



THE XERCES SOCIETY
FOR INVERTEBRATE CONSERVATION



Conservation Cover (327) for Pollinators

Florida

Installation Guide



February 2015

The Xerces Society for
Invertebrate Conservation

www.xerces.org

Bumble bee on dense gayfeather (*Liatris spicata*). (Photograph by Nancy Lee Adamson, The Xerces Society.)

Acknowledgements

This material is based upon work supported by the Natural Resources Conservation Service, U.S. Department of Agriculture, under number 69-3A75-12-253. Any opinions, findings, conclusions, or recommendations expressed in this publication are those of the author(s) and do not necessarily reflect the views of the U.S. Department of Agriculture.



Financial support to the Xerces Society for the development of this guide was provided by the Audrey & J.J. Martindale Foundation, Aveda, Cascadian Farm, Ceres Trust, CS Fund, Disney Worldwide Conservation Fund, The Dudley Foundation, The Elizabeth Ordway Dunn Foundation, Endangered Species Chocolate, General Mills, SeaWorld & Busch Gardens Conservation Fund, Turner Foundation, Inc., The White Pine Fund, Whole Foods Market and its vendors, Whole Systems Foundation, the Natural Resources Conservation Service (NRCS), and Xerces Society members.

The authors would like to thank Bob Glennon; Ernst Conservation Seed Company; Drs. Cory Stanley-Stahr, Jamie Ellis, and Jaret Daniels (University of Florida–Gainesville); Straughn Farms; and the USDA–NRCS Brooksville Plant Materials Center.

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Revised edition

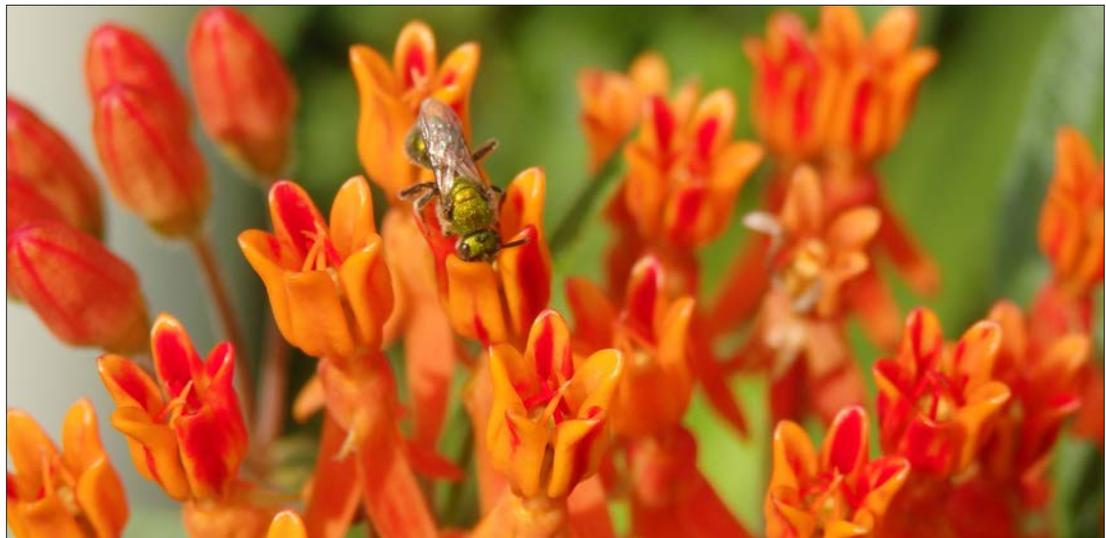
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Native bee on butterfly milkweed (*Asclepias tuberosa*). (Photograph by Nancy Lee Adamson, The Xerces Society.)

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The Xerces Society for Invertebrate Conservation is a nonprofit organization that protects wildlife through the conservation of invertebrates and their habitat. Established in 1971, the Society is at the forefront of invertebrate protection, harnessing the knowledge of scientists and enthusiasm of citizens to implement conservation programs worldwide. The Society uses advocacy, education, and applied research to promote invertebrate conservation.

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Conservation Cover (327) for Pollinators: Florida

Florida

Purpose

These instructions provide in-depth guidance on how to install bee habitat by enhancing nectar, pollen, and nesting resources with wildflower meadow plantings in the southeast, concentrating on Florida. Use this guide and an aerial map for project planning.

Client Conservation Objectives

Depending on landowner objectives and project design, pollinator habitat may also provide food and cover for other wildlife, reduce soil erosion, protect water quality, and support other beneficial insects such as predators and parasitoids of crop pests.

Key Site Characteristics

Practice Standard and site selection for pollinator habitat should take the following into consideration:

- **Existing Conditions:** If existing vegetation is mostly native, consider alternative Practice Standards to enhance floral diversity such as Herbaceous Weed Control (315) (for invasives or grasses) or Prescribed Burning (338).
- **Pesticide Drift:** Habitat must be protected from pesticides (especially insecticides and bee-toxic fungicides and herbicides). Only sites with no to very low risk for pesticide drift should be established as new habitat. Pesticides toxic to pollinators include some approved for organic farms.
- **Accessibility:** New habitat should be accessible to equipment for planting and maintenance operations.
- **Sunlight:** Most wildflowers and native shrubs grow best in full sunlight.
- **Slope:** Steep or highly erodible sites should not be disturbed. For revegetating such sites, consider Critical Area Planting (342) or other suitable Practice Standards.
- **Weed Pressure:** Areas with high weed pressure will take more time and effort to prepare for planting. Knowing the most abundant weed species on site, their reproductive methods, and whether they are grass or broadleaf, perennial or annual, and woody or herbaceous, will help significantly in planning for site preparation and follow up weed management during establishment.
- **Site History:** Factors such as past plant cover (e.g., weeds, crops, grass sod, and/ or native plants), use of pre-emergent herbicides or other chemicals, and soil compaction can affect plant establishment. Conditions such as poor drainage (or potential flooding) may make habitat establishment more difficult.
- **Soils and Habitat:** Choose plants to best match site conditions from this guide's Appendix, from the Florida NRCS *Pollinator Species Mixes and Cost Estimator Spreadsheet* (<http://go.usa.gov/WWcx>), Plant Materials Fact Sheets No. 3 *Planting Native Species for Flower Rich Pollinator Habitats* (<http://go.usa.gov/XQkC>), or No. 4 *Developing Planting Mixtures for Pollinator Habitats* (<http://go.usa.gov/XQ83>).
- **Irrigation:** To establish plants from plugs, pots, or bare root will require irrigation. Irrigation is generally not needed for plantings established from seed, but may help.
- **Other Functions:** The planting may offer opportunities to serve other functions, such as run-off prevention, stream bank stabilization, wildlife habitat, or windbreaks. Those factors can influence plant choice and/ or design.

Figure 1 Plant selection should focus on pollen and nectar-rich native plants as much as possible—include non-invasive, non-native plants when cost and/ or availability are limiting factors—with a mix of plants to ensure consistent and adequate floral resources through the seasons, like this pollinator planting in South Carolina.



(Photograph by Amy Overstreet, South Carolina NRCS.)

Plant Selection

Native Plants: Choose plants providing pollen- and nectar-rich forage resources for bees through the year, or warm-season bunch grasses that provide nesting habitat (25% or less of the mix by seed per square foot). Inclusion of grasses may limit options for use of grass-selective herbicides, if grass weeds are a primary concern. The Appendix provides regionally appropriate seed mixes for dry and wet sites and the Florida NRCS spreadsheet includes a longer list of plants sourced each year for availability.

If you are designing a custom plant list, choose a mix of plants to ensure consistent and adequate floral resources through the seasons. Some NRCS programs require a minimum of three species for each blooming period (spring, summer, and fall). For parts of Florida and the south, providing winter-blooming plants is also vital for supporting pollinators, and some shrubs or trees may best fill that niche. Plant mix composition (i.e., percent of each species) can be designed to complement adjacent crop bloom time—or

other abundant species in the landscape—with more plants blooming immediately before and after adjacent crops.

Non-Native Plants: Focus plant selection on pollen and nectar-rich native plants, but include non-invasive, non-native plants when cost and/ or availability are limiting factors. Please see the Appendix for acceptable non-native plants. Non-native plants such as buckwheat or clover may be planted as part of a crop rotation or in a perennial crop understory using the Cover Crop Practice Standard (340), to increase the value of crop fields to pollinators.

Alternate Pest or Disease Hosts: In most cases, native pollinator plants do not serve as alternate hosts for crop pests or diseases, but selected plants should be cross-referenced for specific crop pest or disease associations. Research indicates that diverse native plantings harbor fewer pests than unmanaged weedy borders.

Site Preparation

Site preparation is **one of the most important** and often inadequately addressed components for project success. It is also a process that may require more than one season of effort to reduce competition from invasive, noxious, or undesirable non-native plants prior to planting. *In particular, site preparation should focus on the removal of perennial weeds* (there are more options to address annual or biennial weeds after planting). Regardless of whether the objective is to establish herbaceous or woody vegetation, more effort and time spent eradicating undesirable plants prior to planting will result in higher success rates in establishing the targeted plant community. Site preparation methods are provided in **Table 1**.

Note: If weed pressure is high, then the weed abatement strategies detailed in **Table 1** should be repeated for an additional growing season. High weed pressure conditions are characterized by:

- Persistent, year-round cover of undesirable plants (covering the entire surface of the site);
- Sites where weeds have been actively growing (and producing seed) for multiple years;
- Sites dominated by introduced sod-forming grasses and rhizomatous forbs (e.g., Canada thistle).

Prior to planting, check seedbed firmness. If a footprint leaves an impression deeper than ¼", cultipack or roll to produce a firm bed.

Figure 2 The site on top was prepared with a single glyphosate treatment, leaving a significant stubble layer and persisting weedy grasses. It is not ready for planting. The site on below was treated for an entire growing season with repeated glyphosate treatments (applied whenever new weeds appeared). The stubble has been removed with a flail mower and it is ready for planting. Neither site has been cultivated.



(Photographs by Brianna Borders, The Xerces Society.)

Table 1 **Site Preparation Methods**

METHOD: NON-SELECTIVE (NON-PERSISTENT) HERBICIDE	
Where to Use <ul style="list-style-type: none"> • Conventional farms and organic farms* • Areas with a low risk of erosion • Areas accessible to sprayer 	Timing <ul style="list-style-type: none"> • Total time: 6+ months • Begin: Winter or early spring after the first weed growth • Plant: Fall
Basic Instructions: <ol style="list-style-type: none"> 1. Mow existing thatch as needed before beginning herbicide treatments to expose new weed growth to the herbicide spray. 2. Apply a non-selective, non-persistent herbicide as per label as soon as weeds are actively growing in the early spring. Avoid persistent herbicides that kill or inhibit germination of some native perennials. 3. Repeat herbicide applications throughout the spring, summer, and early fall as needed (whenever emerging weed seedlings reach 4–6”). 4. For any herbicide-resistant weeds, mow the area to prevent flowering and seed development as necessary. 5. Plant pollinator seed mix (and any transplants) in the fall, waiting at least 72 hours after the last herbicide treatment. Refer to the Planting Methods section of this document for specific recommendations. <p><i>NOTE: Do not till. Avoid any ground disturbance that may bring up additional weed seed. An additional year of site preparation is recommended if weed pressure is particularly high. Avoid use of herbicides that are bee-toxic (e.g., Paraquat and Gramoxone).</i></p> <p><i>* Choice of herbicides must be acceptable to OMRI for organic operations or, if not, used outside of certified ground AND approved by an organic certifier.</i></p>	
METHOD: SOLARIZATION	
Where to Use <ul style="list-style-type: none"> • Conventional farms and organic farms • Areas with a low risk of erosion • Areas accessible to mowing equipment • Locations with full sun 	Timing <ul style="list-style-type: none"> • Total time: 6+ months • Begin: Fall to spring • Plant: Fall to winter
Basic Instructions: <ol style="list-style-type: none"> 1. Mow, rake, or lightly harrow and smooth the site (raking or burning off debris if necessary). 2. After smoothing the site, lay UV-stabilized plastic (such as high tunnel plastic), following ground contours closely to reduce chances of tearing, and burying the edges to prevent airflow between the plastic and the ground. Weigh down the center of the plastic, if necessary, to prevent the wind from lifting it. Use greenhouse repair tape for any rips that occur during the season. 3. If planting in fall, remove the plastic in early fall before the weather cools and the area beneath the plastic is recolonized by nearby rhizomatous weeds. Otherwise, remove shortly before planting, raking off debris, if necessary, prior to planting. 4. Immediately plant the pollinator seed mix. Refer to Planting Methods section of this document for specific bed preparation recommendations. <p><i>NOTE: Solarization may not be as effective in years when summer sun or high temperatures are limited. Do not till. Avoid any ground disturbance that may bring up additional weed seed. An additional year of site preparation is recommended if weed pressure is particularly high.</i></p>	

Planting Methods

Recommended planting methods are site-specific. Factors such as equipment availability should be taken into consideration. Installing and maintaining habitat should fit into general farm management practices as much as possible. Pre-project site conditions, especially weed competition, should be addressed prior to planting. **Table 2** (next page) covers several planting options.

Seeding Wildflowers: Planting from seed can be a lower-cost way to establish wildflowers. Seeding requires **excellent site preparation** to reduce weed pressure since weed control options are limited when the wildflowers start to germinate. **Most native wildflowers are best planted in the late fall.**

Grain drills, unlike native seed drills, are usually not designed to handle wildflower seeds, many of which are very small. However, with simple modifications most types of grass-seed planters or granulated fertilizer spreaders can be used with good results. **Table 2** outlines several possible seeding methods.

Newly-planted areas should be clearly marked to protect them from herbicides or other disturbances.

Table 2 **Methods for Planting Wildflower Seed**

METHOD: BROADCAST SEEDERS OR HAND-BROADCASTING (THROWING SEED)	
<p>Pros</p> <ul style="list-style-type: none"> • Inexpensive • Easy to use • Can often accommodate poorly-cleaned seed • Many models and sizes of broadcasters are commonly available, including hand-held crank and larger tractor or ATV-mounted models 	<p>Cons</p> <ul style="list-style-type: none"> • Requires a smooth seed bed • Seed should be pressed into the soil after planting • Difficult to calibrate • Some models of broadcast seeders cannot accommodate large seeds
<p>Basic Instructions:</p> <ol style="list-style-type: none"> 1. Remove as much stubble as possible prior to seeding, creating a smooth, lightly-packed seed bed. The soil surface can be lightly hand-raked or harrowed to break-up crusted surfaces, but do not cultivate the site (cultivation will bring up additional weed seed). 2. Seeds of similar sizes can be mixed together and bulked up with an inert carrier ingredient such as sand, pelletized lime, sawdust, fine-grained vermiculite, clay-based kitty litter, gypsum, or polenta (fine cornmeal). Use two to three parts bulking agent for each part seed by volume. These inert carriers ensure even seed distribution in the mix, visual feedback on where seed has been thrown, and make calibration easier. 3. The broadcast-seeding equipment used should have a flow gate that closes down small enough to provide a slow, steady flow of your smallest wildflower seed. Models with an internal agitator are also preferred. Planting should begin with the flow gate set to the narrowest opening, to allow at least two perpendicular passes over the seed bed for even distribution. Very large seed can be planted separately with the flow gate set to a wider opening. 4. For small sites (e.g., less than one to two acres), seed can also be hand broadcast (similar to scattering poultry feed). When hand-broadcasting, divide the seed into at least two batches, bulk the seed mix with an inert carrier, and sow each batch separately (scatter the first batch evenly over the site while walking in parallel passes across the site, and then walk in passes perpendicular to the previous passes to scatter the second batch) to ensure seed is evenly distributed. 5. Regardless of how it is broadcast, do not cover the seed with soil after planting. A water-filled turf grass roller (available for rent at most hardware stores) or a cultipacker should be used to press the seed into the soil surface. Natural precipitation or light overhead irrigation can also help ensure good seed-soil contact. Floating row-cover can be used if necessary to protect seeds and small seedlings against predation. 	
METHOD: DROP-SEEDERS OR FERTILIZER SPREADERS (DROPPING SEED)	
<p>Pros</p> <ul style="list-style-type: none"> • Inexpensive • Easy to use • Even seed dispersal • Can accommodate both large and small seed • Many models and sizes are commonly available (hand-powered turf grass seeders are most common, but larger tractor-drawn “pasture-seeder” models also exist) 	<p>Cons</p> <ul style="list-style-type: none"> • Requires a smooth, level seed bed • Seed should be pressed into the soil after planting • Hand-powered models are time consuming for large areas (over ½ acre) • Calibration requires trial and error
<p>Basic Instructions:</p> <ol style="list-style-type: none"> 6. Remove as much stubble as possible prior to seeding, creating a smooth, lightly-packed seed bed. The soil surface can be lightly hand-raked or harrowed to break-up crusted surfaces, but do not cultivate the site (cultivation will bring up additional weed seed). 7. Seed of similar sizes can be mixed together and bulked up with an inert carrier ingredient such as sand, pelletized lime, sawdust, fine-grained vermiculite, clay-based kitty litter, gypsum, or polenta (fine cornmeal). Use two to three parts bulking agent for each part seed by volume. These inert carriers ensure even seed distribution in the mix, visual feedback on where seed has been thrown, and make calibration easier. Planting should begin with the drop gate set to the narrowest opening, to allow at least two perpendicular passes over the seed bed for even distribution. Very large seed can be planted separately with the drop gate set to a wider opening. 8. A water-filled turf grass roller (available for rent at most hardware stores) or a cultipacker should be used to press the seed into the soil surface. Natural precipitation or light overhead irrigation can also help ensure good seed-soil contact. Floating row-cover can be used if necessary to protect seeds and small seedlings against predation. Seed does not need to be covered after planting, but a light, weed and seed free mulch can help retain moisture and reduce seed loss due to wind or water erosion. 	

METHOD: NATIVE SEED DRILLS (DRILLING SEED)	
<p>Where to Use</p> <ul style="list-style-type: none"> • Convenient for planting large areas • Can plant into a light stubble layer • Seed box agitators and depth controls are designed specifically for planting small and fluffy native seeds at optimal rate and depth • Seeds are planted in even rows, allowing for easier seedling recognition • Does not require seed to be pressed into soil surface after planting (e.g., cultipacking) 	<p>Timing</p> <ul style="list-style-type: none"> • Expensive and not readily available in some areas • Difficult to calibrate for small areas (less than one acre) • Requires a tractor and an experienced operator to set planting controls • Seed with a lot of chaff can clog delivery tubes
<p>Basic Instructions:</p> <ol style="list-style-type: none"> 1. Plant only when the soil is dry enough to prevent sticking to the coulters. Under wet conditions, small seed is likely to stick to mud-caked parts of the drill, rather than the ground. 2. Keep seed separated by species until ready to plant. Prior to planting, seed should be organized into batches of large smooth seed, small smooth seed, and tufted seed that does not flow easily. Loosely fill seed boxes (do not compact seed into them) with the appropriate seed batch for each box. Seed quantities that do not cover the agitator should be planted using some other method, since the drill is difficult to calibrate for small volumes of seed. 3. As a general rule, the planting depth for a particular seed should be no more than 1.5x its diameter. To achieve this for most wildflower seed, set the depth controls to plant no deeper than ¼" (consult with the seed vendor for specific guidelines on very sandy soils). Small wildflower seed should be planted on the soil surface. Stop periodically to check planting depth. 4. Operate the drill at less than 5 mph, stopping to check periodically for any clogging of planting tubes (usually observed as a seedbox that is remaining full). Clogging is most common with fluffy seed, or seed with a lot of chaff. Avoid backing up the drill as it will likely cause clogging. <p>For information on native seed drill calibration, see NRCS publication: www.plant-materials.nrcs.usda.gov/pubs/mipmctn10591.pdf</p>	
METHOD: TRANSPLANTING FORBS AND WOODY PLANTS	
<p>Pros</p> <ul style="list-style-type: none"> • Provides mature nectar and pollen resources more quickly • Does not require specialized planting equipment (except for large trees) • Preferred for plants with limited seed availability, which are expensive or difficult to establish from seed • Transplants can be established more easily in weedy sites with adequate mulching 	<p>Cons</p> <ul style="list-style-type: none"> • Expensive and time-consuming for large areas • Transplants typically require irrigation during establishment
<p>Basic Instructions:</p> <ol style="list-style-type: none"> 1. Regular shovels are adequate for transplanting most container stock. However, dibble sticks or mechanical transplanters are sometimes helpful for plug-planting. Power augers and mechanical tree spades can be helpful for larger plants. 2. Plan for plant size at maturity. Most herbaceous plants can be spaced on 2' to 3' centers, while most woody shrubs are spaced on 4' to 10' centers (depending upon size at maturity). It is helpful to measure the planting areas prior to purchasing transplants, and to stage the transplants in the planting area prior to installing them in the ground. 3. Transplanting can occur any time the ground can be worked, but should be timed to avoid prolonged periods of hot, dry, or windy weather. Regardless of when planting occurs, however, the transplants should be irrigated thoroughly immediately after planting. Holes for plants can be dug and pre-irrigated prior to planting as well. Follow-up irrigation is dependent upon weather and specific site conditions, but generally even native and drought tolerant plants should be irrigated with at least 1" of water per week (except during natural rain events), for the first two years after establishment. Long, deep watering is best to encourage deep root system development and shallow irrigation should be avoided. Drip irrigation is useful, and other methods that allow for deep watering can be successful. It is advisable to irrigate at the base of plants and avoid overhead irrigation that would encourage weed growth. Once plants are established, irrigation should be removed or greatly decreased. Non-native plants may require more frequent irrigation, and may still require supplemental irrigation once established. 4. Most of the plants in the Appendix are adapted to a variety of soil conditions and do not need any specific amendments. However, in areas where the soil is compacted, degraded, or depleted, compost should be used during planting. Compost should be free from weed seeds, aged properly, and mixed thoroughly with soil in the holes during planting. 5. In cases where rodent damage may occur, below ground wire cages are recommended. Similarly, plant guards may be needed to protect plants from above ground browsing or antler damage by deer. Newly-planted areas should be clearly marked to protect them from herbicides or other disturbances. 6. Mulching is recommended to reduce weed competition and to retain moisture during the establishment phase. Recommended materials include wood chips, bark dust, weed-free straw (e.g., rice straw), nut shells, grape-seed pumice, or other regionally appropriate mulch materials that contain no viable seeds. 	

Planting Method Photos

Figure 3 For broadcast seeding, seed of **similar size** is mixed together (left). Sand or another inert carrier is added (at a ratio of at least 2:1) and then mixed (middle left), and the mix is divided into separate batches (middle right) for broadcasting in more than one pass (to ensure adequate coverage). When hand-broadcasting seed, walk in perpendicular passes over the entire planting area (right).



(Photographs by Brianna Borders, The Xerces Society.)

Figure 4 Native wildflower seed should be planted directly on the soil surface (left). After broadcasting, roll the site with a turf roller (middle) or cultipacker (right).



(Photographs by Brianna Borders, The Xerces Society.)

(Photograph by Regina Hirsch, University of Wisconsin.)

Figure 5 Hand-crank “belly grinder” type seeders (left) are inexpensive and can broadcast seed more evenly than hand-scattering on larger sites. Similarly, lawn fertilizer spreaders (right) are another commonly available tool for broadcasting seed. In both cases, models with internal agitators are preferred to prevent clogging. For best results, divide the seed into separate batches, grouping seed of similar sizes for planting together with the flow gate adjusted accordingly.



(Photographs courtesy of the New Hampshire NRCS.)

Figure 6 Native seed drills are the ideal tool for large planting sites (5+ acres). Typical models can plant in a light stubble layer, have depth controls for optimal seed placement, and have separate seed boxes for different sizes of seed. Such drills need an experienced operator and careful calibration.



(Photograph by Eric Lee-Mäder, The Xerces Society.)

Note: It can be difficult to plant very large and very small seed together in a single seed mix using mechanical broadcasters. Use an inert carrier (such as sand) and walk in at least two perpendicular passes to ensure the most even seed distribution possible.

Maintenance During Establishment (Short-Term)

Weed control is critical in the first and second years after planting. If the site is well prepared, then less effort will be required for weeding after project installation. Maintenance practices must be adequate to control noxious and invasive species and may involve mowing, burning, hand-hoeing, or spot-spraying with herbicides.

Weeds should be prevented from going to seed in, or adjacent to, the project area during the first two years (and possibly three) after planting to help ensure long-term success. Familiarity with the life cycle of weeds will facilitate appropriate timing of management activities. Since young wildflower and weed seedlings may look alike, care should be taken to properly identify weeds before removal.

Common weed-management strategies include:

- **Spot-Spraying:** Spot-spraying with herbicides can be effective, relatively inexpensive, and require minimal labor, even on larger project areas. Care should be taken so that herbicides do not drift or drip onto desirable plant species. Spot-spraying is usually performed with backpack spraying, or occasionally with rope-wick implements (when weed growth is substantially taller than newly established wildflowers).
- **Selective Herbicides:** Grass-selective herbicides can be used to control weedy grasses in broadleaf plantings. Contact a local crop advisor or Extension specialist for appropriate herbicide selection and timing.
- **Managing Irrigation:** Most wildflowers established from seed thrive with little or no supplemental irrigation. Keeping irrigation to a minimum helps native wildflowers out-compete non-native weedy species that sometimes have higher soil moisture requirements. Similarly, when irrigation is needed for transplants, it should be supplied at the base of the transplant when possible (through drip irrigation, for example) to avoid watering nearby weeds.
- **Mowing/ String-Trimming:** Mowing or string-trimming can be utilized to keep weedy species from shading out other plants and to prevent them from going to seed. Mowing is especially useful when establishing wildflower plots of perennial species. When planted with perennial seed mixes, sites can be mowed occasionally (ideally as high as mower settings allow) during the first year after planting to prevent annual and biennial weeds from flowering and producing seed. Perennial wildflowers are slow to establish from seed, and are usually not harmed by incidental mowing in the first year after planting. Mowing can also be used on plots of re-seeding annuals at the end of the growing season to help shatter wildflower seedpods, and to reduce woody plant encroachment. Mowing and string-trimming can also be useful around woody transplants to manage nearby weeds.
- **Hand-Weeding:** Hand-weeding (including hoeing) can be effective in small areas with moderate weed pressure. Hand-weeding will likely be necessary in forb plots to eliminate broadleaf weeds during the first few seasons.

Figure 7 *Short Term:* In the first spring after seeding the previous fall, this planting site is dominated by annual and biennial weeds like wild radish (left). Mowing the site periodically during the first year (ideally as high as mower settings allow) will prevent these short-lived weeds from producing more seed, and allow sunlight to reach the slower-growing natives (middle), which are generally unharmed by the occasional mowing. *Long Term:* Flourishing wildflowers and pollinator habitat in the second year after planting (right).



(Photographs by Eric Lee-Mäder, The Xerces Society.)



(Photograph by Don Keirstead, New Hampshire NRCS.)

Operations and Maintenance (Long-Term)

Control herbivores as needed, but remove tree guards or other materials that could impede plant growth as soon as possible after establishment. In most cases, irrigation can be removed from transplants by the end of the second year after planting. Continue to protect habitat from pesticides and herbicides except when necessary to control noxious or invasive plants. Ongoing herbicide use (spot-treatment) or occasional hand-weeding may be necessary to control noxious weeds. Maintain the long-term plant diversity of pollinator habitat by re-seeding or re-planting as necessary.

Wildflower plantings generally need to be managed over time to maintain open, early successional characteristics. The actual management will depend on the size and location of the habitat. Possible management tools/ techniques include

mowing or burning. If mowing is used, be sure all equipment is clean and free of weed seed. Do not mow or burn during critical wildlife nesting seasons (consult your state wildlife biologist for specific guidance). After establishment, no more than 30% of the habitat area should be mowed or burned in any one year to ensure sufficient undisturbed refuge areas for pollinators and other wildlife.

Finally, note that some common farm management practices can cause harm to bees and other beneficial insects. Insecticides are especially problematic, including some insecticides approved for organic farms. Therefore, if insecticide spraying is to occur on the farm, it is critical that the Conservation Cover planting area is outside of the sprayed area and/ or protected from application and drift.

Figure 8 Grow tubes or trunk protectors may help during establishment to reduce browsing by herbivores and trunk damage from mowers or weeding operations (left), but should be removed as soon as possible to avoid impeding plant growth. Most transplants will benefit from 1" of water per week during the first two years of establishment, either from natural rainfall or irrigation, such as the drip-irrigation (right).



(Photograph by Jessa Kay Cruz, The Xerces Society.)



(Photograph by Eric Lee-Mäder, The Xerces Society.)

Figure 9 Newly-planted areas should be clearly marked to protect them from herbicides or other disturbances (left). Using signs such as the one on the right can be a useful tool to designate protected pollinator habitat. (Note: Due to wildlife safety concerns, we recommend attaching habitat signs to the top hole of the fence post or plugging the top hole with a bolt and nut. Alternatively, posts which do not have holes—such as solid wood stakes—should be used.)



(Photograph by Kelly Gill, The Xerces Society.)



Appendix: Seed Mixes, Plant Lists and Sources, and References

Sample Seed Mixes

The following sample seed mixes are formulated for a one-acre planting area. For larger areas, increase the rate accordingly. To create custom seed mixes, see recommended species master list on page 16, Florida NRCS Pollinator Species Mixes and Cost Estimator Spreadsheet (available at: <http://go.usa.gov/WWcx>), or the references section for vendors (for established or custom mixes). *Plants listed by first season of bloom, then alphabetically.*

Base Mix for Florida NRCS Honey Bee and Native Pollinator Initiative

This low-cost mix is the base mix for core NRCS conservation practices throughout Florida: Conservation Cover, Field Border, and the 30-foot-wide herbaceous component of Hedgerow plantings—for more information, see *Hedgerow Planting (422) for Pollinators Installation Guide: Florida*¹.

COMMON NAME	SCIENTIFIC NAME	% OF MIX	SEEDS/ FT ²	LBS/ AC.	BLOOM TIME	RANGE ²
Blanketflower	<i>Gaillardia pulchella</i>	4%	1.54	0.28	Early–Late	N, C, S/ ST
Golden tickseed	<i>Coreopsis tinctoria</i>	18%	7.47	0.1	Early–Late	N, C, S/ ST
Dixie ticktrefoil ⁵	<i>Desmodium tortuosum</i>	6%	2.32	0.51	Mid	N, C, S/ ST
Black-eyed Susan ³	<i>Rudbeckia hirta</i>	28%	11.62	0.32	Mid–Late	N, C, S/ ST
Dotted horsemint	<i>Monarda punctata</i>	16%	6.64	0.2	Mid–Late	N, C, S
Partridge pea ³	<i>Chamaecrista fasciculata</i>	2%	0.75	0.5	Mid–Late	N, C, S/ ST
Narrowleaf sunflower ³	<i>Helianthus angustifolius</i>	6%	2.45	0.21	Late	N, C, S
Beaked panicgrass ⁴	<i>Panicum anceps</i>	3%	1.25	0.1	—	N, C, S/ ST
Purple lovegrass ⁴	<i>Eragrostis spectabilis</i>	18%	7.47	0.33	—	N, C, S/ ST
TOTALS		100%	41.5	2.54		

Base Seed Mix Notes:

1. Available at: www.xerces.org/wp-content/uploads/2013/01/InstallGuideJobSheet_Florida_Hedge.pdf
2. Regions of natural range are: North (N), Central (C), South (S), and South Tropical (ST).
3. Southeastern ecotype required for Florida NRCS assisted plantings (original seed source from FL, GA, AL, SC, NC, or MS).
4. Grass.
5. Panicked ticktrefoil (*Desmodium paniculatum*) may be substituted where Dixie ticktrefoil is a species of concern.

Figure 10 Native to North (N) and Central (C) Florida (and most of the U.S.), lanceleaf tickseed (*Coreopsis lanceolata*), attracts a variety of pollinators. Below, a buckeye butterfly and sweat bee share a single bloom.



(Photographs by Nancy Lee Adamson, The Xerces Society.)

Figure 11 Goldenmane tickseed (*Coreopsis basalis*) and golden tickseed (*Coreopsis tinctoria*), are non-natives, occurring naturally in the southern U.S. and west of Florida. They are non-invasive, commonly planted due to their ease of establishment and low-cost seed.



(Photograph by Jennifer Hopwood, The Xerces Society.)

Upland Base Mix for USDA Conservation Reserve Program (CRP)

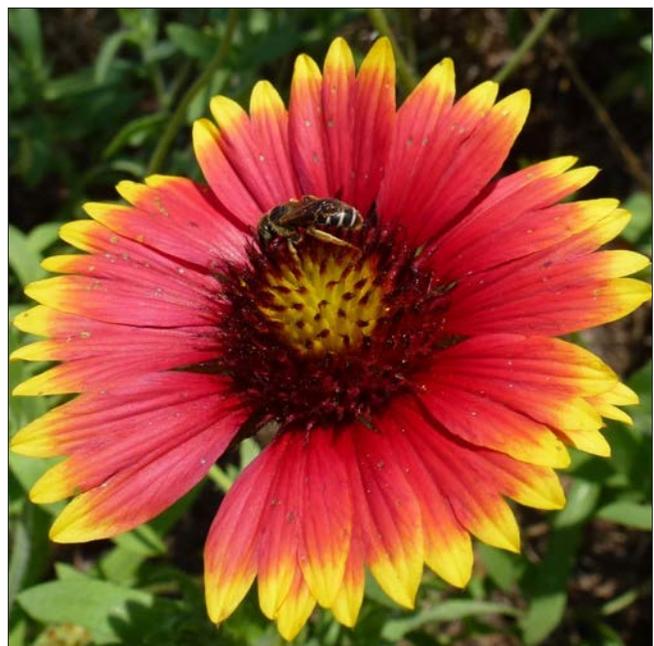
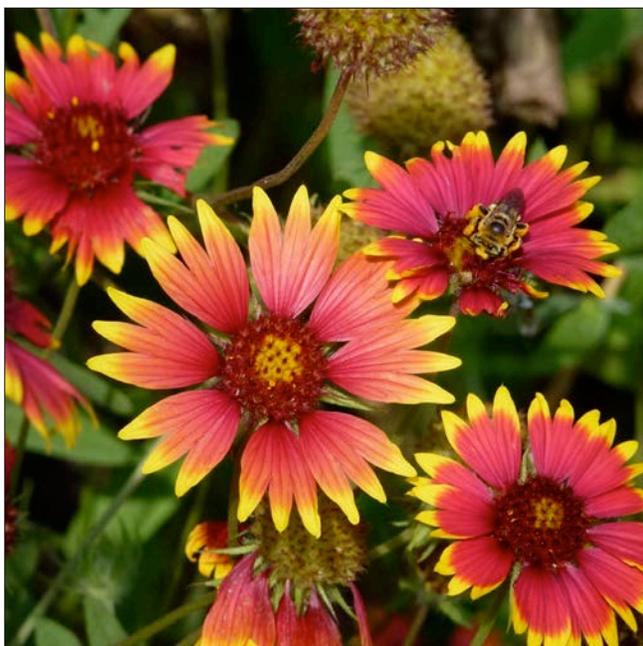
The NRCS provides technical assistance for the Conservation Reserve Program (CRP), administered by the Farm Service Administration. CRP plantings require nine wildflower species (three species per season) and two grasses. In Florida, mixes would ideally also include winter bloom, which may best be provided by shrubs and small trees—see *Hedgerow Planting (422) for Pollinators Installation Guide: Florida*¹.

COMMON NAME	SCIENTIFIC NAME	% OF MIX	SEEDS/ FT ²	LBS/ AC.	BLOOM TIME	RANGE ²
Blanketflower	<i>Gaillardia pulchella</i>	6%	2.4	0.44	Early–Late	N, C, S/ ST
Golden tickseed ⁵	<i>Coreopsis tinctoria</i>	15%	6	0.08	Early–Late	N, C, S/ ST
Manyflowered penstemon ³	<i>Penstemon multiflorus</i>	2%	0.8	0.09	Early–Mid	N, C, S/ ST
Panicled ticktrefoil	<i>Desmodium paniculatum</i>	3%	1.2	0.26	Mid	N, C, S/ ST
Black-eyed Susan ³	<i>Rudbeckia hirta</i>	15%	6	0.17	Mid–Late	N, C, S/ ST
Dotted horsemint	<i>Monarda punctata</i>	15%	6	0.18	Mid–Late	N, C
Lanceleaf tickseed ⁶	<i>Coreopsis lanceolata</i>	11%	4.4	0.87	Mid–Late	N, C
Partridge pea ³	<i>Chamaecrista fasciculata</i>	3%	1.2	0.80	Mid–Late	N, C, S/ ST
Narrowleaf sunflower ³	<i>Helianthus angustifolius</i>	10%	4	0.35	Late	N, C, S
Little bluestem ^{3, 4}	<i>Schizachyrium scoparium</i>	12%	4.8	1.05	—	N, C, S/ ST
Purple lovegrass ^{3, 4}	<i>Eragrostis spectabilis</i>	8%	3.2	0.14	—	N, C, S/ ST
TOTALS		100%	40	4.41		

Upland Seed Mixes Notes:

1. Available at: www.xerces.org/wp-content/uploads/2013/01/InstallGuideJobSheet_Florida_Hedge.pdf
2. Regions of natural range are: North (N), Central (C), South (S), and South Tropical (ST).
3. Southeastern ecotype required for Florida NRCS assisted plantings (original seed source from FL, GA, AL, SC, NC, or MS).
4. Grass.
5. Researchers at the University of Florida also recommend the annual goldenmane tickseed (*Coreopsis basalis*) as an alternative in North and Central Florida.
6. For plantings in the South or South Tropical regions, substitute slender gayfeather (*Liatrix gracilis*) or blue mistflower (*Conoclinium coelestinum*).
7. See Master Plant Lists Notes (p. 14–16).
8. Remove from plantings in the South or South Tropical regions (and anise goldenrod (*Solidago odora*) from Central region).

Figure 12 Blanketflower (*Gaillardia pulchella*) is a great early season resource with a long bloom period that supports different pollinators—including sunflower (left) and many other native (right) bees—in addition to beneficial insects. A hardy and attractive plant, it can also be harvested and sold as cut flowers.



(Photographs by Nancy Lee Adamson, The Xerces Society.)

Upland Diverse Mix for Pollinators and Other Beneficials

Greater plant diversity creates more habitat niches, ensures resilience through variations in climate seasonally and annually (moisture and temperature affect flowering and flowering time), and supports a greater diversity of pollinators and other beneficial arthropods that help control crop pests.

COMMON NAME	SCIENTIFIC NAME	% OF MIX	SEEDS/ FT ²	LBS/ AC.	BLOOM TIME	RANGE ²
Manyflowered penstemon ³	<i>Penstemon multiflorus</i>	2%	0.8	0.09	Early–Mid	N, C, S/ ST
White wild indigo	<i>Baptisia alba</i>	0.5%	0.2	0.29	Early–Mid	N, C, S/ ST
Blanketflower	<i>Gaillardia pulchella</i>	5%	2	0.37	Early–Late	N, C, S/ ST
Butterfly milkweed ²	<i>Asclepias tuberosa</i>	0.5%	0.2	0.12	Early–Late	N, C, S/ ST
Giant ironweed ^{3, 8}	<i>Vernonia gigantea</i>	2%	0.8	0.12	Early–Late	N, C
Golden tickseed	<i>Coreopsis tinctoria</i>	14%	5.6	0.08	Early–Late	N, C, S/ ST
Panicled ticktrefoil	<i>Desmodium paniculatum</i>	1%	0.4	0.09	Mid	N, C, S/ ST
Anise goldenrod ^{3, 8}	<i>Solidago odora</i>	2%	0.8	0.03	Mid–Late	N
Black-eyed Susan ³	<i>Rudbeckia hirta</i>	13%	5.2	0.14	Mid–Late	N, C, S/ ST
Blue mistflower	<i>Conoclinium coelestinum</i>	3%	1.2	0.03	Mid–Late	N, C, S/ ST
Button rattlesnakemaster ³	<i>Eryngium yuccifolium</i>	1%	0.4	0.14	Mid–Late	N, C, S/ ST
Dense gayfeather ³	<i>Liatris spicata</i>	0.5%	0.2	0.09	Mid–Late	N, C, S/ ST
Dotted horsemint ³	<i>Monarda punctata</i>	13%	5.2	0.15	Mid–Late	N, C, S
Lanceleaf tickseed ³	<i>Coreopsis lanceolata</i>	6%	2.4	0.47	Mid–Late	N, C
Narrowleaf silkgrass	<i>Pityopsis graminifolia</i>	0.5%	0.2	0.01	Mid–Late	N, C, S/ ST
Partridge pea ³	<i>Chamaecrista fasciculata</i>	2%	0.8	0.54	Mid–Late	N, C, S/ ST
Narrowleaf sunflower ³	<i>Helianthus angustifolius</i>	6%	2.4	0.21	Late	N, C, S
Slender gayfeather ³	<i>Liatris gracilis</i>	3%	1.2	0.52	Late	N, C, S/ ST
Broomsedge bluestem ⁴	<i>Andropogon virginicus</i>	8%	3.2	0.17	—	N, C, S/ ST
Hairawn muhly ^{3, 4}	<i>Muhlenbergia capillaris</i>	2%	0.8	0.02	—	N, C, S/ ST
Little bluestem ^{3, 4}	<i>Schizachyrium scoparium</i>	10%	4	0.87	—	N, C, S/ ST
Purple lovegrass ^{3, 4}	<i>Eragrostis spectabilis</i>	5%	2	0.09	—	N, C, S/ ST
TOTALS		100%	40	4.65		

Figure 13 Dotted horsemint (*Monarda punctata*)—often referred to as "beebalm"—is a member of the mint family that attracts various pollinators, especially bumble bees, in late summer and early fall.



(Photograph by Don Keirstead, New Hampshire NRCS.)



(Photograph by Nancy Lee Adamson, The Xerces Society.)

Moist to Wet Site Base Mix for USDA Conservation Reserve Program (CRP)

The NRCS provides technical assistance for the Conservation Reserve Program (CRP), administered by the Farm Service Administration. CRP plantings require nine wildflower species (three species per season) and two grasses. In Florida, mixes would ideally also include winter bloom, which may best be provided by shrubs and small trees—see *Hedgerow Planting (422) for Pollinators Installation Guide: Florida*¹. Plug and container plantings may also be more practical for wetlands due to the limited availability and cost of wetland seed, and easier establishment of plants.

COMMON NAME	SCIENTIFIC NAME	% OF MIX	SEEDS/ FT ²	LBS/ AC.	BLOOM TIME	RANGE ²
Leavenworth's coreopsis ^{5, 8}	<i>Coreopsis leavenworthii</i>	5%	0.8	0.04	Early–Mid	N, C, S/ ST
White wild indigo ⁸	<i>Baptisia alba</i>	0.5%	4	0.29	Early–Mid	N, C, S
Dotted horsemint ³	<i>Monarda punctata</i>	15%	6	0.18	Early–Late	N, C, S/ ST
Giant ironweed ³	<i>Vernonia gigantea</i>	6.5%	4.8	0.38	Early–Late	N, C, S/ ST
Golden tickseed	<i>Coreopsis tinctoria</i>	15%	2.4	0.08	Early–Late	N, C, S/ ST
Wand goldenrod	<i>Solidago stricta</i>	6%	1.2	0.1	Mid	N, C, S/ ST
Blue mistflower	<i>Conoclinium coelestinum</i>	12%	3.2	0.14	Mid–Late	N, C, S/ ST
Narrowleaf sunflower ³	<i>Helianthus angustifolius</i>	15%	6	0.52	Mid–Late	N, C, S
Partridge pea ³	<i>Chamaecrista fasciculata</i>	5%	1.2	1.34	Mid–Late	N, C, S/ ST
Beaked panicgrass ^{3, 4}	<i>Panicum anceps</i>	12%	6	0.37	—	N, C, S/ ST
Redtop panicgrass ^{4, 6}	<i>Panicum rigidulum</i>	8%	4.4	0.17	—	N, C
TOTALS		100%	40	3.61		

Moist to Wet Site Seed Mixes Notes:

1. Available at: www.xerces.org/wp-content/uploads/2013/01/InstallGuideJobSheet_Florida_Hedge.pdf
2. Regions of natural range are North (N), Central (C), South (S), and South Tropical (ST).
3. Southeastern ecotype required for Florida NRCS assisted plantings (original seed source from FL, GA, AL, SC, NC, or MS).
4. Grass.
5. Clustered bushmint (*Hyptis alata*) and white wild indigo (*Baptisia alba*) are alternative spring-blooming natives that grow throughout the state.
6. Bushy bluestem (*Andropogon glomeratus*) is an alternate for the southern regions.
7. Remove from plantings in the South or South Tropical regions (and Mohr's coneflower (*Rudbeckia mohrii*) from Central region). Consider adding species grown as plugs or in larger containers to increase diversity of wetland plantings in the more southerly parts of the state.
8. See Master Plant Lists Notes (p. 16 –18).
9. Widely available in containers.

Figure 14 Many species of native legumes are excellent pollinator plants that also attract a variety of beneficial insects and wildlife. White wild indigo (*Baptisia alba*), left, and wild lupine (*Lupinus perennis*), right, are two early-blooming examples that provide forage at the beginning of the season while enriching the soil.



(Photograph by Larry Allain, USGS.)



(Photograph by Scott Seigfreid.)

Moist to Wet Site Diverse Mix for Pollinators and Other Beneficials

Greater plant diversity creates more habitat niches, ensures resilience through variations in climate seasonally and annually (moisture and temperature affect flowering and flowering time), and supports a greater diversity of pollinators and other beneficial arthropods that help control crop pests.

COMMON NAME	SCIENTIFIC NAME	% OF MIX	SEEDS/ FT ²	LBS/ AC.	BLOOM TIME	RANGE ²
Dotted horsemint ³	<i>Monarda punctata</i>	5%	2	0.06	Early–Mid	N, C, S
Giant ironweed ^{3, 7}	<i>Vernonia gigantea</i>	4%	1.6	0.23	Early–Late	N, C
Golden tickseed ^{5, 8}	<i>Coreopsis tinctoria</i>	8%	3.2	0.04	Early–Late	N, C, S/ ST
Joe-pye weed ⁷	<i>Eutrochium fistulosum</i>	2%	0.8	0.05	Mid	N, C
Blue mistflower	<i>Conoclinium coelestinum</i>	7%	2.8	0.08	Mid–Late	N, C, S/ ST
Button rattlesnakemaster ³	<i>Eryngium yuccifolium</i>	1%	0.4	0.14	Mid–Late	N, C, S/ ST
Common sneezeweed ³	<i>Helenium autumnale</i>	7%	2.8	0.08	Mid–Late	N, C
Leavenworth's coreopsis	<i>Coreopsis leavenworthii</i>	4%	1.6	0.03	Mid–Late	N, C, S/ ST
Mohr's coneflower ^{3, 7, 8}	<i>Rudbeckia mohrii</i>	4%	1.6	0.05	Mid–Late	N
Narrowleaf primrosewillow ⁷	<i>Ludwigia linearis</i>	4%	1.6	0.01	Mid–Late	N, C
Partridge pea ³	<i>Chamaecrista fasciculata</i>	3%	1.2	0.8	Mid–Late	N, C, S/ ST
Seaside primrosewillow	<i>Ludwigia maritima</i>	5%	2	0.01	Mid–Late	N, C, S/ ST
Slender goldentop	<i>Euthamia caroliniana</i>	2%	0.8	0.03	Mid–Late	N, C, S/ ST
Swamp milkweed ⁸	<i>Asclepias incarnata</i>	1%	0.4	0.25	Mid–Late	C, S/ ST
Vanillaleaf ⁷	<i>Carphephorus odoratissimus</i>	1%	0.4	0.05	Mid–Late	N
Eastern rosemallow ^{7, 8, 9}	<i>Hibiscus moscheutos</i>	1%	0.4	0.09	Late	N, C
Narrowleaf sunflower ³	<i>Helianthus angustifolius</i>	10%	4	0.57	Late	N, C, S
Rayless sunflower ^{3, 7}	<i>Helianthus radula</i>	5%	2	0.09	Late	N, C
Wand goldenrod	<i>Solidago stricta</i>	4%	1.6	0.07	Late	N, C, S/ ST
Beaked panicgrass ^{3, 4}	<i>Panicum anceps</i>	8%	3.2	0.24	—	N, C, S/ ST
Bushy bluestem ^{3, 4}	<i>Andropogon glomeratus</i>	1%	0.4	0.08	—	N, C, S/ ST
Redtop panicgrass ⁴	<i>Panicum rigidulum</i>	6%	2.4	0.13	—	N, C, S/ ST
Woolgrass ^{4, 7}	<i>Scirpus cyperinus</i>	7%	2.8	0.004	—	N, C
TOTALS		100%	40	3.19		

Figure 15 Eastern rosemallow (*Hibiscus moscheutos*) supports the specialist hibiscus bee (*Ptilothrix bombiformis*), a species that is native to the eastern U.S.



(Photograph by Nancy Lee Adamson, The Xerces Society.)

SEED VS. PLUG CONSIDERATIONS (FOR UPLAND AND WETLAND PLANTINGS)

Seed availability and pricing varies, but the general trend is towards greater availability and less expensive seed. Planting plugs or larger containers of species difficult to find, or expensive as seeds, is a practical way to enhance diversity. Keep in mind that seeded areas will need to be mown the first year or two to control annual weeds and allow light to planted seedlings, so when combining seeds and plugs, keeping plugs in a distinct zone is helpful during the establishment period.

Fewer seeds are available for moist to wet sites and seeds can be more easily washed away in wet versus upland sites. Plugs and bareroot plant materials are readily available and relatively inexpensive for wetlands (due to high demand created by wetland mitigation).

While we are providing sample seed mixes for wetlands, planting plugs or larger container plants may help ensure greater establishment success in wetlands. Planting shrubs and trees in combination with plugs is especially effective for protecting riparian areas, while also enhancing resources for pollinators, beneficial insects, and other wildlife.

Master Plant Lists

Recommended Native¹ Wildflowers for Pollinators²

COMMON NAME	SCIENTIFIC NAME	HT.	BLOOM PERIOD	WATER NEEDS ³	RANGE ⁴	NOTES
Early Season Blooming Species						
Aquatic milkweed ^Z	<i>Asclepias perennis</i>	1–3'	SP, SU, FA	H (OBL)	N, C	See Notes ^Z
Blanketflower	<i>Gaillardia pulchella</i>	2'	SP, SU, FA	L (UPL)	N, C, S/ ST	Low-cost seed; thrives in disturbed sites
Butterfly milkweed ^Z	<i>Asclepias tuberosa</i>	2'	SP, SU, FA	L (UPL)	N, C, S/ ST	See Notes ^Z
Clustered bushmint	<i>Hyptis alata</i>	3–4'	SP, SU, FA	M (FACW)	N, C, S/ ST	Adapted to wet soils
Dotted horsemint ⁶	<i>Monarda punctata</i>	2–4'	SP, SU	L (FAC)	N, C, S	Prefers sandy soils ⁶
Giant ironweed ⁶	<i>Vernonia gigantea</i>	6'	SP, SU, FA	M (FAC)	N, C	See Notes ⁶
Golden tickseed ¹	<i>Coreopsis tinctoria</i>	3–4'	SP, SU, FA	L (FAC)	N, C, S/ ST (planted)	Annual; adventive in FL ¹
Goldenmane tickseed ¹	<i>Coreopsis basalis</i>	1–2'	SP, SU	M	N, C (planted)	Annual; adventive in FL ¹
Manyflowered penstemon ⁶	<i>Penstemon multiflorus</i>	3'	SP, SU	L (UPL)	N, C, S/ ST	See Notes ⁶
Oak Ridge lupine ⁵	<i>Lupinus diffusus</i>	2–4'	SP	L	N, C, S	Biennial; prefers sandy soils; benefits from fire ⁵
White wild indigo ⁵	<i>Baptisia alba</i>	3–4'	SP, SU	L (FAC)	N, C, S/ ST	Adapted to moist soils ⁵
Wild lupine ⁵	<i>Lupinus perennis</i>	2'	SP	L	N	Prefers sandy soils ⁵
Mid–Late Season Blooming Species						
Anise goldenrod ⁶	<i>Solidago odora</i>	2–5'	SU, FA	L (UPL)	N	See Notes ⁶
Aquatic milkweed ^Z	<i>Asclepias perennis</i>	3'	SU	H (OBL)	N, C	Queen butterfly host plant ^Z
Beach sunflower	<i>Helianthus debilis</i>	1'	SU	L (FAC)	N, C, S	Restricted to eastern coastal plain
Black-eyed Susan ⁶	<i>Rudbeckia hirta</i>	2–3'	SU, FA	L (FACU)	N, C, S/ ST	See Notes ⁶
Blue mistflower	<i>Conoclinium coelestinum</i>	1–2'	SU, FA	M (FAC)	N, C, S/ ST	
Boneset ⁶	<i>Eupatorium perfoliatum</i>	4'	SU	H (FACW)	N	See Notes ⁶
Button rattlesnakemaster	<i>Eryngium yuccifolium</i>	5'	SU, FA	L (FAC)	N, C, S/ ST	
Common sneezeweed ⁶	<i>Helenium autumnale</i>	4'	SU, FA	H (FACW)	N, C	See Notes ⁶
Dense gayfeather ⁶	<i>Liatris spicata</i>	5'	SU, FA	L (FACU)	N, C, S/ ST	Prefers sandy soils ⁶
Dixie ticktrefoil ^{5, 6}	<i>Desmodium tortuosum</i>	3–9'	SU	L	N, C, S/ ST	Annual or perennial ^{5, 6}
Eastern rosemallow	<i>Hibiscus moscheutos</i>	4–6'	SU	M (OBL)	N, C	Supports specialist hibiscus bee (<i>Ptilothrix bombiformis</i>), alt. rosemallow or okra bee
Fewflower milkweed ^Z	<i>Asclepias lanceolata</i>	3–5'	SU, FA	H (OBL)	N, C, S/ ST	See Notes ^Z
Joe-pye weed	<i>Eutrochium fistulosum</i>	6'	SU	H (FAC)	N, C	Alt. <i>Eupatoriadelphus fistulosus</i> and <i>Eupatorium fistulosum</i>
Lanceleaf tickseed	<i>Coreopsis lanceolata</i>	2'	SU, FA	L (UPL)	N, C	Low-cost seed
Leavenworth's coreopsis	<i>Coreopsis leavenworthii</i>	3'	SU, FA	L (FACW)	N, C, S/ ST	
Mohr's coneflower ⁶	<i>Rudbeckia mohrii</i>	2–5'	SU, FA	M (FACW)	N	See Notes ⁶
Narrowleaf primrosewillow	<i>Ludwigia linearis</i>	2–3'	SU, FA	H (OBL)	N, C	
Narrowleaf silkgrass	<i>Pityopsis graminifolia</i>	2–3'	SU, FA	L (FACU)	N, C, S/ ST	
Panicled ticktrefoil ⁵	<i>Desmodium paniculatum</i>	3–4'	SU	L (FACU)	N, C, S/ ST	
Partridge pea ^{5, 6}	<i>Chamaecrista fasciculata</i>	2'	SU, FA	L (FAC)	N, C, S/ ST	Butterfly host plant; extra-floral nectaries attract beneficial insects ^{5, 6}
Seaside goldenrod	<i>Solidago sempervirens</i>	3–5'	SU, FA	L (UPL)	N, C, S/ ST	
Seaside primrosewillow	<i>Ludwigia maritima</i>	4–5'	SU, FA	H (OBL)	N, C, S/ ST	

COMMON NAME	SCIENTIFIC NAME	HT.	BLOOM PERIOD	WATER NEEDS ³	RANGE ⁴	NOTES
Mid–Late Season Blooming Species <i>continued</i>						
Slender bush clover ⁵	<i>Lespedeza virginica</i>	2'	SU	L	N	See Notes ⁵
Starry rosinweed ⁶	<i>Silphium asteriscus</i> var. <i>angustatum</i>	2–5'	SU, FA	L	N, C, S (coastal)	See Notes ⁶
Summer farewell ^{5, 6}	<i>Dalea pinnata</i>	2–3'	SU, FA	L	N, C	Southern dogface (<i>Zerene cesonia</i>) host plant ^{5, 6}
Swamp milkweed ⁷	<i>Asclepias incarnata</i>	3–4'	SU, FA	M (OBL)	C, S/ ST	See Notes ⁷
Vanillaleaf	<i>Carphephorus odoratissimus</i>	4'	SU, FA	M (FACW)	N	
Late Season Blooming Species						
Narrowleaf sunflower ⁶	<i>Helianthus angustifolius</i>	8'	FA	L (FAC)	N, C, S	See Notes ⁶
Pinebarren goldenrod ⁶	<i>Solidago fistulosa</i>	4–6'	FA	L (FACW)	N, C, S/ ST	Common in dry, sandy forest understory ⁶
Pink-scale blazing star	<i>Liatris elegans</i>	4'	FA	L	N, C	Prefers sandy soils
Rayless sunflower ⁶	<i>Helianthus radula</i>	4'	FA	M (FACW)	N, C	See Notes ⁶
Shortleaf blazing star	<i>Liatris tenuifolia</i>	6'	FA	L	N, C	Prefers sandy soils
Slender gayfeather ⁶	<i>Liatris gracilis</i>	4'	FA	M (FACU)	N, C, S/ ST	Prefers sandy soils ⁶
Slender goldentop	<i>Euthamia caroliniana</i>	3'	FA	M (FAC)	N, C, S/ ST	
Wand goldenrod	<i>Solidago stricta</i>	2–6'	FA	H (OBL)	N, C, S/ ST	
White crownbeard	<i>Verbesina virginica</i>	4–5'	FA	M (FAC)	N, C, S/ ST	

Recommended Native Wildflowers for Pollinators Notes:

1. Non-native, non-invasive annual species that occur naturally west of Florida in the southern United States
2. Perennial plants unless otherwise noted.
3. Water Needs abbreviations: L = low, M = medium, H = high; wetland indicator status in parentheses (see <https://plants.usda.gov/wetinfo.html> for more details).
4. Regions of natural range are: North (N), Central (C), South (S), and South Tropical (ST).
5. Legume—rich in nitrogen and attractive to a wide variety of wildlife.
6. Southeastern ecotype required for Florida NRCS assisted plantings (original seed source from FL, GA, AL, SC, NC, or MS).
7. Monarch butterfly host plant. Milkweed also supports a huge diversity of other pollinators and beneficial insects. Does not do well in seed mixes or from small transplants—look for milkweeds sold as plugs or in larger containers to supplement plantings—tolerates clay soils; tolerates wet or dry conditions.

Figure 16 Milkweed (*Asclepias* spp.) is the host plant for the monarch butterfly, which feeds exclusively on milkweed as a caterpillar—shown left, on butterfly milkweed (*Asclepias tuberosa*). On the right, native bees forage on swamp milkweed (*Asclepias incarnata*)—which is only found in southern parts of Florida.



(Photograph by Nancy Lee Adamson, The Xerces Society.)



(Photograph by Kelly Gill, The Xerces Society.)

Native Grasses and Sedges for Pollinator Seed Mixes

Note: Grasses and sedges should ideally comprise no more than 25% of seed mixes on pollinator sites.

COMMON NAME	SCIENTIFIC NAME	HT.	WATER NEEDS ¹	RANGE ²	NOTES
Beaked panicgrass ³	<i>Panicum anceps</i>	2–4'	Med (FAC-)	N, C, S/ ST	See Notes ³
Broomsedge bluestem	<i>Andropogon virginicus</i>	3–5'	Low (FAC-)	N, C, S/ ST	
Bushy bluestem ³	<i>Andropogon glomeratus</i>	2–5'	High (FACW+)	N, C, S/ ST	See Notes ³
Eastern gamagrass	<i>Tripsacum dactyloides</i>	6'	Med (FAC)	N, C, S/ ST	Pollen collected by bees; host plant for various skipper butterflies
Hairawn muhly ³	<i>Muhlenbergia capillaris</i>	2–3'	Low (FACU)	N, C, S/ ST	See Notes ³
Indian grass	<i>Sorghastrum nutans</i>	6'	Low (FACU)	N, C	Scattered distribution
Little bluestem ³	<i>Schizachyrium scoparium</i>	2–4'	Low (FACU)	N, C, S/ ST	See Notes ³
Pineywoods dropseed	<i>Sporobolus junceus</i>	3'	Low	N, C, S/ ST	
Purple lovegrass ³	<i>Eragrostis spectabilis</i>	2–4'	Low (FACU)	N, C, S/ ST	See Notes ³
Redtop panicgrass	<i>Panicum rigidulum</i>	3–4'	Med (FACW)	N, C, S/ ST	
Saw-grass	<i>Cladium jamaicense</i>	6'	High (OBL)	N, C, S/ ST	Wetland emergent species
Toothache grass	<i>Ctenium aromaticum</i>	5'	Med (FACW)	N, C, S	Prefers sandy soil; host plant for various skipper butterflies
Wiregrass	<i>Aristida beyrichiana</i>	4'	Low (FAC-)	N, C, S/ ST	(= <i>A. stricta</i> var. <i>beryichiana</i>)
Woolgrass	<i>Scirpus cyperinus</i>	6'	High (OBL)	N, C	

Native Grasses and Sedges for Pollinator Seed Mixes Notes:

1. Water Needs abbreviations: L = low, M = medium, H = high; wetland indicator status in parentheses (see <https://plants.usda.gov/wetinfo.html> for more details).
2. Regions of natural range are: North (N), Central (C), South (S), and South Tropical (ST).
3. Southeastern ecotype required for Florida NRCS assisted plantings (original seed source from FL, GA, AL, SC, NC, or MS).

Non-Native Annual Plants for Insectary Meadows and Cover Crops

COMMON NAME	SCIENTIFIC NAME	BLOOM SEASON	HT.	NOTES ¹
Crimson clover ²	<i>Trifolium incarnatum</i>	Early	1.5'	Fall-seeded cover crop ²
Goldenmane tickseed	<i>Coreopsis basalis</i>	Early	1.5'	
Hairy vetch ²	<i>Vicia villosa</i>	Early	1.5'	Aggressive at high seeding rates ²
Buckwheat	<i>Fagopyrum esculentum</i>	Mid	2'	
Lemon beebalm	<i>Monarda citriodora</i>	Mid	3'	
Golden tickseed	<i>Coreopsis tinctoria</i>	Mid	3'	
Scarlet runner bean ²	<i>Phaseolus coccineus</i>	Mid	10'	Vine (requires support) ²
Common sunflower	<i>Helianthus annuus</i>	Late	9'	
Cosmos	<i>Cosmos bipinnatus</i>	Late	5'	Select single-petal varieties for pollinators

Non-Native Annual Plants for Insectary Meadows and Cover Crops Notes:

1. All have medium water needs
2. Legume—rich in nitrogen and attractive to a wide variety of wildlife.



Bumble bee on common sneezeweed (*Helenium autumnale*). (Photograph by Kelly Gill, The Xerces Society.)

Regional Native Seed Vendors and Native Plant Nurseries

Inclusion on this list does not constitute an endorsement. Other vendors not listed below may also have suitable plant materials. **Before ordering, ensure that all plants or seeds purchased for pollinator habitat have NOT been treated with systemic insecticides.**

Plant Real Florida Searchable Database

Florida Association of Native Nurseries' native plant database that includes information on plant communities, habit, growing requirements, wildlife benefits, and contacts for nurseries with each species and professional landscapers.

321-917-1960 • www.plantrealflorida.org

Aquatic Plants of Florida (T) • Sarasota, FL
800-266-1272 • www.apoff.com

Biosphere Consulting (T) • Winter Garden, FL
407-656-8277 • www.biospherenursery.com

Ernst Conservation Seed (S&T) • Live Oak, FL
800-873-3321 • www.ernstseed.com

Florida Native Plants (T) • Sarasota, FL •
941-322-1915 • www.floridanativeplants.com

Florida Wildflowers Growers Cooperative (S) • Crescent City, FL
352-988-8117 • www.floridawildflowers.com

Maple Street Natives (S&T) • West Melbourne, FL
321-729-6857 • www.maplestreetnatives.com

The Natives (S&T) • Davenport, FL
863-422-6664 • www.thenatives.net

Southern Habitats (S&T) • Greenville, FL
850-879-7900 • www.southernhabitats.com

Notes: Seeds Only (S), Transplants Only (T), Seeds & Transplants (S&T)

References & Resources

SEED MIX CALCULATOR & PLANT INFORMATION

Florida NRCS Pollinator Species Mixes and Cost Estimator

Develop your own pollinator conservation seed mix using this seed rate calculator (updated annually for species availability).

[http://efotg.sc.egov.usda.gov/references/public/FL/FLPMFS4WS\(protected\).xlsx](http://efotg.sc.egov.usda.gov/references/public/FL/FLPMFS4WS(protected).xlsx)

Florida NRCS Plant Materials Fact Sheets

No. 3 Planting Native Species for Flower Rich Pollinator Habitats

<http://efotg.sc.egov.usda.gov/references/public/FL/FLPMFS3.pdf>

No. 4 Developing Planting Mixtures for Pollinator Habitats

<http://efotg.sc.egov.usda.gov/references/public/FL/FLPMFS4.pdf>

Atlas of Florida Vascular Plants

Check on the natural distribution of plants you are considering planting.

www.florida.plantatlas.usf.edu/

Florida Native Plant Communities

Choosing plants based on natural plant community composition best supports associated wildlife.

www.fnps.org/resources/native-plant-communities

www.plantrealflorida.org

Florida's Best Native Plants: 200 Readily Available Species for Homeowners and Professionals

Gil Nelson's guide includes trees, shrubs, wildflowers, and grasses, with photographs and detailed horticultural information to help determine the best plant based on site conditions.

Weeds in Florida (University of Florida Extension Website)

A collection of identification and management fact sheets to common weeds of Florida.

http://edis.ifas.ufl.edu/topic_book_florida_weeds

Pollinator Conservation Resource Center

For additional information on pollinator plant lists, conservation guides, pesticide protection and more.

www.xerces.org/pollinator-resource-center

COMPREHENSIVE GUIDES

Attracting Native Pollinators: Protecting North America's Bees and Butterflies

This comprehensive book on pollinator conservation includes information about pollinator ecology, guides for identifying common bees, and habitat designs for multiple landscapes.

www.xerces.org/announcing-the-publication-of-attracting-native-pollinators/

Farming with Native Beneficial Insects: Ecological Pest Control Solutions

The newest book from Xerces provides clear, effective, science-based conservation strategies that increase beneficial insect populations on farms through conservation systems.

www.xerces.org/farming-with-native-beneficial-insects/

SITE PREPARATION & PLANTING GUIDELINES

Soil Solarization: A Nonpesticidal Method for Controlling Diseases, Nematodes, and Weeds

This fact sheet, produced by the University of California Cooperative Extension discusses the solarization process, including plastic selection, installation, removal, and underlying principles.

http://vric.ucdavis.edu/pdf/soil_solarization.pdf

Seed Quality, Seed Technology, and Drill Calibration

This Washington NRCS Plant Materials Technical Note (no. 7. 2005) features extensive information on calibrating native seed drills, and the use of inert carriers.

www.plant-materials.nrcs.usda.gov/pubs/wapmctn6331.pdf

Seeding Pollinator Plots (NRCS Technical Note)

This NRCS Plant Materials Center guide includes detailed information about the use of various types of seeders, and how seed size influences planting method, and planting success.

https://prod.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs142p2_023218.pdf

SEEDLING IDENTIFICATION

USDA-NRCS Central Region Seedling Identification Guide for Native Prairie Plants

Many of the plant species recommended in this guide are featured in a series of seedling photos in this downloadable resource.

www.nrcs.usda.gov/Internet/FSE_PLANTMATERIALS/publications/mopmcpu6313.pdf

USDA-NRCS Southeast Region Seedling Identification Guide for Native Grasses

www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs144p2_021323.pdf

Bonestroo Prairie Seedling and Seeding Evaluation Guide

Many of the plant species recommended in this guide are featured in a series of seedling photos in this resource. The publication also includes guidelines for assessing establishment success of seeded native grass and wildflower plots.

www.prairiemoon.com/books/identification-guides/prairie-seedling-and-seeding-evaluation-guide.html

