet joe pye weed
<i>Euthamia graminifolia</i>	grass-leaved goldenrod
<i>Geranium maculatum</i>	wild geranium
<i>Heliopsis helianthoides</i>	ox eye sunflower
<i>Liatris aspera</i> *	tall blazing star*
<i>Liatris spicata</i>	dense blazing star
<i>Monarda fistulosa</i>	wild bergamot
<i>Penstemon digitalis</i>	foxglove beardtongue
<i>Pycnanthemum tenuifolium</i>	narrowleaf mountainmint
<i>Pycnanthemum virginianum</i>	Virginia mountainmint
<i>Ratibida pinnata</i> *	yellow coneflower*
<i>Rudbeckia hirta</i>	black eyed Susan
<i>Symphyotrichum laeve</i>	smooth blue aster
<i>Symphyotrichum novae-angliae</i>	New England aster
<i>Tradescantia ohiensis</i>	Ohio spiderwort
<i>Vernonia gigantea</i>	giant ironweed
<i>Veronicastrum virginicum</i>	Culver's root
<i>Zizia aurea</i>	golden Alexander

4. Training and Communication

It is extremely important that groups and individuals collecting seed for Wingspan 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.

Training courses will be offered in each state and a training webinar has been developed to provide comprehensive training for Wingspan seed collection teams. Before becoming a Team Lead or making Wingspan seed collections, it is highly recommended that at least one lead botanist (all team members are welcome) participate in the training course. If you are a Team Lead and need to train a collection team, contact the Pollinator Partnership or your State Coordinator for more information.

4a. Communication

Wingspan Team Leads and Volunteer Seed Collectors should direct all questions and concerns to their State Coordinators. To contact the Pollinator Partnership directly, call 415-362-1137 or email info@pollinator.org. State Coordinator, Pollinator Partnership, and additional regional support contacts can be found in Appendix H.

5. Permission to Collect

Seed collection may take place on private lands or lands managed by another federal agency (e.g. Fish and Wildlife Service, USDA Forest Service, and Department of Defense) or state, county, or municipal agencies, as long as landowner permission is provided. Document landowner permission on the field data form associated with the seed collection. If seed collection will occur on state lands or right of way areas, a right of entry permit must be obtained as well as notification of your presence in regard to date, time and total persons that will be on site. Right of entry permits can be obtained from district or county DOT offices or State Park offices. Plan ahead – you will not get a permit overnight. Sample Right of Entry Permit and Notification Documents can be found in Appendix D.

If you are a Team Leader and have arranged for your State 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 Hold Harmless Document that will release your State Coordinator and Pollinator Partnership from any damage that may inadvertently occur while you are utilizing the permit in the name of a third party. A sample Hold Harmless Document / Volunteer Waiver Form can be found in Appendix E.

6. Preliminary Site Visits

Preliminary site visits are often necessary to assess the populations, confirm the identification/location of specimens, and estimate the likely harvesting date and potential seed production. It is important that a knowledgeable botanist leads the collection team and is involved in identifying the plants and the most suitable populations for seed collection. Additionally, where populations are suitable and the quality and quantity of seed is adequate, it may be possible to make collections of multiple target species from the same site. Team Leaders can make preliminary site visits to confirm plant ID when the plants are in flower and mark populations for their volunteer collection teams to return to when the seeds mature.

Begin by assessing the target population and confirm that a sufficient number of individual plants have seeds at natural dispersal stage. This will ensure that adequate genetic diversity can be sampled from the population, and that the seeds are likely to be at maximum viability and longevity.

Carefully examine a small, representative sample of seeds using a cut test and for smaller seeds a hand lens. Seed should be dry, dark, and relatively loose in its shell. Cut the seed open and examine the contents, the material inside should be a lighter colored embryo. If the embryo is dark or dry like the outer shell, the seed may be damaged or dead. The presence of insect damage is an indicator of damaged material. Doing cut tests will help you to estimate the frequency of empty or damaged seeds and confirms that the majority of seeds are mature and fully formed. Use this information as a guide for when to hold your collection event.

How to identify a 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.

7. Preventing the Spread of Noxious Weeds and other Hazards

In natural resource work, including seed collections, equipment and organisms are often moved from one location to another. This provides the potential for the spread of non-target species to invade new habitat. Non-target species are the plants, animals, diseases, pathogens and parasites that are not intended to be moved. As responsible environmental stewards, it is essential that we do our best to reduce our impact and prevent the movement of invasive and weedy species whenever possible. Please use the following protocols before, during, and after each collection.

Come Clean and Educated

- Before leaving the 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.
- Learn to identify the problem weeds you might encounter. It's easy to learn to identify the problem weeds in most areas and you can find a host of free ID guides wherever you are or are going.
- There are many websites available to learn about your local problem weeds and invasive species. Check out your state Department of Natural Resources, www.playcleango.org, or www.invasivespeciesinfo.gov to name a few.

During the Collection

- Avoid parking in weed patches. Most weeds spread along roadways, as vehicles can easily transport many types of weeds and seeds. Avoid parking in weedy spots. If you are driving off the pavement, try to identify a course that will avoid any weeds.
- Avoid walking through weed patches. Many weed seeds will cling to clothes, shoes, and even hair. If you avoid walking through weeds you will reduce the amount of seed that you might be transporting.
- If collecting from numerous sites in one day, clean all gear between each site.

Leave Clean

- It's important to clean in the right location. 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 weed seeds. Do this before you leave a site and throw the seeds in the trash. Pay special attention to pant cuffs, shoes (including laces), and socks. 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 – it 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, wash your vehicle undercarriage as soon as possible after leaving a weedy area. If you know you have been in weeds, go straight to the car wash without any delay. As soon as you drive out of the weeds, you will begin spreading seeds. Make sure to spray the undercarriage of your vehicle with high pressure water to wash off any seeds. Only wash inside the car wash bay and never spray weed seeds outside the car wash bay.

Take Extra Precaution

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.

Safety Concerns

Make sure to bring plenty of water (minimum 1 liter). Wear bright clothes when working near roads, and do not collect along busy highways. Wear comfortable, well-fitting shoes and socks, and bring gloves. Dress in layers.

Be careful when handling milkweed plants, as the sap can 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
- Inform your team lead of any allergies, such as to latex

Always check for ticks after leaving the field. Look where you step and always remain aware of your surroundings. Watch for poison ivy, poison oak, and poison sumac. Do not venture anywhere alone or without informing your team lead.

8. Field Documentation and Data Forms

Use a copy of the Project Wingspan Field Data Form in Appendix B for each seed collection and fill out all the data fields. Fill out a data form for each species collected even if you collect many species from the same location. Data should be recorded in the field to ensure all pertinent information is retained. Keep the original form for your records as you will need to send a copy of this data form with your related seed collection to Mason State. There is a Team Lead Collection Tracking Sheet in Appendix I. This sheet is to be used to track Collection ID numbers to prevent duplication. It will also be used to track collection and shipping dates onto a centralized sheet. Notify your State Coordinator by email after the collection has been made to document the collection of the species.

In order to maintain genetic integrity and resilience across native milkweed and forage plant populations, color-coded seed collection and distribution zones have been identified for each target state (See Appendix J). Team Leads will need to reference the county-level map for their state in Appendix J and identify in which zone their collection site is located (green, orange, or blue) and record this in the Field Data Form, Survey 123 App, and make sure it is clearly written on the outside of the seed bag sent to Mason State Nursery. This information is key for proper processing, cleaning, and grow out of the seed.

8a. Seed Collection Reference Number Format

Wingspan collecting teams use the following format to identify their collections. The Seed Collection Reference Number will include three parts: the Seed Collection Team reference ID (state abbreviation and collection team number), the project site ID (represented by letters a-z) and collection number; for example, OH.CT1.A-3 for Ohio seed Collection Team 1's 3rd collection at site A. Seed collection reference numbers should be unique and sequential from year to year, and should never be repeated. If the last collection of the previous year was 34, the next year's collection numbering should start with 35. The same goes for project site ID, each new site should be unique and sequential. See Appendix C for Collection Team reference IDs and Appendix B for a filled out example of a Field Data Form.

Examples

Ohio collection team 1 collects their first collection of the season, *Asclepias incarnata*, at a local park. The seed collection reference number would be as follows:

OH.CT1.A-1

Ohio collection team 1 goes to the same site and their next collection is a new species (*Rudbeckia hirta*). The seed collection reference number would be as follows:

OH.CT1.A-2

- If revisiting a site to collect a new species, utilize the same project site ID, but assign a unique collection number.

Ohio collection team 1 now goes to a new site and collects from *Asclepias incarnata*. The seed collection reference number would be as follows:

OH.CT1.B-3

- Even though it is the same species that was sampled at project site A, it is a different population (it is found at site B), with unique genetics, so it is recorded as a new collection number.
- If a site is revisited and the same species is collected from that same site, but on a different date, that information can be added to the original data sheet, without creating a new record. This would happen if not enough seed was mature at the first visit, and a second visit is necessary to collect from the same population.

9. Seed Collecting Tools

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

- Paper bags (Sandwich lunch bags or grocery paper bags)
- Permanent black marker or pencil
- Pruners, heavy scissors or garden clippers
- Heavy garden gloves
- Large storage container (To hold bags of harvested seed)
- GIS Application to acquire latitude and longitude
- Data forms
- Permits (when applicable)

10. Seed Collection Protocol

Following proper seed collection protocol (cited in the USFWS Policy Regarding Controlled Propagation of Species Listed under the Endangered Species Act (FR65:183, p56916), collect propagules from each of the known populations on the target species list.

In order to ensure genetically representative propagules suitable for plant reintroductions, we will adhere to the following 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 the 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 5th plant is a good way to randomize collection.
- Prioritize sites where populations are of wild origin
- Do not collect in the early morning, before the dew has evaporated. Seed should be dry when collected.
- While collecting, keep track of the number of plants from which you've harvested seeds and report that number to the data collector.

11. Seed Collection

Collect mature, dry seeds into double-bagged brown paper bags. Large collections can be made using plastic buckets and then transferred into bags. Specific information regarding collection and cleaning of target plants is detailed in Section 12. Do not collect in the early morning, before the dew has evaporated. Seed should be dry when collected.

Do not allow collections to overheat, and do not leave them in a vehicle or in full sun. Exposure to sustained high temperatures can badly damage seed collections. Maintain ventilation around the collections at all times, if making more than one collection on a field day, bring the existing collections outside of the car and leave in a shady spot. Never leave seed in a vehicle for any period of time. Damp collections should be spread out on newspaper to dry naturally in a well-ventilated area immediately after collection. For further explanation of the seed collection techniques, please see the quick reference guide in Appendix F.

11a. Labeling 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 in Mason State Nursery until it is planted at its final habitat restoration site. Write the following information below on the outside of your collecting bag. If using a cloth bag, write the information on a jewelers tag 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 and record the following information:

- Latin name
- Common name
- Collection date
- County, State
- State collection zone color (green, orange, or blue)
- Collector's name
- Unique collection team Seed Collection Reference Number (See Section 8 for details)

12. Recommendations for Collection and Cleaning for Specific Target Plants

Estimated monthly collection periods for each species are detailed in the Plant Profiles (Appendix A). This will vary based on the region, weather, and growing conditions that year, but those months can serve as a ballpark. Preliminary site visits will provide a more accurate picture of when seeds will ripen and collection should occur.

Asclepias spp., milkweed

Collection Time: Late summer

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 inside, you will likely have the downy fluff floating around the room as it is quite buoyant.

Note: *Asclepias verticillata* should not be collected in Pennsylvania due to potential change in legal status.

Cephalanthus occidentalis, buttonbush

Collection time: Late summer to early fall

Collect before the 'nutlets' start to fall apart. Seeds are ready for collection when they turn brown. Cut the 'nutlet' off the stem and put it into your collection bag. Gentle smashing will release the seed.

Chamaecrista fasciculata, partridge pea

Collection Time: Fall

Seeds ripen in pods. Pods turn from green to brown when they are ready for harvest. Spilt open some of the pods in the field to see if the seeds are brown and plump. If the seeds are still green they are not ready. It's easiest to collect several pods and put them in your collection bag. When indoors, peel the pods to release the seeds.

Cirsium discolor, field thistle

Collection time: Late summer to early fall

Seeds 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. Seeds should be dark in color and plump, as flat seeds indicate the embryo has not developed and the seeds are not ripe.

Coreopsis tripteris, tall coreopsis

Collection Time: Late summer through fall

Seed is ready for harvest when the heads turn yellow to brown. Ripe seed is grayish black in color and resembles a sunflower seed. Seeds are inside the calyx tubes that make up the flower head. Place entire dried flower head into the collection bag. Gently mash the flower head into the palm of your hand to remove any remaining seed.

Echinacea purpurea, eastern purple coneflower

Collection time: Late summer to early fall

Seed is ready for harvest when heads turn dark brown to black. Place entire dried flower head into the collection bag. Most of the seeds will fall out readily with light shaking. Gently mash the flower head into the palm of your hand to remove any remaining seed.

Note: This species should not be collected in Pennsylvania due to potential change in legal status.

Eupatorium perfoliatum, common boneset

Collection Time: Late 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. Seeds should be dark in color and plump, as flat seeds indicate the embryo has not developed and the seeds are not ripe.

Eutrochium purpureum, sweet joe pye weed

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. Seeds should be dark in color and plump, as flat seeds indicate the embryo has not developed and the seeds are not ripe.

Euthamia graminifolia, grass-leaved 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. Seeds should be dark in color and plump, as flat seeds indicate the embryo has not developed and the seeds are not ripe.

Geranium maculatum, wild geranium

Collection time: Early summer

These seeds are challenging to collect, as the Geranium seed pods burst when ripe and launch the seeds away from the parent plant. You will need to collect before the seed is fully ripe and when the carpel beaks begin to yellow. Remove the umbel and put it in the collection bag. Allow the seed to ripen in the bag. Store them in a cool dry location for two weeks before you lightly smash the carpel to release the seed.

Heliopsis helianthoides, ox-eye sunflower

Collection Time: Fall

Seed will ripen about a month after flowering if the weather is mild. Seed is ready for harvest when the heads turn from yellow to brown. Ripe seed is grayish brown in color. Plants can be self-sterile, so crack some open before collecting to check for viability. Place entire dried flower head into the collection bag. Gently mash the flower head into the palm of your hand to remove any remaining seed.

Liatris spp., blazing star

Collection time: 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. Seeds should be dark in color and plump as flat seeds indicate the embryo has not developed and the seeds are not ripe. Seed ripen at the bottom of the stem first, so when the top starts to dry out it is usually safe to start collection.

Note: *Liatris aspera* should not be collected in Pennsylvania.

Monarda fistulosa, wild bergamot

Collection Time: Mid through late summer

Seeds are ready for harvest when the flower head turns from green to brown. Ripened seed is tiny and inside the tiny calyx tubes that make up the flower head. Remove the petals (if there are any remaining) and place entire dried flower head into the collection bag. Tap the flower heads on a piece of white paper and the remaining seeds will fall out.

Penstemon digitalis, foxglove beardtongue

Collection Time: Midsummer to fall

Seed ripen in upright capsules that turn from green to brown when ready to harvest. The dried capsules can be turned upside down and emptied right into an envelope or collection bag.

Pycnanthemum spp., mountainmint

Collection Time: Late summer

Seed heads turn from green to brown when ripe. Cut off the entire seed head and put in the collection bag to dry. Mash the dried seed head in your hand or onto a piece of

white paper to release the seed from the calyx. Seeds are very tiny and dark brown resembling itty-bitty mouse poop.

Ratibida pinnata, yellow coneflower

Collection Time: Late summer

The seeds form on the inside of the brown or black cone in the center of the flower. When the cone becomes hard and turns grayish or dark brown the seeds are ripe. Remove the entire cone from the plant and put them in the collection bag. Gently pull apart the cones to dislodge the remaining seeds.

Note: This species should not be collected in Pennsylvania due to potential change in legal status.

Rudbeckia hirta, black-eyed Susan

Collection Time: Late summer through early fall

The seeds form on the inside of the brown or black cone in the center of the flower. When the cone becomes hard and turns grayish or dark brown the seeds are ripe. This usually occurs three to four weeks after the blooms fade. Remove the entire cone from the plant and put them in the collection bag. Gently pull apart the cones to dislodge the remaining seeds.

Symphyotrichum spp., asters

Collection Time: Late summer through 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. Seeds should be dark in color and plump, as flat seeds indicate the embryo has not developed and the seeds are not ripe.

Tradescantia ohiensis, Ohio spiderwort

Collection Time: Early summer

Seeds ripen in capsules wrapped in the calyx. The capsules open when the seed is ripe and drop the seeds out quickly. It is best to start checking the seeds about six weeks after they bloom to see if they are ready.

Vernonia gigantea, giant ironweed

Collection Time: Fall

Seeds are ready for collection when the pappus (scales, bristles, or featherlike hairs that are attached to the seeds) is dry and the white fluff begins to expand. Like other members of the composite family, 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. Seeds should be dark in color and plump, as flat seeds indicate the embryo has not developed and the seeds are not ripe.

Veronicastrum virginicum, Culver's root

Collection time: Late Summer

Tiny seeds are produced inside small woody capsules along a spike. Capsules turn from yellow to brown when they are ready to harvest. Remove the whole spike and put

it into your collection bag. Capsules need to be crushed to release the seed, as the seed will not readily fall out. You can use a rolling pin to lightly crush the capsules.

Zizia aurea, golden Alexander

Collection Time: Summer

Seeds ripen into capsules on the flower umbel. The capsules turn from green to brown when they are ready to harvest. Remove the entire flower umbel and put into collection bag. Rub ripe capsule to release the seed.

13. Seed Storage

After your collection, let the seed dry for 3 days in a cool, dark, dry location before shipping to Mason State Nursery. The optimal method for drying seed material is to spread it out in a single layer on laid out newspaper. Placing a fan nearby on the lowest setting can expedite the drying process. If space is a constraining factor, leave the seed in the collection bag, but leave the bag open and stir the seeds at least once a day. Again, a fan on its lowest setting blowing over the bags can help expedite the drying process.

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. Seeds vary greatly in how they need to be cleaned. Refer to individual plant information in Section 12 for method of cleaning, if necessary.

Only ship seed Monday through Wednesday to ensure that it arrives at Mason State Nursery 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.

14. Photo Documentation

Digital 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. Digital Photos not uploaded to the app should be labeled with the unique collection ID number and submitted to your State Coordinator via email by the end of the collection season. At least three photos should be taken for each collection:

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

When possible, you have the option to photograph the flower or leaf structure, depending on what is visible and 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.

Pollinator Partnership also encourages you to take photos of your team out in the field collecting seed, for potential use in promotional materials for the project. These can be uploaded directly in the Survey 123 app or can be emailed directly to Amber Barnes or your State Coordinator.

15. GIS App

You will use the GIS app to acquire specific data about the location of each seed collection including latitude and longitude coordinates. Specific directions on how to use the GIS app are in Appendix G. A training webinar will accompany this manual in order to provide further assistance to seed collection participants.

16. Shipping

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 Team Lead should ship the seed directly to Mason State Nursery, unless otherwise instructed by the State Coordinator. In some cases, the Collection Team Lead may need to send the seed first to the State Coordinator, who will then send the seeds in bulk to Mason State Nursery. Do not mail seeds out on Thursday or Friday in order to ensure they are not left in an uncontrolled (i.e., hot or humid) shipping center for a prolonged period. Always check the estimated delivery before mailing to make sure the seed will arrive before the weekend. If no one is available to receive mail over the weekend, the seeds may end up sitting for two days (or longer) in a boiling hot mailbox or on a doorstep in the direct sun.

Packaging

As often as possible, ship each seed collection in one bag. Make sure that the seed bags are clearly labeled with your unique collection number and state collection zone. 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, place a second label on top of the seed inside the bag. We recommend shipping in a sturdy cardboard box, such as a USPS Priority Mail Medium Flat Rate Box. These boxes can be used to ship seed anywhere in the U.S. (with tracking) for the flat rate of \$14.35, regardless of weight – if it fits, it ships! Boxes can be ordered online at the USPS Postal Store (<https://www.usps.com/>) or picked up at any USPS Post Office, free of charge. The labeled paper bags should be securely packaged for shipping (i.e., taped at the seams and padded with newspaper or loose bubble wrap inside the box). Woven PVC or nylon air freight envelopes can be used for smaller quantities of seed. Please do not use any non-breathable bags or containers for seeds as this may contribute to mold growth.

Shipping via USPS

To ship the seed, first log in to the project USPS account at www.usps.com (contact State Coordinator, Collection Team Lead, or Pollinator Partnership for login credentials). From the homepage, select “Mail & Ship” and then “Click-N-Ship.” From there, you will be able to fill out the shipping label using the following steps:

1. Where are you sending from?

You will need to edit the “Return Address” to reflect your own address, as the default address is the Pollinator Partnership headquarters in San Francisco.

2. Where are you sending to?

Unless instructed otherwise by your State Coordinator, all seed must be shipped to the following address:

**Dave Horvath
IDNR, Mason State Nursery
17855 County Road 2400 E
Topeka, Illinois 61567**

Under “Additional Actions,” check the box indicating “I would like to get tracking notification” so that Pollinator Partnership can be updated on the status of the package.

3. Enter a shipping date

Select same day shipping to ensure the seed is delivered ASAP.

4. Enter package details

Select “I am Shipping Flat Rate”

5. Enter package value

Leave this field blank.

6. Select a service type

Select “Priority Mail” under “Choose a Service Type.” Once all other fields are complete, you can click “View available Services and Prices” at the bottom. Then, select the option for “Priority Mail® Medium Flat Rate Box.” Be sure to check the scheduled delivery date to ensure it falls before the weekend. The price of postage should be \$14.35. Depending on the amount of seed collected, feel free to use a larger or smaller box or envelope, but note that the price will change depending on package size.

7. Add insurance and extra services

Do not change anything in this category. Leave all fields set to the default options.

8. Label Summary

Review the label summary to ensure the address and delivery date are correct, then click “Add to Cart.”

9. Shipping Cart

Once again, review the order to ensure all the information is correct, then select “Next: Billing Information.”

10. Billing Information

Check the box indicating “*I certify that my mailing complies with...” Select “Use PayPal,” and click “Next: Pay and Print.”

11. Printing the label

Now that you have paid for the postage, you can print the label. The label should be securely taped to the top of the box.

12. Mailing

Once the seed has been securely packaged in a USPS box and postage has been added, you can either hand deliver the package to any USPS Post Office, or you can schedule a pickup with your daily mail pickup (your office might have an outgoing mail receptacle which a postal worker takes from during your daily mail delivery). Regardless of how the package is received by the USPS, you want to make sure: 1) it is received by a postal worker on the same day, and 2) it is never left in an uncontrolled or hot or humid environment.

Please contact your State Coordinator or info@pollinator.org to confirm when seed has been shipped. If you have any questions or concerns regarding the delivery of the package, please contact Dave Horvath, Nursery Supervisor at Mason State Nursery, at 309-535-2185 or dave.horvath@illinois.gov

Appendix A:

Target Plant Species
Plant Profiles

Target Plant Species

Project Wingspan 29 Target Plants for Seed Collection		Bloom Period											
Latin (Botanical) Name	Common Name	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
<i>Zizia aurea</i>	golden Alexanders				X	X	X						
<i>Tradescantia ohiensis</i>	Ohio spiderwort				X	X	X	X					
<i>Geranium maculatum</i>	wild geranium				X	X	X	X					
<i>Penstemon digitalis</i>	foxglove beardtongue					X	X	X					
<i>Asclepias syriaca</i>	common milkweed						X	X	X				
<i>Asclepias exaltata</i>	poke milkweed						X	X	X				
<i>Cephalanthus occidentalis</i>	buttonbush						X	X	X				
<i>Asclepias incarnata</i>	swamp milkweed						X	X	X	X			
<i>Asclepias tuberosa</i>	butterfly weed						X	X	X	X			
<i>Rudbeckia hirta</i>	black eyed Susan						X	X	X	X			
<i>Pycnanthemum virginianum</i>	Virginia mountain mint						X	X	X	X			
<i>Pycnanthemum tenuifolium</i>	narrowleaf mountainmint						X	X	X	X			
<i>Chamaecrista fasciculata</i>	partridge pea						X	X	X	X			
<i>Ratibida pinnata</i>	yellow coneflower						X	X	X	X			
<i>Heliopsis helianthoides</i>	oxeye sunflower						X	X	X	X			
<i>Asclepias verticillata</i>	whorled milkweed						X	X	X	X			
<i>Veronicastrum virginicum</i>	Culver's root						X	X	X	X			
<i>Echinacea purpurea</i>	eastern purple coneflower							X	X	X			
<i>Monarda fistulosa</i>	wild bergamot							X	X	X			
<i>Eutrochium purpureum</i>	sweet joe pye weed							X	X	X			
<i>Eupatorium perfoliatum</i>	common boneset							X	X	X			
<i>Liatis spicata</i>	dense blazing star							X	X	X			
<i>Euthamia graminifolia</i>	grass-leaved goldenrod							X	X	X			
<i>Cirsium discolor</i>	field thistle							X	X	X	X		
<i>Liatis aspera</i>	tall blazing star							X	X	X	X		
<i>Vernonia gigantea</i>	giant ironweed							X	X	X	X		
<i>Coreopsis tripteris</i>	tall coreopsis							X	X	X	X		
<i>Symphotrichum laeve</i>	smooth blue aster								X	X	X		
<i>Symphotrichum novae-angliae</i>	New England aster								X	X	X		

Plant Profiles for Appendix A. can be found at <https://www.pollinator.org/wingspan/seed-collection>

Appendix B:

Field Data Form
(Blank and Example)

Project Wingspan Field Data Form

COLLECTION TEAM INFORMATION					
Seed Collection Team Reference ID:	OH.CT1	Project Site ID:	A	Collection Number:	1
Date(s) Collected:	4-24-17	Collection Time:	12:30 pm	Number of Volunteers:	4
Collector Names (Circle data collector):	Jane Doe, Ravi Patel, Tyrone Jones, Cindy Lee				
Seed Collection Zone (circle the color):	Green (north)	Orange (central or west)		Blue (south)	
SEED COLLECTION DATA:					
Scientific Name:	Asclepias incarnata		Common Name:	Swamp milkweed	
Number of Plants Sampled:	57		Photograph Taken:	Y or N	
LOCATION DATA:					
State:	Ohio	County:	Cuyahoga	Land Owner:	Cleveland Metroparks
Permission Filed:	Y or N	GPS Data Recorded:	Y or N	Managed Area Name:	Acacia
Latitude:	41.504442		Longitude:	-81.491285	
Directions: Provide detailed directions to the collection site. Refer to nearby landmarks, roads, and towns. Include parking information and directions from parking area to collection site. Headed north on I-271 toward Lyndhurst, took Brainard Rd exit. Turned right onto Cedar Rd. Turned right, into the Acacia Reservation parking lot. Found the marked trail and walked about 50 meters to the collection field, located on the left side of the trail.					
HABITAT DATA					
Non-Target Associated Species:	Unknown grasses, red clover, queen ann's lace, goldenrod, and multiflora rose.			Land Use Type:	
SCOUTING INFORMATION: Target plant species in bloom but not ready for collection					
Scientific Name:	Monarda fistulosa	Common Name:	wild bergamot	Approx. Number of Plants Present:	35
Scientific Name:	Coreopsis tripteris	Common Name:	tall coreopsis	Approx. Number of Plants Present:	58
Scientific Name:		Common Name:		Approx. Number of Plants Present:	
Scientific Name:		Common Name:		Approx. Number of Plants Present:	
Scientific Name:		Common Name:		Approx. Number of Plants Present:	
Scientific Name:		Common Name:		Approx. Number of Plants Present:	
Scientific Name:		Common Name:		Approx. Number of Plants Present:	
Notes:					

Project Wingspan Field Data Form

COLLECTION TEAM INFORMATION					
Seed Collection Team Reference ID:		Project Site ID:		Collection Number:	
Date(s) Collected:		Collection Time:		Number of Volunteers:	
Collector Names (Circle data collector):					
Seed Collection Zone (circle the color):	Green (north)	Orange (central or west)	Blue (south)		
SEED COLLECTION DATA:					
Scientific Name:			Common Name:		
Number of Plants Sampled:			Photograph Taken:	Y or N	
LOCATION DATA:					
State:		County:		Land Owner:	
Permission Filed:	Y or N	GPS Data Recorded:	Y or N	Managed Area Name:	
Latitude:			Longitude:		
Directions: Provide detailed directions to the collection site. Refer to nearby landmarks, roads, and towns. Include parking information and directions from parking area to collection site.					
HABITAT DATA					
Non-Target Associated Species:				Land Use Type:	
SCOUTING INFORMATION: Target plant species in bloom but not ready for collection					
Scientific Name:		Common Name:		Approx. Number of Plants Present:	
Scientific Name:		Common Name:		Approx. Number of Plants Present:	
Scientific Name:		Common Name:		Approx. Number of Plants Present:	
Scientific Name:		Common Name:		Approx. Number of Plants Present:	
Scientific Name:		Common Name:		Approx. Number of Plants Present:	
Scientific Name:		Common Name:		Approx. Number of Plants Present:	
Scientific Name:		Common Name:		Approx. Number of Plants Present:	
Notes:					

Appendix C:

Collection Team Reference Numbers

Appendix C: Collection Team Reference Numbers

This Collection Team Reference ID will be assigned to each Team Lead by the State Coordinator.

Collection Team reference ID by State						
Team #	Ohio	Indiana	Illinois	Michigan	Pennsylvania	Wisconsin
1	OH.CT1	IN.CT1	IL.CT1	MI.CT1	PA.CT1	WI.CT1
2	OH.CT2	IN.CT2	IL.CT2	MI.CT2	PA.CT2	WI.CT2
3	OH.CT3	IN.CT3	IL.CT3	MI.CT3	PA.CT3	WI.CT3
4	OH.CT4	IN.CT4	IL.CT4	MI.CT4	PA.CT4	WI.CT4
5	OH.CT5	IN.CT5	IL.CT5	MI.CT5	PA.CT5	WI.CT5
6	OH.CT6	IN.CT6	IL.CT6	MI.CT6	PA.CT6	WI.CT6
7	OH.CT7	IN.CT7	IL.CT7	MI.CT7	PA.CT7	WI.CT7
8	OH.CT8	IN.CT8	IL.CT8	MI.CT8	PA.CT8	WI.CT8
9	OH.CT9	IN.CT9	IL.CT9	MI.CT9	PA.CT9	WI.CT9
10	OH.CT10	IN.CT10	IL.CT10	MI.CT10	PA.CT10	WI.CT10
11	OH.CT11	IN.CT11	IL.CT11	MI.CT11	PA.CT11	WI.CT11
12	OH.CT12	IN.CT12	IL.CT12	MI.CT12	PA.CT12	WI.CT12

Appendix D:

**Sample Right of Entry Permit
and Notification Documents**

Appendix D. Sample Right of Entry Permit and Notification Document – Oral

POLLINATOR PARTNERSHIP

Documentation of Oral Permission to Access Private Lands

The (Name of State Coordinator) obtained oral permission to access private lands as follows:

Description of the work and/or project title, to include date and time of entry and departure or anticipated duration of the work if recurring visits will be made:

Address of Property:

Printed name and address of landowner contacted:

The landowner was provided with the following information:

1. (proposed date and time of entry and departure, or period of time during which recurring visits will be necessary).
2. (kind and number of vehicles to be used).
3. (number of persons in the party).
4. (name, email address, and phone number of chief of party).
5. (purpose of the work).
6. (locations on the property where work is to be done).

Date permission was granted:

Name and signature of State Coordinator who obtained permission:

Other persons in the party who witnessed the oral permission (as applicable):

The documentation of an oral agreement should be retained in the project file by the initiating office until the project is completed.

Appendix D. Sample Right of Entry Permit and Notification Document - Written

POLLINATOR PARTNERSHIP

(Insert Name of Private Landowner)

(Insert Date)

(Insert Address of Private Landowner)

Dear (Insert Name of Private Landowner):

The Pollinator Partnership and its affiliates require employees and volunteers to obtain written permission from landowners in certain cases before entering onto private property to conduct plant surveys, seed collections, and seed/plug planting. Consequently, we are hereby requesting your signature below to confirm your approval for Pollinator Partnership employees or volunteers to enter your land for the purpose described below (the "Purpose"). The data and/or seed collected will be used for enhancing monarch butterfly and rusty patched bumble bee habitat via Project Wingspan, and details about the work conducted will be provided to you upon request.

Specific information regarding this request is as follows:

1. (proposed date and time of entry and departure, or period of time during which recurring visits will be necessary).
2. (kind and number of vehicles to be used).
3. (number of persons in the party).
4. (name, email address, and phone number of State Coordinator or Team Lead).
5. (purpose of the work).
6. (locations on the property where work is to be done).

Pollinator Partnership agrees to hold the Landowner identified above harmless from any and all actual damages, liabilities, claims, losses, costs and damages arising from the entry of Pollinator Partnership's employees or volunteers upon Landowner's property for the Purpose, other than those arising from Landowner's willful misconduct or gross negligence.

If you have any questions about Project Wingspan, you may contact (insert name of State Coordinator) at the following telephone number: (insert number).



Please indicate your consent to this request by signing below and (list method of return, e.g., envelope provided, leave at a designated location, etc.). Thank you for your cooperation.

Sincerely,

Requestor Signature Date: _____

Requestor Name Date: _____

I approve of the entry of Pollinator Partnership employees and volunteers upon the Property identified above, for the Purpose described herein.

Landowner Signature Date: _____

Landowner Name

Appendix E:

**Volunteer Waiver/
Hold Harmless Document**

Appendix E. Pollinator Partnership Volunteer Waiver/Hold Harmless Document

Name of Volunteer (please print): _____
Effective Date ____/____/____

Address: _____
Phone Number: (____)____-____

Name of Volunteer Activity: _____

Check here if Volunteer is under age 18: ☐

I, the above listed Volunteer, desire to work as a volunteer for Pollinator Partnership "The Organization" and engage in the activities related to being a volunteer for Project Wingspan.

I hereby voluntarily execute this Volunteer Waiver under the following terms:

I, the Volunteer, release and hold harmless the Organization and its successors and assigns (the "Organization Releases") from any and all liability, claims, and demands of whatever kind or nature, either in law or in equity, which arise or may hereafter arise from my volunteer work with the Organization.

I understand that this Waiver discharges the Organization Releases from any liability or claim that I, the Volunteer, may have against the Organization with respect to bodily injury, personal injury, illness, death, or property damage that may result from my participation in connection with the Volunteer Activity defined above. I also fully understand that the Organization does not assume any responsibility for or obligation to provide financial assistance or other assistance, including but not limited to medical, health or disability insurance, in the event of injury, illness, death or property damage.

I, the Volunteer, understand that I expressly waive any such claim for compensation or liability on the part of the Organization beyond what may be offered freely by the representative of the Organization in the event of such injury or medical expense.

I hereby release the Organization Releases from any claim whatsoever which arises or may arise in the future on account of any first aid treatment or other medical services that are conducted in connection with an emergency during the Volunteer Activity.

I understand that my participation in the Volunteer Activity may include various activities that may be hazardous to me and I hereby expressly and specifically assume the risk of injury or harm in these activities and release the Organization Releases from all liability for injury, illness, death, or property damage resulting from my participation in the Volunteer Activity.

I grant unto the Organization all right, title, and interest in and the unlimited right to use any and all photographic images and video or audio recordings including my name or image (collectively, "My Likeness") that are made by, or shared with, the Organization

Volunteer Waiver

during my work in connection with the Volunteer Activity, including, but not limited to, any royalties, proceeds, or other benefits that are derived from such photographs or recordings.

I expressly agree that this Waiver is intended to be as broad and inclusive as permitted by the laws of the State of _____ in the United States of America, and that this Waiver shall be governed by and interpreted in accordance with the laws of the State of _____. I agree that in the event that any clause or provision of this Waiver shall be held to be invalid by any court of competent jurisdiction, the invalidity of such clause or provision shall not otherwise affect the remaining provisions of this Release which shall continue to enforceable.

Volunteer's Signature

Print Volunteer's Name

If under 18:

Signature of Parent/Guardian

____/____/____
Date

Printed Name of Parent/Guardian

Emergency Contact:

Name: _____

Relationship to Participant: _____

Phone Number: _____

VOLUNTEERS MUST COMPLETE THE WAIVER AND RELEASE FORM

**PARENT/LEGAL GUARDIAN SIGNATURE IS REQUIRED IF VOLUNTEER IS UNDER
AGE 18**

Appendix F:

**Seed Collecting Techniques –
Quick Reference**

Appendix F. Seed Collection Techniques – Quick Reference

Seed Collection Techniques Quick Reference Adapted from Bureau of Land Management Seeds of Success Program

	What to do...	Why?
1.	Assess the target population and confirm that a sufficient number of individual plants (minimum of 50) have seeds at natural dispersal stage.	To ensure that adequate genetic diversity can be sampled from the population, and that the seeds are likely to be at maximum possible viability and longevity.
2.	Carefully examine a small, representative sample of seeds using a cut test and for smaller seeds a hand lens.	Estimate the frequency of empty or damaged seeds and confirm that the majority of seeds are mature and fully formed.
3.	Collect mature, dry seeds into double-bagged brown paper bags. Large collections can be made using plastic buckets and then transferred into bags.	Ensures the highest possible viability at collection and maximizes the potential storage life at the Mason State.
4.	If seeds can be liberated from their fruits quickly and easily, by shaking the open fruits over a container, carry this out and note it on the field data form.	Maximizes the use of available field time and allows for seeds to be cleaned and prepared once dried.
5.	Sample equally and randomly across the extent of the population, maintaining a record of the number of individuals sampled.	Capture the widest possible genetic diversity from the plant population sampled.
6.	Collect no more than 20% of the viable seed available on the day of collection.	Ensure that the sampled population is not over collected and is maintainable.
7.	For each collection, estimate the viable seed production per fruit, per individual and per population, and note these on the field data form.	Document species seed biology and better assess the influence of collecting on the population.
8.	Clearly label all bags with your name, date, collection zone and Latin name. If there are multiple bags, label 1 of 3, 2 of 3, etc.	To ensure that this unique identifier is attached to each sample of a collection. All other data will be recorded on the field data form.

Appendix G:

GIS App Instructions

Appendix G. Project Wingspan Seed Collection Report GIS App Instructions

Introduction:

In order to facilitate accurate and consistent data collection during the volunteer seed collection efforts, Pollinator Partnership teamed up with the University of Arkansas' Center for Advanced Spatial Technologies (CAST) to develop an innovative reporting tool. The Project Wingspan (PW) Seed Collection survey allows users to input spatial data directly to a shared database while in the field. Registered users with a smartphone can download the free Survey123 for ArcGIS app and then install the Project Wingspan Seed Collection Tool. Completed surveys can be submitted directly into the Project Wingspan geodatabase from the field using a mobile device, or stored/saved as a draft(s) within the mobile app until a Wi-Fi or cellular connection can be re-established. The submitted data significantly improves communication among partners and can be monitored, which improves coordination and organization between the project team. The seed collection reports collected through this app may even support other pollinator research and modeling efforts for future field studies.

Purpose:

The PW Seed Collection Tool is being used to: digitize or capture some of the information contained within the seed collection Field Data Form, provide us with an accurate location of the collection sites, create a database for field photos from each seed collection within Project Wingspan, and give us real-time progress updates on the seed collection effort. This digital survey does not replace the paper Field Data Form, but it compliments it and provides an accurate map of the spatial distribution of the Project Wingspan collection sites. This feature will be critical for the redistribution of the seed onto the landscape and ensure proper curation of the seedlings. **Paper copies of the original seed collection Field Data Forms should be mailed with the seed collected, and the original seed collection field data documents should always be maintained by the State Coordinator or Team Leader for each seed collection team.**

Users have two ways in which to access the Project Wingspan Seed Collection Report. The preferred method is to use a mobile device loaded with the **Survey123 for ArcGIS** application, OR registered users can use a desktop or mobile web browser (latest versions of Chrome, Firefox; Safari are recommended). Each user of the Project Wingspan Seed Collection Tool will require a **secure log-in and password** (a registered ArcGIS Online account managed by Brian Culpepper/CAST), and each reported Seed Collection should only be completed **once, regardless of method used**.

This set of instructions will guide new or existing users through the online, digital submission of a Project Wingspan Seed Collection Report and demonstrate both methods: online web browser and using the preferred method via the **Survey123 for ArcGIS** mobile application with the Project Wingspan Seed Collection survey installed. The use of a mobile device is recommended because a precise LOCATION is required for each submission, and most mobile devices have camera on-board so that uploading field work photos will be much easier. P2 Pro Tip: Carry a field clipboard with white paper to use as a neutral plant leaf or plant seed pod photography while in the field.

Getting Started:

As previously mentioned, the Project Wingspan Seed Collection survey form can be used within a web browser OR within a free mobile app called "Survey123 for ArcGIS". The mobile application is located within the app stores for Apple, Windows Mobile or Android devices. If you have a smart phone or **GPS* enabled tablet**, you should download the latest version of the **Survey123 for ArcGIS** application.

Field Data Reporter Requirements

State Coordinators for Project Wingspan should identify at least one person within each Seed Collection Team to serve as their designated reporter for each PW seed collection site visit. The Field Data Reporter should be an experienced field worker with a smart-phone or mobile device that includes a built-in Camera and onboard GPS.

- **Camera:** Since a minimum of three photographs are required for each seed collection report, it will expedite the field workflow if the user's device contains a camera. It may help to practice these field photos before you head to the seed collection site. Clip boards or other items may help provide contrasting backgrounds for your flower, leaf, or seed photos. White one-centimeter gridded paper works well for some users.
- **GPS:** Enable Location Services within your mobile device settings to assist your field reporting of the location of each Seed Collection Report. You can also use the map to "move" or navigate the map under the "map marker" until you've precisely identified the seed collection location for the report. Enable Location Services well before you reach the seed collection site so that your GPS will be updated and ready to locate you, precisely. Confirm that your app: Survey123 for ArcGIS is ALLOWED to use your device location too. Sometimes these settings must be set manually on some devices.

Paper Field Data Forms

The paper field data forms included within PW training materials should also be completed during each field collection effort since those notes will help the designated **PW Seed Collection Reporter** upload the correct attributes (and the three required site photos) using their mobile device or desktop computer. Please maintain copies of these paper field data forms. These paper fieldwork forms can even be photographed and uploaded within each digital Seed Collection Report that's collected/submitted within the mobile app – another way to "backup" your field notes and store them within the digital Seed Collection record that is submitted into the Project Wingspan geodatabase.

An emailed summary of each "Successfully submitted" PW Seed Collection Report will be sent to an account owners email address. Typically, those emails will arrive within 15 minutes of submission of a Seed Collection, regardless of method used to submit.

Appendix G - Part 1: For access to the PW Seed Collection Report on a Smartphone

Each State Coordinator and **designated** Field Data Recorder(s) will need to request a **Project Wingspan** user-account in order to download the PW Seed Collection Report survey. This Seed Collection Survey is not accessible without account credentials specific to Project Wingspan, but if you have an existing account from previous work with P2, such as with the MWAEBF project; then let Brian Culpepper know and you can re-use the existing account for PW. To request this username / password, please send an email to Isaac Lisle (isaac@pollinator.org) and Brian Culpepper (brian@cast.uark.edu) with the following subject line: **Project Wingspan User Account Request**. Please provide this important information within the body of the email:

- Your first/last name
- Organization you represent
- Full mailing address
- Name of your State Coordinator for Project Wingspan
- Date you anticipate field collection to begin within your area
- Phone number (cell preferred) that we can use to reach you
- **Do you have an existing ArcGIS Online Account** (in any other organization?)

Please specify the type of cell phone (iphone/windows/android) or tablet that you plan to use for submitting your Project Wingspan Seed Collection Reports. If you plan to upload these reports from your laptop or desktop computer, it would be helpful to know this too.

After your email request has been received, we will create your account and follow-up with your user-credentials and instructions detailing how to download the app and corresponding Project Wingspan Seed Collection survey. This download must be completed and tested by the Data Recorder volunteer prior to participation in a seed collection event. Download the Survey123 for ArcGIS application, Log-In to the application using your Project Wingspan credentials* (*these are your ArcGIS Online account credentials) and then DOWNLOAD the Project Wingspan Seed Collection tool to your mobile device. **Complete this while on a Wi-Fi connection and BEFORE you travel to the field!** This PW survey application is large because it contains images of plant profiles to help you in the field. It'll save you valuable time while on-site and you should practice using the application after reviewing the training materials and well before any Seed Collection.

Step 1: Download the App

- To download the **Survey123 for ArcGIS** app on your smart phone, first navigate to the App Store. Depending upon the type of mobile phone you're using, here's where to download the app online:
 - iTunes download (Apple):
<https://itunes.apple.com/us/app/survey123-for-arcgis/id993015031?mt=8>
 - Google Play download (Android):
<https://play.google.com/store/apps/details?id=com.esri.survey123&hl=en>

Appendix G. Project Wingspan Seed Collection Report GIS App Instructions

- Search for “Survey123 for ArcGIS” so you can locate and install this (free) mobile application created by ESRI, Inc. called Survey123 for ArcGIS.
- Click to install the app. You may need to log in using your Apple ID or other credentials to enable the download.



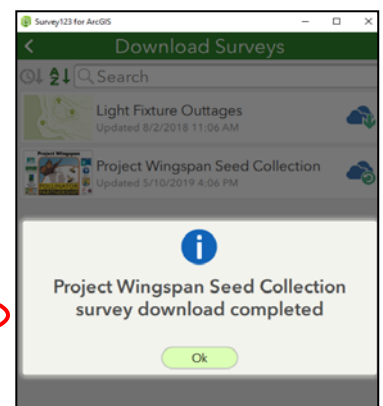
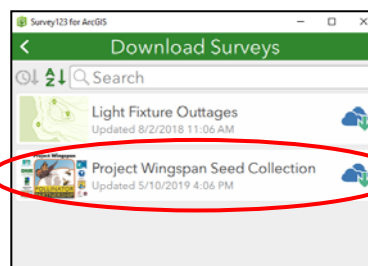
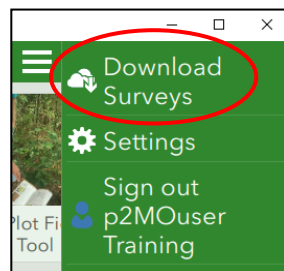
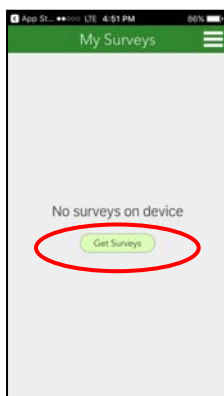
Step 2: Sign In to ArcGIS Online using your PW credentials

- After the **Survey123 for ArcGIS** application is installed, use your credentials to Sign-In to ArcGIS Online within the Survey123 for ArcGIS app. If you have trouble, contact your State Coordinator or Brian Culpepper (brian@cast.uark.edu) for help logging in.



Step 3: Download the Survey

- Next, you will need to download the Project Wingspan Seed Collection survey. Click “Get Surveys” and then select “Project Wingspan Seed Collection” to download the survey. It should now display in the “My Surveys” home screen.

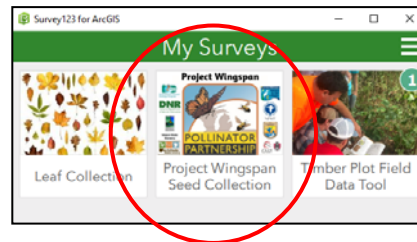


Appendix G. Project Wingspan Seed Collection Report GIS App Instructions

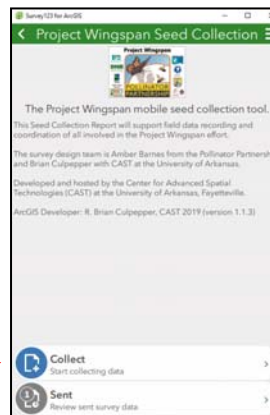
Step 4: Completing a Survey

1. Now that you've installed the app and downloaded the survey, you are all set to begin collecting data! This survey app can be used when 'off-line' and should work whether you have Wi-Fi / cell service or not. However, once you return to cell service or Wi-Fi, you must remember to submit those 'draft' survey responses so that they are successfully added to the project database.

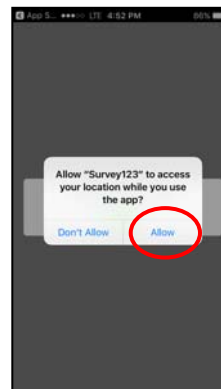
2. To create a seed collection report, select Project Wingspan Seed Collection on the “My Surveys” home page to be directed to the survey.



3. To begin collecting data, select the “Collect” button at the bottom of the Project Wingspan Seed Collection tool home page.



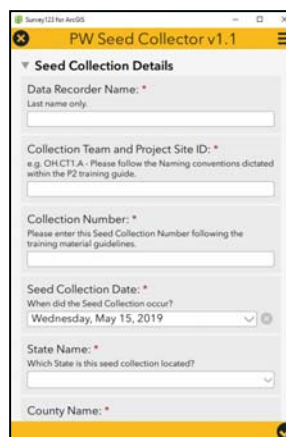
4. You may receive a pop-up box asking if you would like to allow the survey to access your location while using the app. Select “Allow” so that the app can auto-locate your point based on your phone's GPS coordinates.



5. Fill out the form starting with “Data Recorder Name.” Note that fields marked with asterisks are **required** in order to submit the survey. The only fields that are not required are “Target species in bloom”, “Permission required to access the site”, any of the requested photos, and “Site Description”.

Appendix G. Project Wingspan Seed Collection Report GIS App Instructions

6. Refer to Section 8a of the training manual for the appropriate Collection Team and Project Site ID formats.



PW Seed Collector v1.1

Seed Collection Details

Data Recorder Name: *
Last name only.

Collection Team and Project Site ID: *
e.g. OHCT1.A - Please follow the Naming conventions dictated within the P2 training guide.

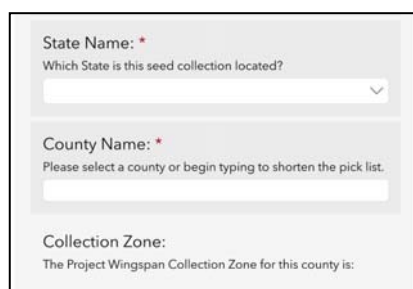
Collection Number: *
Please enter this Seed Collection Number following the training material guidelines.

Seed Collection Date: *
When did the Seed Collection occur?
Wednesday, May 15, 2019

State Name: *
Which State is this seed collection located?

County Name: *

7. Once you select the state and county in which your collection site is located, the collection zone field will auto-populate to the correct color, based on the maps in Appendix J. You can use this information to fill out the Collection Zone field on the paper Field Data Form.



State Name: *
Which State is this seed collection located?

County Name: *
Please select a county or begin typing to shorten the pick list.

Collection Zone:
The Project Wingspan Collection Zone for this county is:

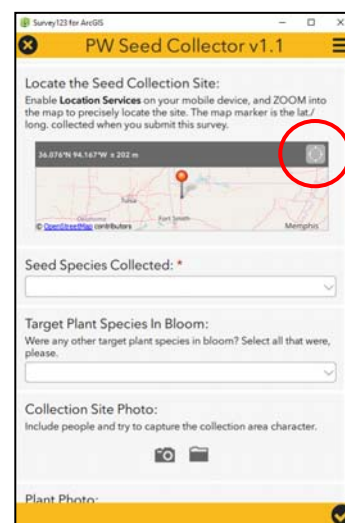


State Name: *
Which State is this seed collection located?
Ohio

County Name: *
Please select a county or begin typing to shorten the pick list.
Cuyahoga

Collection Zone:
The Project Wingspan Collection Zone for this county is:
green

8. **Locating the collection site.** To auto-locate based on your phone's location, select the bullseye at the top right corner of the map. You will need to allow the app to access your location settings when first prompted by the app, and you will need adequate satellite reception. When inside the map, you can toggle between the blue arrow and bullseye buttons below the "-" button to switch between auto-locate and manual-locate. Given the relatively low accuracy of cellphone GPS receivers, especially in areas where trees, buildings, or other natural features cause significant interference, you may want to first try auto-locating your position, and then manually adjust your pin to better reflect your exact position. Switching the base layer map to "World Imagery" may help you determine your exact location based on nearby features.



PW Seed Collector v1.1

Locate the Seed Collection Site:
Enable Location Services on your mobile device, and ZOOM into the map to precisely locate the site. The map marker is the lat/long, collected when you submit this survey.

Seed Species Collected: *


Target Plant Species In Bloom:
Were any other target plant species in bloom? Select all that were, please.

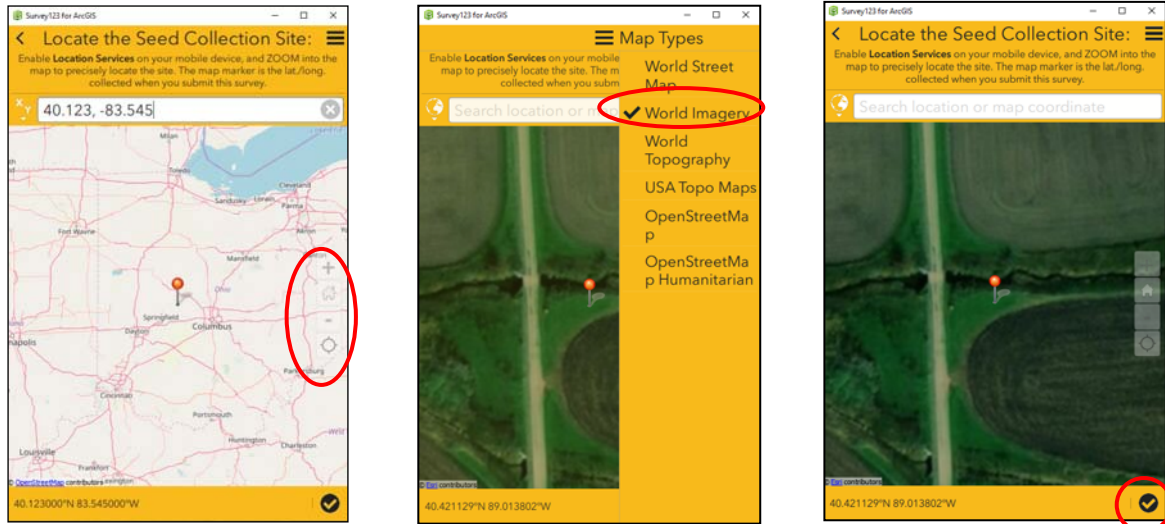
Collection Site Photo:
Include people and try to capture the collection area character.

Plant Photo:

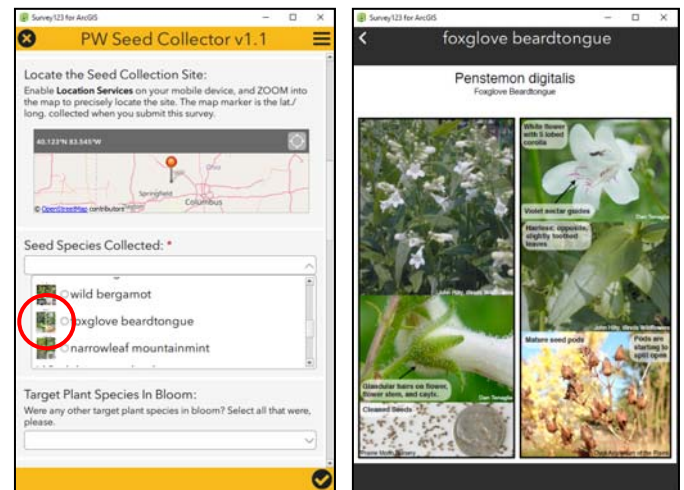
To manually locate the collection site, select the map and drag the pin to the appropriate location. You can zoom in or zoom out by pinching inwards or outwards with two fingers on the map, or by simply pressing the "+" or "-" buttons.

Appendix G. Project Wingspan Seed Collection Report GIS App Instructions

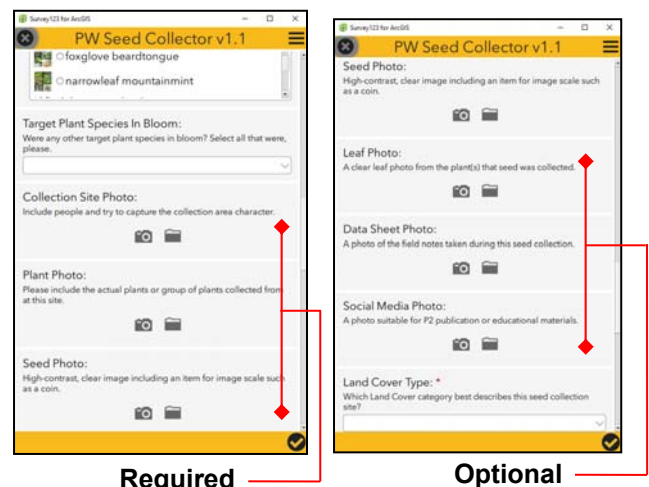
When satisfied with the position of your point, select the  check mark at the bottom-right of the screen to confirm your location.



9. Select the species you will be collecting during your visit. If collecting from multiple species during a seed collection event, a separate report will need to be created for each species, according to the protocol. To further assist with the proper identification of your target species, images from the Plant Profiles have been integrated into the app. To view the photos, click the plant image icon next to the species name within the “seed species collected” drop-down list and a larger image from the Plant Profile pages taken from the Project Wingspan training materials will appear.

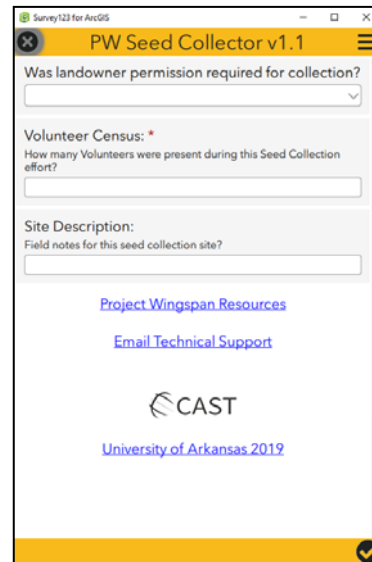


10. **Photos** can be submitted in two ways. Click the camera icon to take a photo directly through the app or click the folder icon to select a photo from your saved pictures. Note that although the first three photo fields do not have an * – Collection Site, Plant, and Seed – they are each required, but the last three – Leaf, Data Sheet, and Social Media Photo – are optional.




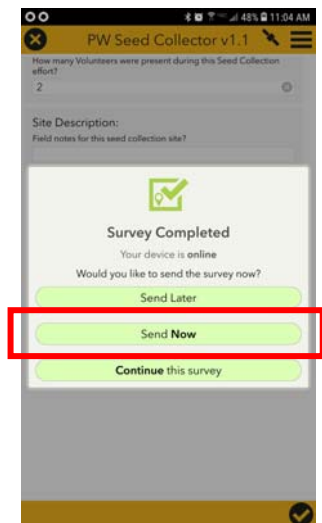
Appendix G. Project Wingspan Seed Collection Report GIS App Instructions


11. For additional support, you will also find a hyperlink to the Project Wingspan training homepage and an email Technical Support hyperlink at the bottom of the PW Seed Collection tool. Note: Cellular service or a Wi-Fi connection is required for their use.

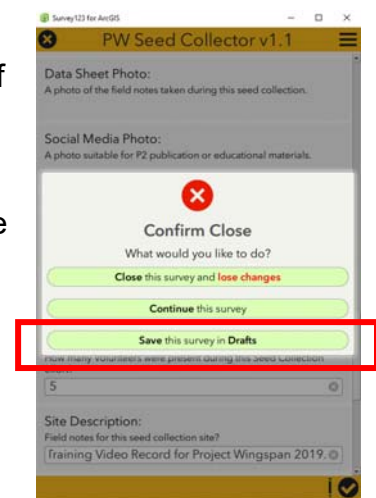


Step 5: Submitting the Survey

- Before submitting your form, double check the fields to make sure everything is correct/nothing was skipped and make certain that each submitted report has a properly formatted **Collection Team and Project Site ID number** so that each Seed bag can be uniquely identified and processed without error. If all fields are complete, photos are uploaded, and you are ready to submit the report, click the check mark in the lower right hand corner of the screen . Then select “Send Now”.



- While it is encouraged to fill out the report entirely in the field using a mobile device, sometimes that may not be possible. If you are not able to complete all fields, or upload your photos due to technical difficulties or other reasons, it may be easier to leverage the “DRAFT” option available within the Survey123 for ArcGIS mobile application. You can ‘pause’ the attribute collection at any time within the Project Wingspan Seed Collection survey by pressing the Check BOX .

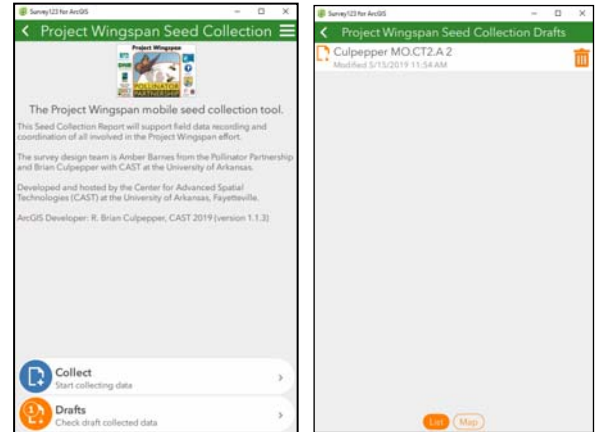


Appendix G. Project Wingspan Seed Collection Report GIS App Instructions

(lower right corner) of the form, and THEN selecting the “**Save this survey in Drafts**” option.

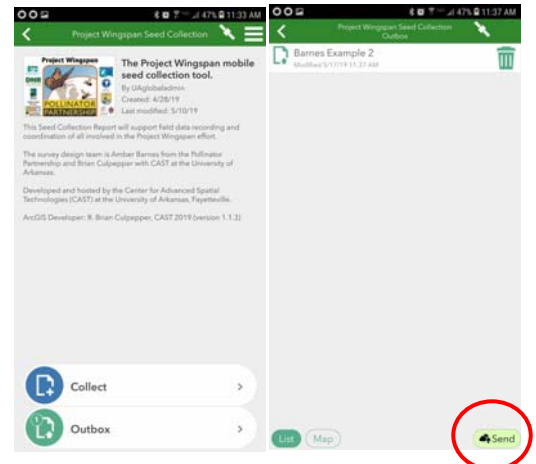
DRAFT SURVEYS within the Seed Collector Report orange DRAFT folder:

- Any reports saved as drafts will show up on the PW Seed Collection Report home screen. Click ‘drafts’ and the following screen will show the number of unsent Seed Collector Report surveys that have not been submitted.
- EACH Draft survey within the Project Wingspan Seed Collection **drafts** folder can be re-opened and completed at a later day or time. Once the PW Seed Collection Report is completed and your device is “online”, users can submit the completed report to the Project Wingspan geodatabase.



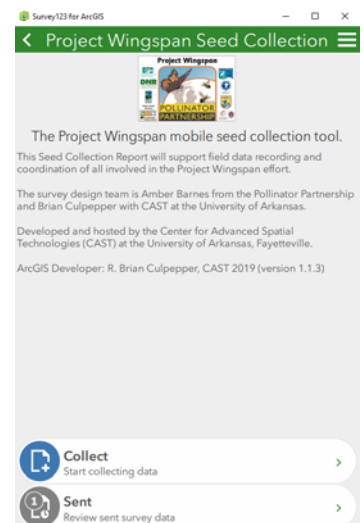
Complete surveys within the Seed Collector Report green OUTBOX folder:

- If a survey was completed, but could not be sent while in the field, they will appear in the OUTBOX folder. **These surveys have not been successfully submitted.** Cellular coverage or Wi-Fi interruptions can interrupt a submission and cause this message to appear.
- Make sure you are still signed in and then click the Outbox button to view the unsent surveys. Click ‘send’ and retry until you receive satisfactory feedback within the app that your reports were successfully submitted.



A SUCCESSFULLY SENT Survey will go into the gray SENT folder:

- The Seed Collector Report Survey’s that were SUCCESSFULLY SUBMITTED have the GRAY button with a COUNT indication.
- You can decide to keep these locally on your mobile device or CLEAR them from your SENT folder by clicking the button at the bottom of the page within the Survey123 for ArcGIS application.



Appendix G - Part 2: Using the Seed Collection Report within a Web Browser (desktop/Tablet browser):

You can also submit your Seed Collection Reports from a web browser, if desired. Although it's best to use the Survey123 mobile application to collect/report your Seed Collection report from the field, it's not always possible. We still have a way for volunteers to upload their field collection reports so that everyone involved within Project Wingspan is updated on your seed collection activities! You must have P2 seed collector Report credentials to log-in and submit any Seed Collection Reports, so review the instructions above for obtaining your PW credentials. Not all volunteers will require credentials; only volunteers that are using the Seed Collector Report applications on their mobile device or desktop web browser.

<https://arcg.is/10ye09>

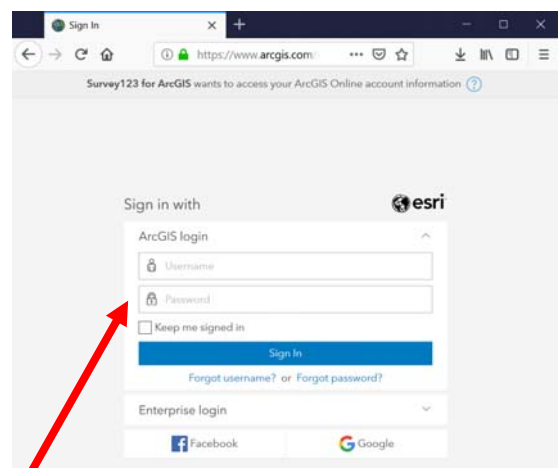
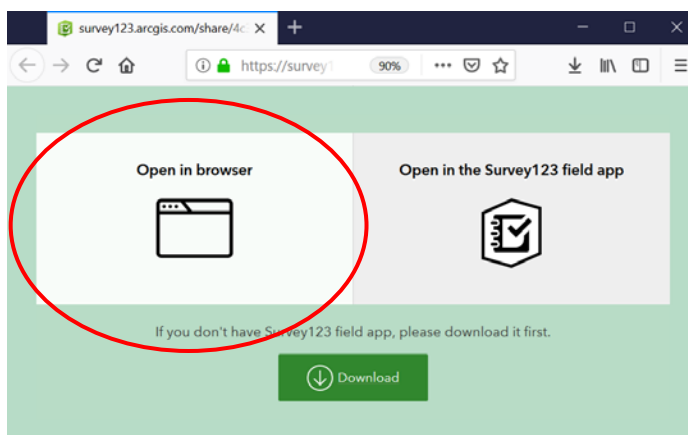
THE URL ABOVE WILL PROMPT the user to Open the survey within a web browser, or within the Survey123 for ArcGIS field application (Android, iOS, Windows).

**** if you have any troubles opening this link; please contact Isaac Lisle (isaac@pollinator.org) at the Pollinator Partnership and Brian Culpepper (brian@cast.uark.edu) at the University of Arkansas, Fayetteville.**

The Seed Collector Report can be submitted from within a Web Browser

The following desktop web browsers are supported (for best performance, be sure to update to the latest version):

- Chrome*
- Firefox*
- Safari*
- Edge – **not recommended but it will work.**
- Internet Explorer 11



Seed Collector Report – Credentials LOGIN page (Credentials are REQUIRED)

Appendix G. Project Wingspan Seed Collection Report GIS App Instructions

Seed Collector Report – Web Browser Form Opens (after a successful Sign-in)

PW Seed Collector v1.1

Seed Collection Details

Data Recorder Name:*
Last name only.

Collection Team and Project Site ID:*
e.g. OH.CT1.A - Please follow the Naming conventions dictated within the P2 training guide.

Please input 3-30 characters

Collection Number:*
Please enter this Seed Collection Number following the training material guidelines.

Please input a number between 1-300

Seed Collection Date:*
When did the Seed Collection occur?

Please input a date between 02/01/2017-12/31/2018

State Name:*
Which State is this seed collection located?

County Name:*
Please select a county or begin typing to shorten the pick list.

Collection Zone:
The Project Wingspan Collection Zone for this county is:

- Once you select the state and county in which your collection site is located, the collection zone field will auto-populate to the correct color, based on the maps in Appendix J. You can use this information to fill out the Collection Zone field on the paper Field Data Form.

Locate the Seed Collection Site:
Enable **Location Services** on your mobile device, and **ZOOM** into the map to precisely locate the site. The map marker is the lat./long. collected when you submit this survey.

- By clicking the “Set Location” the map view will open, and if you’re using a mobile browser, it may be able to locate you using the internal GPS of the device you’re using.
- If not, then you can use a Place Name or Street address to locate your Seed Collection Site, but make sure to drag the map under the PIN so that you can precisely locate the collection site. Toggle various background base maps by clicking on the *thumbnail map* in the upper-right corner of the map window. An internet or cell tower connection is required.
- When scrolling down the page. Take care not to scroll over the map once your pin location is set. If you do, it will change the location of your pin, and your data will not be accurate.

Locate the Seed Collection Site:
Enable **Location Services** on your mobile device, and **ZOOM** into the map to precisely locate the site. The map marker is the lat./long. collected when you submit this survey.

Map data © OpenStreetMap contributors, CC-BY-SA. Powered by Esri

Lat: Lon:

Altitude (m):

Appendix G. Project Wingspan Seed Collection Report GIS App Instructions

Seed Species Collected:*

-Please Select-

Target Plant Species In Bloom:

Were any other target plant species in bloom? Select all that were, please.

-Please Select-

Collection Site Photo:

Include people and try to capture the collection area character.

Press here to choose image file. (<10MB)



Plant Photo:

Please include the actual plants or group of plants collected from at this site.

Press here to choose image file. (<10MB)



Seed Photo:

High-contrast, clear image including an item for image scale such as a coin.

Press here to choose image file. (<10MB)



Leaf Photo:

A clear leaf photo from the plant(s) that seed was collected.

Press here to choose image file. (<10MB)



Data Sheet Photo:

A photo of the field notes taken during this seed collection.

Press here to choose image file. (<10MB)



Social Media Photo:

A photo suitable for P2 publication or educational materials.

Press here to choose image file. (<10MB)



Land Cover Type:*

Which Land Cover category best describes this seed collection site?

-Please Select-

Was landowner permission required for collection?

-Please Select-

Volunteer Census:*

How many Volunteers were present during this Seed Collection effort?

1-3

Please input a number between 0-100

Site Description:

Field notes for this seed collection site?

Please input 0-350 characters

[Project Wingspan Resources](#)

[Email Technical Support](#)



[University of Arkansas 2019](#)

Submit

Appendix G. Project Wingspan Seed Collection Report GIS App Instructions

Example: PW Seed Collection Receipt (via email)

** The format and contents of this message may change.

PW Zone: blue - SiteID: TESTING.AGAIN -- common_milkweed

Recorder Name: p2MOuser Training

Recorder Email: brian@cast.uark.edu

Project Wingspan Seed Collection

Lastname: culpepper

Collection Team - SiteID: TESTING.AGAIN

Collection Number: 3

Seed Collection Date: 05/22/2019

County: Berrien_MI

Collection Zone Type: blue

Seed Type: common_milkweed

Target Species Blooming: swamp_milkweed

Volunteers: 6

Site Notes:

Latitude:36.13245

Longitude: -96.6779

p2mouser

brian@cast.uark.edu

Thank you for Volunteering for the Project Wingspan project!

Here are some PW Site Visit Planning Resources

[Driving Directions to this Seed Collection Site](#)

[Weather at the Seed Collection Site](#)

Sincerely,

The Pollinator Partnership - 2019

Appendix H:

Contact Information

Appendix H. Contact Information

State Coordinators:

Elizzabeth Kaufman

State Coordinator of Illinois
Pollinator Partnership
Great Lakes Region
Email: ek@pollinator.org

Connie Crancer

State Coordinator of Michigan
Pollinator Partnership
Great Lakes Region
Email: cc@pollinator.org

Joe Hovis

State Coordinator of Pennsylvania
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Emily Yates

State Coordinator of Indiana
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Email: ey@pollinator.org

Mike Retterer

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Great Lakes Region
Email: mr@pollinator.org

Angie Doucette

State Coordinator of Wisconsin
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Email: aid@pollinator.org

Coordinating Partners

Pollinator Partnership:**Amber Barnes**

Wildlife Conservation Ecologist &
Native Plant Materials Coordinator
Pollinator Partnership
Great Lakes Region
Email: ab@pollinator.org

Elizzabeth Kaufman

Plant Ecologist &
Monarch and Pollinator Habitat
Coordinator
Pollinator Partnership
Great Lakes Region
Email: ek@pollinator.org

Isaac Lisle

Program Associate
Pollinator Partnership
423 Washington Street, 5th Floor
San Francisco, CA 94111
Tel: 415-362-1137
Email: isaac@pollinator.org

Appendix H. Contact Information

U. S. Fish and Wildlife Service:

Meredith Bryant

Wildlife Biologist
Great Lakes Restoration Initiative Pollinator
Coordinator
U.S. Fish and Wildlife Service
2651 Coolidge Road, Suite 101
East Lansing, MI 48823
Tel: 517-351-6238
Email: meredith_bryant@fws.gov

Jim Hazelman

Michigan Private Lands State Coordinator
U.S. Fish & Wildlife Service
Partners for Fish and Wildlife Program
Michigan Private Lands Office
2651 Coolidge Road, Suite 101
East Lansing, MI 48823
Tel: 517-351-6238
Email: jim_hazelman@fws.gov

Jeff Kiefer

Indiana Private Lands State Coordinator
U.S. Fish & Wildlife Service
Partners for Fish and Wildlife Program
Indiana Private Lands Office
620 S. Walker St.
Bloomington, IN 47403
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Email: Jeffrey_Kiefer@fws.gov

Lori Stevenson

Ohio Private Lands State Coordinator
U.S. Fish & Wildlife Service
Partners for Fish and Wildlife Program
Ohio Private Lands Office
771 East Main Street, Suite #102
Newark, OH 43055
Tel: 740-670-5312
Email: lori_stevenson@fws.gov

Julia Kemnitz

Partners for Fish and Wildlife
Indiana Private Lands Office
U.S. Fish and Wildlife Service
620 S. Walker Street
Bloomington, IN 47403
Tel: 812-334-4261 ext.1217
Email: Julia_Kemnitz@fws.gov

Brendan Woodall

Wisconsin Private Lands Biologist
Partners for Fish & Wildlife Program
4511 Helgens Drive
Madison, Wisconsin 53718
Tel: 608-221-1206
Email: brendan_woodall@fws.gov

Mason State Nursery:

Dave Horvath

IDNR Nursery Program Manager
Mason State Nursery
17855 County Road 2400E
Topeka, Illinois 61567
Tel: 309-535-2185
Email: dave.horvath@illinois.gov

University of Arkansas – CAST:

Brian Culpepper

GIS Research / Outreach Spec.
CAST, University of Arkansas
Tel: 479 575-8745
Email: brian@cast.uark.edu

Hanna Ford

Public Information Specialist
CAST, University of Arkansas
Tel: 479-575-8614
hlford@uark.edu

Appendix I:

Collection Tracking Sheet

Appendix I. Collection Tracking Sheet

[illegible]

Appendix J:

Seed Collection Zone Maps

Appendix J: State Collection Zone Boundaries

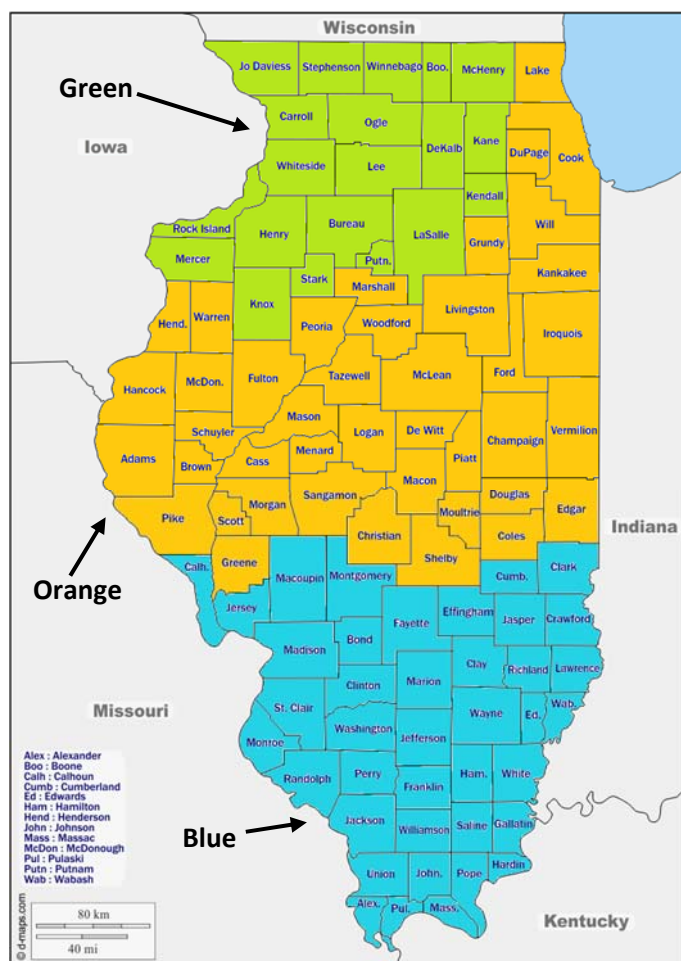


Figure 1: Illinois Seed Collection Zones (3 Zones)

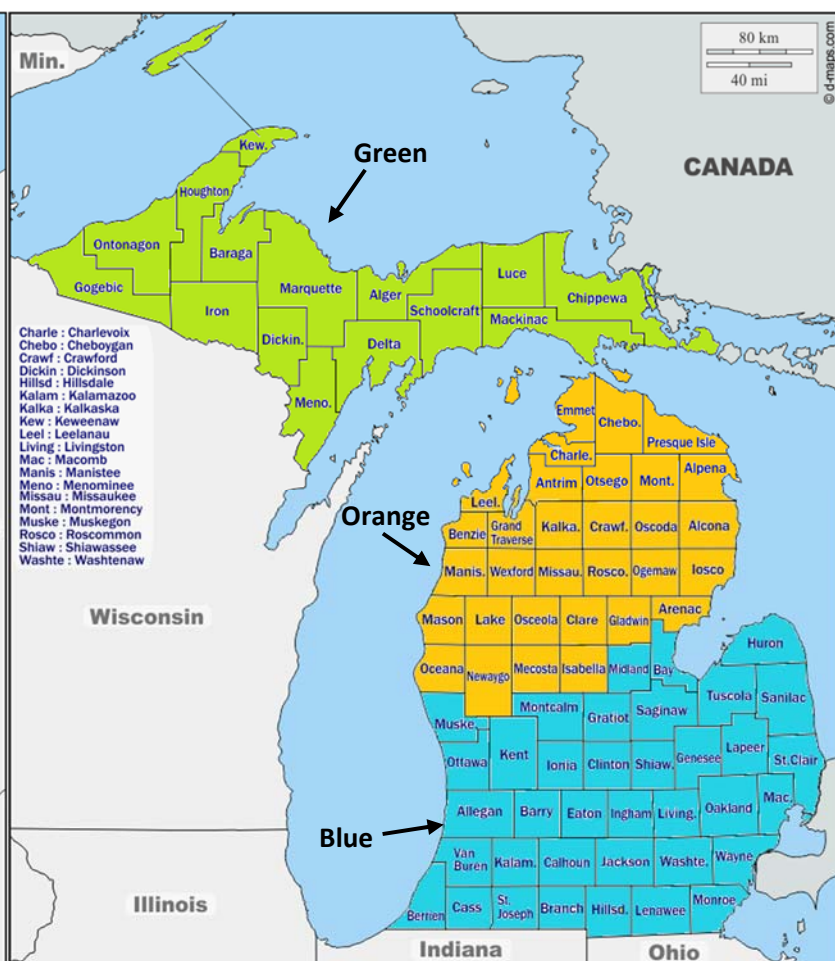


Figure 2: Michigan Seed Collection Zones (3 Zones)



Figure 3: Pennsylvania Seed Collection Zones (3 Zones)

Appendix J: State Collection Zone Boundaries



Figure 4: Ohio Seed Collection Zones (2 Zones)



Figure 5: Indiana Seed Collection Zones (3 Zones)

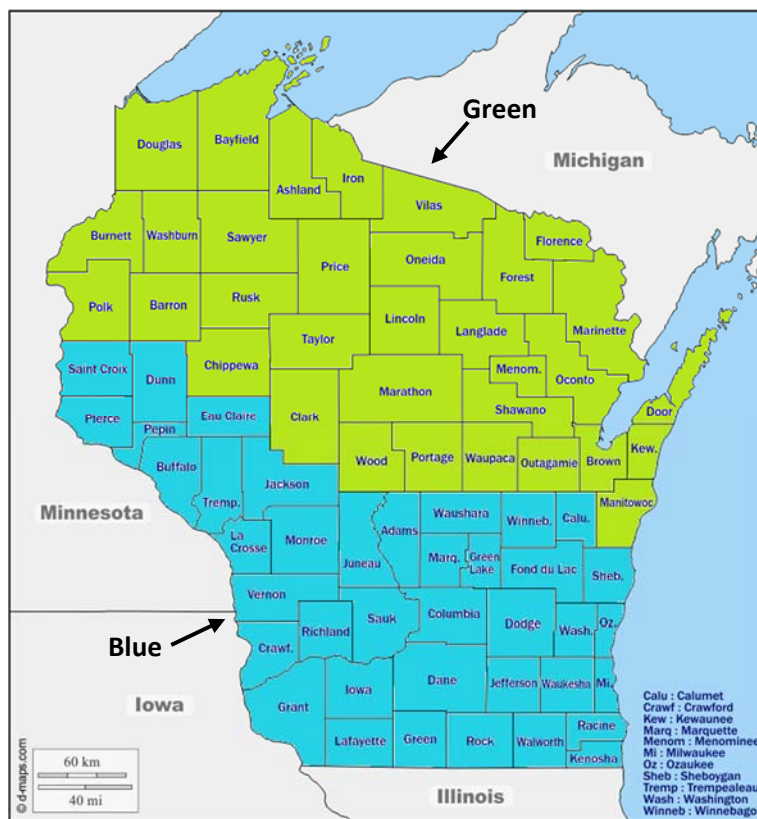


Figure 6: Wisconsin Seed Collection Zones (2 Zones)

Seed Collection Zone Color Key:

Green = North

Orange = Central or West

Blue = South