

# Monarch Habitat Development ON UTILITY RIGHTS OF WAY

Southwest



NAPPC

**POLLINATOR  
PARTNERSHIP**



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**POLLINATOR  
PARTNERSHIP**

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## Introduction

### Benefits of Managing for Monarchs

Utility rights-of-way are ideal for creating and managing for monarch habitat, and they provide multiple benefits to and opportunities for the utility. First and most importantly, monarch-friendly landscapes can provide safe utility landscapes. The number one responsibility of the utility is the efficient, timely, secure, and uninterrupted service of electricity. Utility corridors managed for monarchs provide the ability to comply with FERC and NERC regulations while supporting critical wildlife migratory corridors. The 2000 mile journey of the monarch butterfly is unique and a treasure whose fragility is evident in the diminishing numbers of monarchs. In the Southwest monarch spend their summers breeding and laying eggs in milkweed stands before making their migration to coastal California or Mexico. By creating monarch habitat that includes milkweeds and other native plant species, monarchs will have the nectar resources to fuel their journey.



Southwest utilities not only have the opportunity to support this wonder of nature, but in doing so they can build community relations, attract and retain new employees, foster employee loyalty and save money. This guide is intended to complement your company's existing vegetation management practices and enhance defined areas for monarch habitat. While creating monarch habitat on a large scale is ideal, this manual should not be used in place of a large scale management plan.

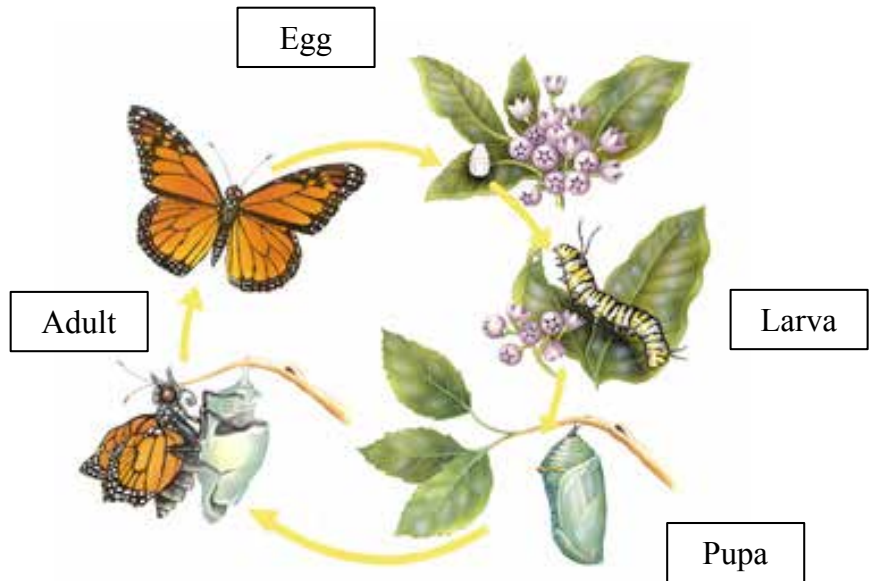


# Monarch Biology

## Monarch Life Cycle

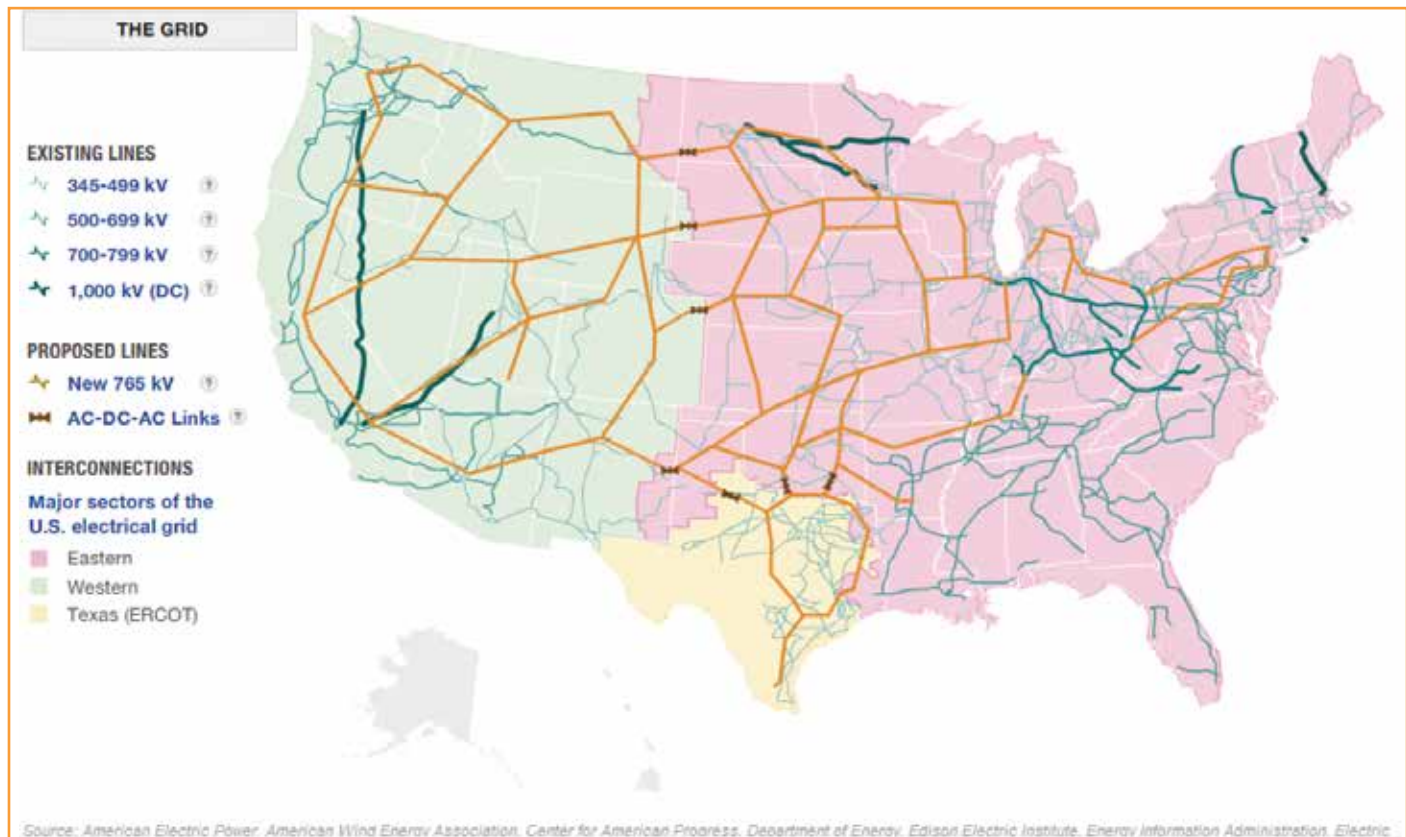
### Monarch Habitat Basics

Understanding the monarch's life cycle provides insight to the plant species needed to support them throughout their migratory journey. There is one plant that is indispensable to the life cycle of the monarch: milkweed. *Asclepias* spp. (milkweeds) are host plants for monarchs to lay their eggs. In addition, milkweeds provide food and protection for caterpillars. Many other flowering plants such as *Echinacea* spp. (coneflowers) provide nectar sources adult monarchs can use as fuel along their migratory routes. Make sure to plant species of milkweed within their native region for a more successful and ecologically responsible project. The Habitat Planting Guide, Appendix 1, provides you with a list of recommended plant species for each region.



### Monarch Life Cycle

A monarch egg is laid on a milkweed leaf. This egg hatches into a caterpillar within 3 to 6 days. The caterpillar feeds and grows over a 2-week period. Once fully grown, it chooses a safe location to form its chrysalis, and after about 10 days an adult emerges and begins to feed on nectar once its wings dry.



## What is the Monarch Migration?

There are two populations of monarchs in North America, one located east of the Rocky Mountains and the other to the west, although there is probably some interchange between these populations across the Rocky Mountains and in Mexico. Butterflies from the eastern population overwinter in Mexico, while those from the west overwinter at numerous sites along the California coast.

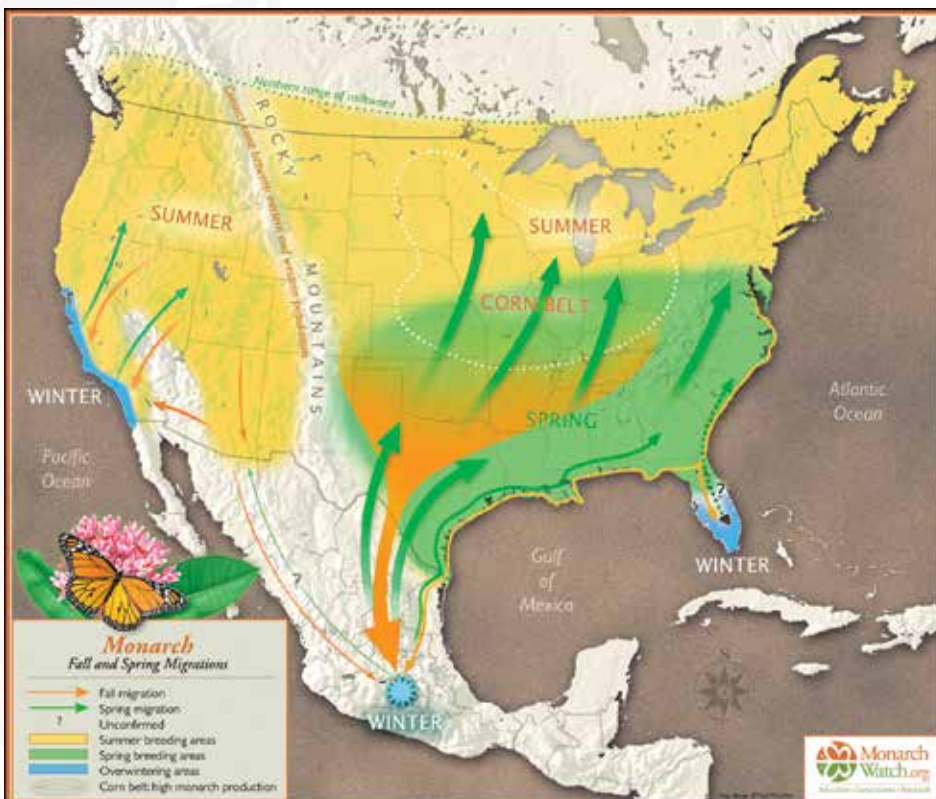
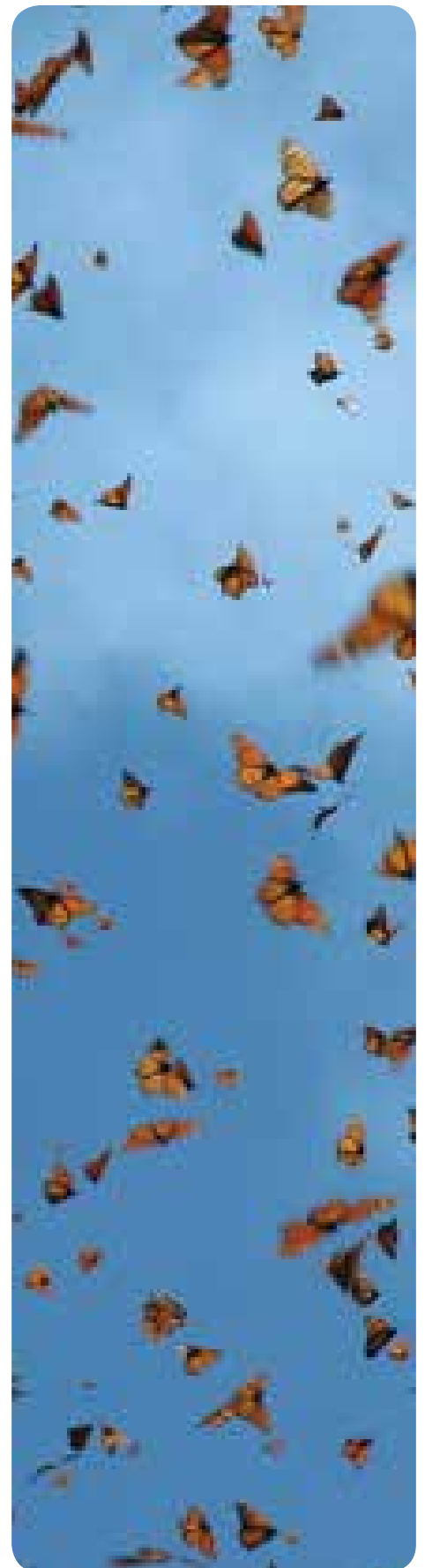
## The Eastern Migration

The eastern migration starts in March as butterflies from Mexico travel north into Texas and other southern states, breeding as they move northward. The butterflies produced in these areas move northward in May and June to colonize the northern U.S. states and southern Canada. Two or

three additional generations are produced before the southward migration begins two months later. Beginning in mid-August and continuing into fall, hundreds of millions of monarchs migrate south to spend the winter in high-elevation oyamel fir forests in central Mexico. Visit Journey North ([www.learner.org/jnorth/monarch/](http://www.learner.org/jnorth/monarch/)) to track the fall migration and monitor the arrival of monarchs in the spring. Monarch Watch ([www.monarchwatch.org](http://www.monarchwatch.org)) has a tagging program that helps us understand the routes they take in their migration.

## The Western Migration

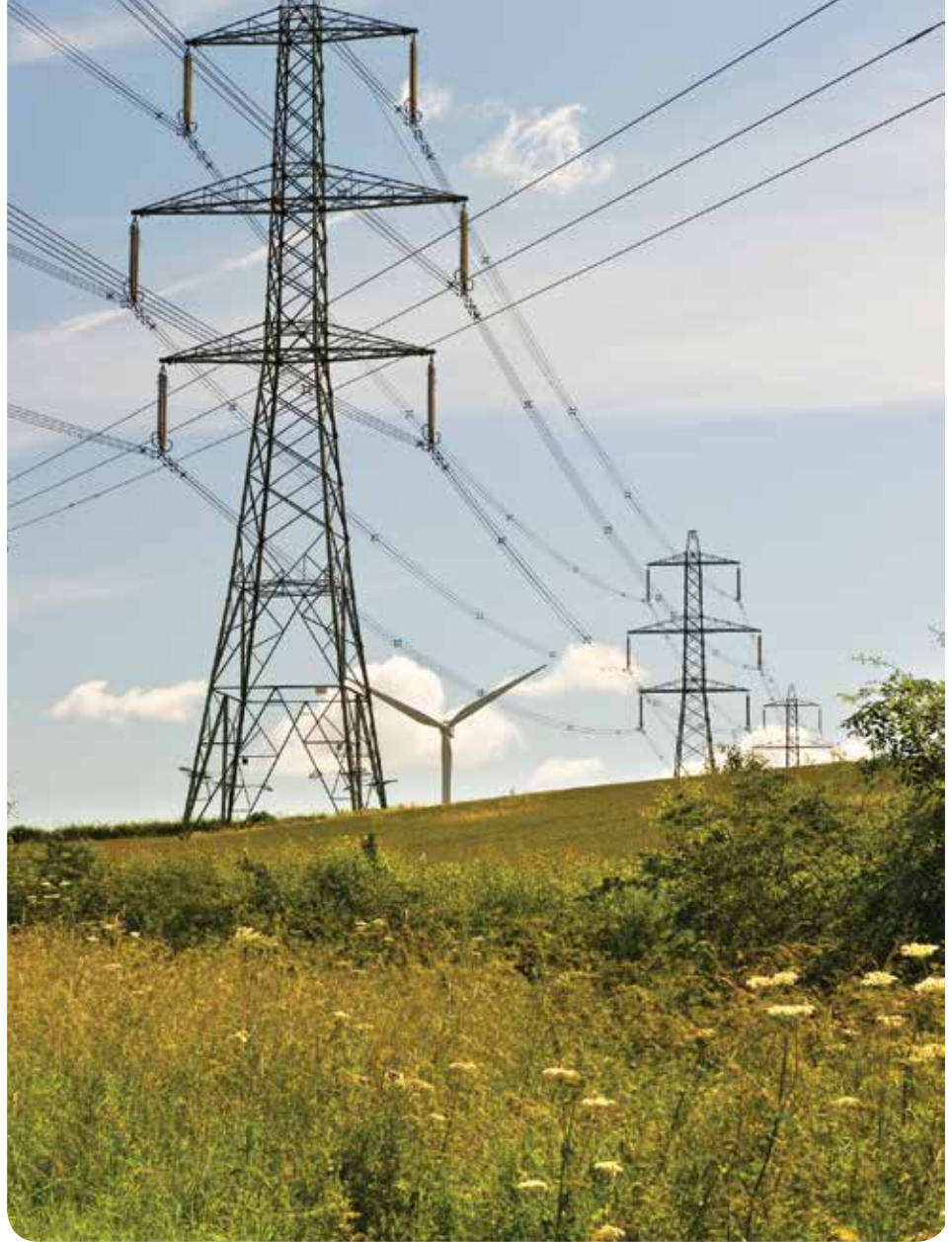
In the spring, western monarchs move inland, breeding in scattered habitats containing milkweeds throughout much of the west but primarily in California. In November, western monarchs begin to return to forested overwintering sites along the California coast, from Baja to Mendocino County.





## Monarch Habitat Development and Enhancement

There are many ways to approach developing monarch habitat on your Right of Way (ROW). Budget, size of the project area, and timeline all factor into how your project will progress and take shape. The steps provided in this manual are for your convenience and reference; use what you find applicable to your specific project.



- Step 1: Selecting a Site and Drafting a Management Plan
- Step 2: Building a Team, Gaining Support
- Step 3: Planning
- Step 4: Budget and Timeline
- Step 5: Site Preparation and Planting
- Step 6: Maintenance and Land Management
- Step 7: Education, Outreach, and Certification





## Step 1:

### Selecting a Site and Drafting a Management Plan

#### Site Selection

We hope that including monarch-friendly plants and management techniques in ROW management will be so easy that you will find opportunities to do so across large expanses of ROWs you manage. The information provided is to be used to enhance your existing management plans to include monarch habitat. Starting with a discrete project area is a great way to try these techniques before building them into landscape-level management.

Using the Site Evaluation Rubric in Appendix 2 (sample) and Appendix 3 (blank) begin evaluating potential project sites. The rubric is designed to help decision makers select a site for developing monarch habitat within a utility right-of-way for the first time. The rubric is intended to aid in objectively evaluating potential sites. No answer is 'wrong', they are just statements of facts to help you decide which site will

be the best to work with for your initial habitat project.

Before forming a team with external members, you may want to select several sites that would all be suitable and decide as a team which to move forward with.

Site selection may be influenced by the potential partnerships that may be formed at a specific site. For example, if a piece of land has an environmentally active neighbor, or is in the jurisdiction of a conservation authority, these groups may work together to achieve a common goal. Additionally, sites that may be used for public outreach, or that are more accessible to the public may be more desirable and thus, should be considered in site selection.

Once an initial site has been successfully established, your team may consider customizing or editing the rubric for future projects.

If the site is known habitat for a sensitive species, review all laws, regulations, and guidelines. Consult with the U.S. Fish and Wildlife Service, or in Canada with Environment Canada, for additional guidance. Even the slightest change in sensitive habitat can have negative effects on the rare, threatened, and endangered species it

supports. However, with careful planning, a habitat enhancement project could benefit both the species at risk AND monarchs.

#### Drafting a Management Plan

Draft the first version of a management plan that is within the capacity of your company to accomplish at this time at a suitable location. Your plan should consist of a broad objective, goals, actions, a budget, a timeline, roles and responsibilities, project evaluation, and outreach. In the following sections you will be provided with examples of each management plan component coupled with technical guidance on how to maximize the success of your project.

#### Objectives

Since the intent of this manual is to provide technical guidance for developing monarch habitat on utility rights-of-way, the objective for most all projects will be fairly similar to the sample objective below.

Sample Objective: Create monarch habitat while maintaining regulatory compliance in area X.

X = The name of your project site





## Step 2:

### Building a Team, Gaining Support **Establish Roles and Responsibilities**

To make monarch habitat projects as smooth and successful as possible it is important to gain internal support from within your company and the community.

Evaluate whether it is possible to establish an internal Monarch Habitat Team, and then reach out to the community for additional members as needed. As you have experienced with other land management situations, including community members in your land management planning process increases support and confidence in the forthcoming actions. You may want to invite representatives from the government and non-profit sector as well. For example; the local nature center biologist, the city planning office, department of public works, etc.

Experienced utility managers tell us that their projects would not have been successful without community partners, including schools, scouts, community naturalists, church groups, neighboring companies, landowners, as well as employee volunteers.

At the first and all subsequent team meetings take a roster of everyone in attendance along with their contact information. When it is reasonable to do so, begin assigning roles and responsibilities. Roles and responsibilities will grow and change as your actions develop. Delegate tasks to bring diversity and increase wider commitment to the project.



### Example Project Participants Worksheet

Name	Affiliation	Role/Responsibilities	Contact Information
Stephanie Ramirez	Utility Corp.	Corporate Liaison	sramirez@utility.com
Katy Kennedy	Utility Corp.	Budget and Timeline	KKennedy@utility.com
Andrew Phillips	Utility Corp.	Habitat Maintenance	APhillips@utility.com
Bosco Tam	GreenTeam (non-profit organization)	Site Preparation	BTam@greenteam.org
Amanda Lee	Master Naturalists (community volunteers)	Volunteer Coordinator	Alee@gmail.com
Jackie Fields	Utility Corp.	Media and Communications	JFields@utility.com
Nathan Moita	Mayor's Office (City Government)	Media and Communications	NMoita@city.gov







## Step 3:

### Planning

As a team, evaluate the potential sites determined in Step 1. Provide the site rubric results to the entire team to stimulate discussion, and hold a meeting to review the pros and cons of each site. Encourage every member of the team to provide their opinion. Ultimately, select a site with as few obstacles to success as possible.

If working alone, evaluate the results of each site evaluation.

### Managing Expectations

This manual is intended to aid in the development of monarch habitat in specific areas of utility rights-of-way for monarch habitat. It is not intended to be used as a large-scale management plan, although large-scale monarch habitat development is encouraged after success with initial projects. Think about possible limitations to the project, be upfront and realistic. Create a list of limitations, similar to the one below.

The following are major anticipated constraints to successfully developing monarch habitat (select all that apply):

- Invasive species
- Species at risk or sensitive habitat
- Winter road maintenance (ie. salting, grading, mowing)
- Department of Transportation vegetation maintenance with pesticides
- Water access/drought
- Seasonal timing
- Plant availability
- Seed availability
- Maintenance
- Adjacent lands
- Heavy recreational use
- Livestock or wildlife (deer and other ungulates)
- Environmental – lack of sun, high wind speed, etc.

While this is not a comprehensive list, it can be used along with the site evaluation rubric to begin identifying potential weak points in your project. Find ways to mitigate the issues before they turn into problems further down the road. For example, a section of impromptu hiking trail runs through your selected project area. Develop and install interpretive signage about the monarch habitat project that speaks directly to hikers at the assumed trail head, and install temporary fencing after the seeds and plants have been installed to discourage cut-throughs.



## Goals

Identify a series of goals to support your main objective. Determine specific actions that need to be taken to attain your goals. Develop actions that are narrow enough in scope that they can be managed by a single person; actions from one goal can overlap into another. By listing goals and actions your project becomes manageable by creating sections that will easily translate into a timeline and provide structure for your budget. Below is an example of how to approach this section of your management plan.

## Habitat Development and Maintenance

**Goal: Restore 90% of X area with beneficial monarch plant species within 2 years.**

### Actions:

1. Conduct a soil test to ensure desired planting materials will establish and develop into habitat.
2. Select which plant species from the Habitat Planting Guide (Appendix 1) to use in the project. (Additional guidance provided in Step 5)
3. Source and purchase plant materials.
4. Prepare site for installation, including removing invasive plant species.
5. Install a temporary deer fence.
6. Install plant material.

**Goal: Remove 90% of invasive plants before monarch habitat plant material installation.**

### Actions:

1. Conduct an inventory of all existing plant species.
2. Evaluate all available invasive plant removal methods and determine best approach for the site (additional guidance in Step 5). Removal may incur a cost that must be considered.
3. Properly dispose of all invasive species and weeds. It is important not to

send invasives to a compost facility.

4. Determine how invasive plants will be treated after the initial removal and the monarch habitat plant materials have been installed.
5. Educate your team and community on the spread of invasive species. Well-intentioned volunteers can accidentally spread invasives by not cleaning their shoes, etc.
6. Apply the invasive plant removal methods.
7. Evaluate the success of the removal.

**Goal: Maintain a threshold of 80% native plant species/20% introduced species on the site.**

### Actions:

1. Develop a monitoring schedule for early detection of invasive species.
2. Determine how invasive plants will be treated after the initial removal and the monarch habitat plant materials have been installed.
3. Monitor and treat any additional invasive plants that appear after initial removal.
4. Conduct a seasonal (4 times per year) plant inventory to determine if supplemental monarch habitat plant materials need to be ordered and installed.

## Certification

**Goal: Attain Wildlife Habitat Council's Corporate Habitat Certification**

### Actions:

1. Determine which certification process best applies to your project; Wildlife at Work or Corporate Lands for Learning.
2. Contact a Wildlife Habitat Council (WHC) biologist to establish contact and formally begin the certification process.

3. With the support of a WHC biologist, determine which additional actions need to be taken on the land to qualify for certification.
4. Arrange for a WHC biologist site visit.
5. Develop a wildlife management plan for the site and document the project.
6. Complete and submit all necessary paperwork.
7. If certification is attained, apply for recertification in two years.

## Outreach

**Goal: Gain the active participation in the project of two organizations, other than the utility company.**

### Actions:

1. Develop a list of potential partner organizations.
2. Seek a point of contact at each organization.



3. Plan an initial meeting and/or field day at the site to provide project background.
4. Send out initial meeting and/or field day invitations.
5. Hold the initial meeting and/or field day to gauge interest.
6. Follow-up with all who attended to encourage on-going participation.
7. Invite all who are interested to future meetings and assign roles and responsibilities to build support and ownership amongst outside organizations.

**Goal: Hold an annual National Pollinator Week Event** (see [www.pollinator.org](http://www.pollinator.org)).

**Actions:**

1. Solicit support and help from company staff.
2. As needed, ask for additional support from outside organizations.

3. Establish a theme, date, time, location and target audience.
4. Create an action plan for executing activities and assign duties.
5. Contact vendors as needed.
6. Begin publicizing the event about a month before the event.
7. Request outreach materials from the Pollinator Partnership.
8. Register this site with the S.H.A.R.E. (Simply Have Areas Reserved for the Environment) program at: <http://www.pollinator.org/SHARE.htm>.
9. Submit the event to the National Pollinator Week Event Calendar at [www.pollinator.org](http://www.pollinator.org).
10. Hold the event and document it with photographs or video, and submit those to [www.pollinator.org](http://www.pollinator.org).
11. Asked for participant feedback.
12. Hold an event review meeting and begin planning for next year.

## Project Evaluation

**Goal: Evaluate the project for success, weaknesses, and potential for improvement.**

**Actions:**

1. Review the Project Evaluation Form (Appendix 5) before starting the project.
2. Before habitat construction, take an inventory of existing plants and pollinators. Identify plants and pollinators to their genus, if possible.
3. Take 'before' pictures of the site.
4. After plants are established, conduct a pollinator survey or partner with an organization that can.
5. After plant establishment (about 2 growing seasons) take the first of many 'after' pictures.
6. Complete the Project Evaluation Form provided in Appendix 5, see the Sample Project Evaluation in Appendix 4.
7. Determine whether or not to install additional plant materials.





## Step 4:

### Budget and Timeline

#### Budget

Internally determine the maximum amount of funding your company can spend on this project and seek support from departments other than your own. Approach your team and determine if additional support can be leveraged by the local government, community members, or other companies.

Although volunteer hours are not monetary, seek commitments from groups such as Master Gardeners or Master Naturalist in your community. Weekly or even monthly commitments to perform specific site maintenance tasks will reduce overall maintenance costs.



#### Sample Budget

Item	Lead	Budgeted Amount
Planting Materials	Utility Corp.	\$1,000.00
Invasive Plant Removal	Utility Corp.	Included in current IVM Budget
Seeding and Planting	Utility Corp.	\$200.00 (lunch for volunteers)
Development of Interpretive Signage (one sign)	Ecological Services, Inc.	\$500.00
Installation of Interpretive Signage (one sign)	Precision Landscapers LLC	\$500.00
Post-Planting Weekly Watering	Precision Landscapers LLC	\$1,000.00
Weekly Invasive Plant Scouting	Master Gardeners	\$0.00
	<b>TOTAL</b>	<b>\$3,200.00</b>



## Sample Timeline

Action	Fall	Winter	Spring	Summer	Fall	Winter	Spring	Summer
Identify Potential Project Sites	X							
Hold Public Meetings	X	X	X	X	X	X	X	X
Evaluate Potential Sites and Select Project Area	X	X	X					
Draft Monarch Habitat Development Plan		X	X					
Establish Post-Planting Watering Plan		X	X					
Procure Planting Materials *		X	X					
Invasive Plant Removal			X	X	X			
Seeding and Planting			X		X			
Development of Interpretive Signage		X	X					
Installation of Interpretive Signage			X					
Plan and Hold a 'Ribbon-Cutting' Event			X	X				
Weekly Invasive Plant Scouting			X	X	X	X	X	X
Project Evaluation and Assessment						X	X	X
Hold a National Pollinator Week Event for the Public							X	
Present at a Professional Meeting								X

\* Orders may need to be placed in the winter, especially large orders, for spring delivery.

## Timeline

Once you have the budget developed, re-evaluate your list of goals and actions. Prioritize the list of goals, and begin assigning dates for goals to be completed by and specific dates when the actions will take place. Ask yourself if all the goals can be completed with your existing budget.

## Getting Estimates

Review the list of tasks and your budget. If there are tasks that cannot be completed 'in-house' by your organization, partners, or volunteers consider contracting the task out to another company as your budget allows.

## Evaluation

The Project Evaluation sample goal (in the previous section) and associated action items should get you thinking about ways you can evaluate your project to highlight success and improve on challenges. The entire team should participate in the evaluation process, and you should also seek additional comments from the community. See Appendix 4 for a sample project evaluation form and Appendix 5 for a blank form.

Based on this initial project, use what you have learned to begin expanding monarch habitat throughout the rest of your local, regional, national or international utility landscape system.



## Step 5:

### Site Preparation and Planting

Before preparing the site for planting, use the Habitat Site Evaluation Rubric (Appendix 3) to review key components to habitat development success: soil pH, the ability to procure additional planting materials and/or seed, and capacity to reduce invasive species.

### Soil Testing

Doing a simple soil test can save you a lot of time, money, and frustration. There are many laboratories across the country that will test your soil for pH and nutrients. Sending a small amount of soil will tell you if a site is suitable for planting or not. You can do an in-house soil test using an inexpensive pH meter, however this will not evaluate the essential nutrient levels.

In general, milkweeds do well in acidic to slightly acidic soil, below a pH of 7 (neutral). If the pH is too high, the plants will not be able to absorb the available nutrients in the soil and will die.

### Selecting Plants for Pollinators

Selecting the right mix of plant species is the backbone of any habitat enhancement project. See the Habitat Planting Guide in Appendix 1 for regionally appropriate native species that will provide both habitat and nectar for adult monarchs as well as

Plants vs. Seeds		
	Plants	Seeds
<b>Labor</b>	Intensive	Less Intensive
<b>Cost</b>	High	Low
<b>Water Need</b>	Generally needed for establishment.	Not required.
<b>Development Period</b>	Plants can flower the same season they are planted.	Development from seed to flowering plant can take 2-3 years.
<b>Availability</b>	Inventories are usually sold off seasonally.	Can be continuously available.

host feeding sources for larvae. Check local nativity with [www.PLANTS.USDA.gov](http://www.PLANTS.USDA.gov) or Biota of North America ([www.bonap.org](http://www.bonap.org)). For example, in the Southwest there are a few *Asclepias* (milkweed) species to choose from, but also include other nectar resources such as; dogbane, hyssop, buckwheat, and sage, to name a few.

Each recommended plant species listed in the Habitat Planting Guide has been evaluated for height, bloom period and commercial availability, so that you can efficiently meet your overall land management goals and maintain continuous bloom.

Plant materials such as plugs are usually more costly than purchasing seeds. Budget and scale are the most important factors when determining the correct combination of plants and seeds for your project. Plants are showier and more appealing to community members, but may require advance ordering. If you are short on labor and do not have access to water, plant-

ing thousands of plug plants across many acres will be impractical, whereas, broadcasting seed across many acres will be much less labor intensive. Above is a chart highlighting the pros and cons of seeds and plants that have already been started by a grower. Successful monarch habitat development can be achieved with either.

Generally, 3-5 plug plants are needed per square meter. Reduce this amount if using a combination of seeds and plugs.

Maintaining a long bloom period ensures that monarchs have nectar sources when they pass through your site on their migrations. Creating a diagram like the one below is helpful when making species selection. The project that used the planting plan in the diagram below decided to source the milkweeds as plug plants and the nectar species as seeds. With the species mix below, nectar will become available in March for the beginning of the eastern spring migration through Novem-

Planting Diagram													
Species	Flowering Period												Seed or Plug
	J	F	M	A	M	J	J	A	S	O	N	D	
<i>Salvia columbariae</i>			X	X	X	X							S
<i>Dalea formosa</i>				X	X	X	X	X					S
<i>Erigeron aphanactis</i>				X	X	X	X	X	X				S
<i>Asclepias californica</i>					X	X	X						P
<i>Asclepias speciosa</i>					X	X	X	X	X				S
<i>Eriogonum fasciculatum</i>					X	X	X	X	X	X			S
<i>Monarda fistulosa</i>					X	X	X	X	X				S
<i>Rudbeckia occidentalis</i>						X	X	X	X	X	X		S
<i>Agastache micrantha</i>							X	X	X	X			S
<i>Solidago canadensis</i>									X	X	X		S



ber for the end of the fall migration.

Over select the number of species you would like to include in the planting. Choose three species for each flowering season, and begin sourcing the material.

If it aids in meeting management objectives for the site, use a site and region-specific modification of the Wire-Zone/Border-Zone technique (see [www.arborchem.com](http://www.arborchem.com)). Select recommended plant species based on mature height potential.

In areas prone to fire, work with a vegetation management specialist to avoid creating a plant-based fuel ladder that could cause injury to humans, service disruption, and unnatural fire damage to surrounding habitats. Miller (2007) suggests planting a perennial meadow that can withstand woody plant encroachment. This is a good management alternative when managing for monarchs. The Habitat Planting Guide in Appendix 1 focuses on replacing grass with perennial forbs and low-growing shrubs that thrive in meadows and along roadsides. Grasses do not provide nectar for pollinators and increase fire risk.

## Timing of Planting

Determine the optimal planting time(s) for your region. Optimal planting times depend on precipitation, elevation, and temperature. In much of the Southwest seeding is done in the late fall and winter to take advantage of the winter rains.

## Site Preparation Techniques

The main components to site preparation are weed removal, ordering, receiving and installing plant materials.

## Removing Weeds

If undesirable species are the dominant plants at the site, decide what tactics will be used to remove them. Make sure the plants and seed you will be planting have been ordered. Coordinate the delivery so they can be planted shortly after the area has been cleared of invasive or undesirable species. If the site goes unplanted for an

extended length of time after invasive plant removal, the invasive species will return to fill the ecological void. Planting as soon as possible after invasive species are removed allows the desirable species to fill the open ecological niche.

When doing hand removal of persistent multi-stemmed woody plants, consider carrying a spray bottle of herbicide on your belt and directly spray the cuts as you work through the site. This will avoid over spraying or killing desired plants, and spraying the cuts immediately will prevent the cut from healing over and allowing the undesired plant to persist and thrive. Always read the labels and follow them exactly when using herbicide. Once the undesirable species have been sprayed, new plants and seeds should be installed approximately one week later.

Increasingly more and more utilities, ranches and federal, state, and private land managers are turning to goats for invasive plant removal. Goats are a particularly favorable option in sites close to residential areas; neighbors will not have to hear the sounds of machines or worry about chemicals. In many instances, goats are more cost effective. As a standard rule of thumb, about 25 goats can clear a heavily infested  $\frac{1}{4}$  acre per day. Goats prefer woody broad-leaf plant material.

Covering soil with a tarp or plastic will kill beneficial mycorrhizal, which many plants need to survive. Also, tilling the site may be problematic. It tends to promote growth of invasive species by disturbing the seed bank. It can also create a very muddy and unattractive area, which may not be desir-



able if you are bringing in volunteers to help plant your habitat.

## Seeding

The species listed in the Habitat Planting Guide are generally available as seeds. There are many techniques for seeding a site. Depending on the location of your site and the equipment you have available, decide which method is best for your project.

## Broadcast Seeding

Broadcast seeding is when seed is scattered either by hand or machine.

The soil should be tilled or at least raked when broadcast seeding. Scatter the seed across the site by walking the site in the north-south direction, then scatter the seed in an east-west pattern. All of the plant species recommended in the Habitat Planting Guide, Appendix 1, are native to the specified region and are highly adapted to drought. Although not necessary, watering the newly seeded site regularly for the following 4-6 weeks after seeding will promote establishment. As an erosion and invasive plant control measure, cover the site with certified weed-free straw if desired.

## Drill Seeding

Drill seeding uses mechanical equipment, a drill seeder, to cut into the soil and drop in the seed. By mechanizing the tasks of tilling, laying seed, raking over, and packing the seed into the soil, drill seeding can be an efficient alternative. However, you will need a specialized drill seeder.

## Hydroseeding

Hydroseeding combines seed with an organic mulching liquid that is hydraulically launched out of a hose attached to an energy source, usually a vehicle. Hydroseeding is an efficient option for covering large areas and/or areas that are difficult to access on foot. When applied correctly, germination can occur faster than broadcast or drill seeding. However, it is more expensive than broadcast or drill seeding.

## Aerial Seeding (Not Recommended)

Aerial seeding is a broadcast form of seeding in that seed is broadly applied to an area without drilling into the soil. Aerial seeding can cover very large areas in the shortest amount of time out. However, germination rate is often low and the costs are very high.

## Plug Planting

Plugs are often more successful than seeds. A great resource for milkweed plugs is the Milkweed Market at <http://monarchwatch.org/milkweed/market/>. Develop a planting strategy and communicate it to your group. Holes for plug plants can be dug with a basic trowel or small auger. To save time, have the holes dug in advanced. Generally, 3-5 plug plants are needed per square meter. Reduce this amount if using a combination of seeds and plugs.

If you are planning on using volunteers to help manage invasive species in your habitat, group your plugs a little bit. Having patches of the same species will help volunteers identify “good plants” from weeds in the early growing season, before flowers have blossomed. Once in bloom, it is easier for all pollinators to find grouped plants.

## Ordering Plants and Seed

Using the planting recommendations in the Habitat Planting Guide (Appendix 1) and the guidance under ‘Selecting Plants for Pollinators’, you should have a chart of over a dozen species to source and order. Many nurseries and seed vendors

post their inventories on the web. Since their production is so closely tied to the weather, the prices of plants and seeds can fluctuate on a daily bases. At peak ordering seasons (spring and fall), inventories can be exhausted in a matter of hours. Some nurseries accept future orders, which can aid in project planning and hedge against missing out on a particular species.

Since inventories fluctuate daily, calling the vendor is recommended over placing an order on-line. Additionally, many of the native seed vendors have plant ecologists on staff that can aid in creating a cost effective seed mix. For example, if there are 12 species you would like included in the seed mix, but several are very costly (\$100+/lb.) working with a seed vendor will help you find the balance between cost and diversity. The seed with a \$100/lb. price tag is more budget friendly when that particular species only makes up 2% of a 3 lb. seed mix.

## Receiving Plugs, Container Plants, and Seeds

Specify with the company you are ordering from an exact delivery date, so live plant orders will be delivered when someone is on-site to receive them. Have an area available to hold the plants before the delivery date. If you do not have a lath house on-site, prepare an area that has water available and semi-filtered sunlight. Remember, these plug plants were just shipped in the dark after spending a large amount of time in a greenhouse or other full sun setting and could possibly be experiencing some shock. Prevent shock by providing a neu-

tral environment.

Arrange for seeds to be delivered as close to the planting date as possible. Store seeds in a low-humidity, environmentally controlled area that is inaccessible to rodents and other pests. Never store seeds in a car for any length of time. Never store seeds in the direct sun, in plastic, or in a high-humidity environment.

Conduct a visual inspection as soon as the seeds and/or plants arrive. Confirm that the delivery contains the right species in the correct quantity. If the quality of plants is less than acceptable, photograph the worst offenders and contact the nursery immediately for replacement plants or a refund. Check your seed for insect damage and rot, photograph any damage, and contact the seed company immediately. Remember, when plants are shipped they are often in dark uncontrolled environments for several days. Nurseries and seed companies want to know if their courier has subjected the plant material to excessive heat or mishandling.

## Fencing

Deer fencing may be necessary until plants are established. Consider installing temporary fencing around your site, at least 7 feet high. There are many companies that provide deer fencing in various materials and price points. Some fencing material is more visible than others; consider the aesthetic before making a purchase. If your project site is in a highly visible area where you hope to bring a lot of visitors, you might opt for ‘invisible’ fence materials.







## Step 6:

### Maintenance and Land Management

In addition to selecting the right plant species for your project, there are landscape management techniques to improve monarch habitat on utility lands.

#### Watering

Native plants are well adapted to your ecoregional conditions and seeds will grow and establish without watering. As discussed in previous sections, when planting plants, have water available for at least one month after planting to ensure success.

#### Mowing

Areas neighboring your monarch habitat planting project can also support monarchs, and other pollinators and wildlife. To maximize the floral resources of these areas, which will further enhance your monarch habitat development project, consider switching to a bi-seasonal mowing schedule; early season mowing and summer mowing. A bi-seasonal mowing schedule will enhance the health of the monarch and pollinator populations by providing floral resources in addition to the monarch habitat planting project.

#### Invasive Plant Removal

As you know, utilities are already required to document their transmission vegetation management program as part of the North American Electric Reliability Corporation (NERC) standards. Just as you would for other parts of the utility landscape, evaluate the site, set objectives, define acceptable thresholds, evaluate and select control methods, and commit. Look to your existing transmission vegetation program for existing weed management plans, and ensure that your newly created monarch habitat will be incorporated in the larger vegetation management activities and weed treatments.



Weed scouting and reporting is a great task to delegate to volunteers and community members. For example, a weed scout volunteer group can survey the project area weekly, and report findings to the Integrated Vegetation Management (IVM) specialists at the utility company. This saves the utility scouting time, while engaging the community in the project.

#### Planting

Evaluate the site after every growing season and determine if supplemental plant materials are needed. Projects that have used mainly seed to create habitat will see plant establishment 1-3 years after the initial seeding. Do not be discouraged if your project site has not completely established after the first growing season.



## Step 7:

### Education, Outreach, and Certification

#### Education

Your newly created monarch habitat will provide an excellent learning opportunity for everyone, from school children to college students and other land management professionals. It can also engage existing employees and attract new hires. Educational visits are also a great way to showcase your commitment to the community and connect with others. Registering your site as a S.H.A.R.E. site and holding an event during National Pollinator Week (both at [www.pollinator.org](http://www.pollinator.org)) will ensure that others outside of your community will learn about the work your company is doing to promote pollinators.

#### Outreach

There are many ways to reach out to the community. Consider installing interpretive signage so that any visitor to the site not only becomes more informed about monarchs but also learns about your company and its commitment to the environment and community.

Additionally, providing information on your website in the form of background, project summary, and future plans will reach beyond your local community to others that have interest in similar projects or learning more about your company.

The Pollinator Partnership (P2) has a wide variety of outreach materials available at [www.pollinator.org](http://www.pollinator.org). Many of the materials can be customized with your company's logo.

Once the monarchs come to your area, tagging them through Monarch Watch is a popular activity for children and adults.

#### Certification

Contact organizations such as the Wildlife Habitat Council (WHC) if you are inter-



ested in taking part in the Habitat Certification process. P2 can assist in connecting your company to these types of organizations. Certification ensures that your habitat sustains pollinators and monarchs and also puts your company and your project in the national spotlight. Being part of the WHC will connect you to other land management professionals that can share in your successes and offer guidance for future projects.

#### Connect

Stay connected with national and international conservation efforts! There are a lot of web-based networks that provide recognition and assistance and hold regional and national meetings to share your success.

#### Resources

S.H.A.R.E: [www.pollinator.org/SHARE.htm](http://www.pollinator.org/SHARE.htm)

BeeSmart™ Gardener APP for iPhone and Droid, available at iTunes and the Google Play Marketplace.

Become a NAPPC partner at [www.napcc.org](http://www.napcc.org)

Monarch Joint Venture at <http://www.monarchjointventure.org/>

Pollinator Week: [http://www.pollinator.org/pollinator\\_week](http://www.pollinator.org/pollinator_week)

Monarch Waystation Program: <http://www.monarchwatch.org/waystations/>

Monarch Net: <http://monarchnet.uga.edu/>

Wildlife Habitat Council: <http://www.wildlifehc.org/about-whc/>

Monarch Watch: [www.monarchwatch.org/](http://www.monarchwatch.org/)

Milkweed Market for Milkweed plugs at <http://monarchwatch.org/milkweed/market/>

#### Monitor and Research

The Pollinator Partnership (P2) has partnered with many corporate landscapes, including utility ROWs to conducting monitoring and research. Contact P2 if you are interested in including your ROW in a scientific study that can aid in pollinator conservation.

Consider a monitoring program such as Monarch Larva Monitoring Project: [www.mlmp.org](http://www.mlmp.org)





## Final Thoughts

A successful monarch habitat project on a utility right-of-way holds the promise of supporting the wondrous migration of monarch butterflies while bringing your company and the communities in which you operate great satisfaction. You will support nature in your own backyard while connecting to a migratory corridor across the continent.

Beginning on page 20 you will find the specific plants to help you build monarch habitats. All the plants listed in the Habitat Planting Guide on pages 20-22 are commercially available.

Other regional lists are available if you need assistance in other locations. These are available at [www.pollinator.org](http://www.pollinator.org).

We welcome stories and pictures of your successes and are here to help you meet your challenges. Please contact [info@pollinator.org](mailto:info@pollinator.org) to give us your feedback or to ask questions. Thank you for supporting ecosystems through habitat management and providing resources for the beautiful monarch butterfly.



**NAPPC**





# Appendix 1

The following chart lists species native to the Southwest Region of the U.S. that provide monarch habitat. The Southwest in this guide is defined by the southern half of the western monarch range which

covers the following states; Not all species listed are native to every state in the region, Arizona, California, Colorado, New Mexico, Nevada, and Utah. Not all species listed are native to every state in the region, so

check your state and local noxious weed lists to confirm species are not known to be invasive before planting.

Region	Botanical Name	Common Name	Height	Bloom Period (range)	Light/Exposure	Plant Type
SW	<i>Achillea millefolium var. occidentalis</i>	Western yarrow	3 ft.	April-June	Partial Sun	Forb
SW	<i>Agastache breviflora</i>	Trans-Pecos giant hyssop	2-3ft.	June-August	Full Sun	Subshrub/Forb
SW	<i>Agastache micrantha</i>	White giant hyssop	1-3 ft.	July-October	Full Sun to Partial Shade	Subshrub/Forb
SW	<i>Agastache pallidiflora</i>	Pale giant hyssop	1-2.5ft.	July-October	Partial to Shade	Subshrub/Forb
SW	<i>Agastache rupestris</i>	Sunset hyssop	1-3 ft.	June-September	Full Sun to Partial Sun	Subshrub/Forb
SW	<i>Agastache urticifolia</i>	Nettle giant hyssop	3-6 ft.	June-August	Partial Shade	Subshrub/Forb
SW	<i>Amsonia jonesii</i>	Jones' bluestar	0.5-1.5ft.	April-August	Full Sun to Partial Shade	Forb
SW	<i>Apocynum androsaemifolium</i>	Spreading dogbane	2-5 ft.	June-August	Full Sun to Shade	Forb
SW	<i>Apocynum cannabinum</i>	Indianhemp	2-3ft.	May-July	Full Sun to Partial Shade	Forb
SW	<i>Cirsium canovirens</i>	Graygreen thistle	1-4 ft.	June-September	Full Sun	Forb
SW	<i>Dalea aurea</i>	Golden prairie clover	1-3 ft.	April-June	Full Sun	Subshrub/Forb
SW	<i>Dalea bicolor</i>	Silver prairie clover	1-3 ft.	September - November	Full Sun	Shrub/Subshrub/Forb
SW	<i>Dalea candida</i>	White prairie clover	1-3 ft.	May-August	Full Sun to Partial Sun	Shrub/Subshrub/Forb
SW	<i>Dalea formosa</i>	Featherplume	2-3 ft.	April-August	Full Sun	Shrub/Subshrub/Forb
SW	<i>Dalea greggii</i>	Gregg's prairie clover	2-4 ft.	May-September	Full Sun to Partial Shade	Subshrub/Forb
SW	<i>Dalea jamesii</i>	James' prairie clover	0.5-1ft.	May-July	Full Sun	Subshrub/Forb
SW	<i>Dalea purpurea</i>	Purple prairie clove	1-3 ft.	May-August	Full Sun to Partial Sun	Subshrub/Forb
SW	<i>Echinacea angustifolia</i>	Blacksamson echinacea	2-3 ft.	June-July	Full Sun to Partial Sun	Forb
SW	<i>Erigeron compositus</i>	Cutleaf daisy	2 ft.	May -August	Partial Shade	Forb
SW	<i>Erigeron linearis</i>	Desert yellow fleabane	up to 1ft.	June-August	Full Sun	Forb
SW	<i>Erigeron philadelphicus</i>	Philadelphia fleabane	1-3 ft.	May-June	Full Sun	Forb





Region	Botanical Name	Common Name	Height	Bloom Period (range)	Light/Exposure	Plant Type
SW	<i>Erigeron pinnatisectus</i>	Featherleaf fleabane	0.5 ft.	June-August	Full Sun	Forb
SW	<i>Erigeron pumilus</i>	Shaggy fleabane	0.5-1.5ft.	May-July	Full Sun	Forb
SW	<i>Erigeron speciosus</i>	Aspen fleabane	1-3 ft.	June-August	Full Sun	Shrub/Subshrub/Forb
SW	<i>Eriodictyon californicum</i>	California yerba santa	2-8 ft.	March-May	Full Sun	Shrub
SW	<i>Eriogonum fasciculatum</i>	Eastern Mojave buckwheat	3-6 ft.	May-October	Full Sun	Shrub/Subshrub
SW	<i>Eriogonum umbellatum</i>	Sulphur-flower buckwheat	1-3 ft.	June-September	Full Sun to Partial Shade	Subshrub/Forb
SW	<i>Eutrochium maculatum</i>	Spotted joe pye weed	3-6 ft.	August-September	Full Sun to Partial Shade	Forb
SW	<i>Helenium autumnale</i>	Common sneezeweed	2-5 ft.	July-October	Full Sun to Partial Shade	Forb
SW	<i>Helenium bigelovii</i>	Bigelow's sneezeweed	1-3.5ft.	June-September	Full Sun to Partial Sun	Forb
SW	<i>Helianthus annuus</i>	Common sunflower	2-8 ft.	May-October	Full Sun to Partial Sun	Forb
SW	<i>Helianthus gracilentus</i>	Slender sunflower	1ft.	August-September	Full Sun	Forb
SW	<i>Helianthus maximiliani</i>	Maximillian sunflower	2-5 ft.	August-October	Full Sun to Partial Sun	Forb
SW	<i>Helianthus niveus</i>	Showy sunflower	2-4ft.	September - May	Full Sun	Subshrub
SW	<i>Heliopsis helianthoides</i>	Smooth oxeye	3-6 ft.	June-August	Full Sun	Forb
SW	<i>Liatris ligulistylis</i>	Blazing Star	1-3ft.	July - September	Full Sun	Forb
SW	<i>Liatris punctata</i>	Dotted blazing star	0.5-2.5 ft.	August-October	Full Sun	Forb
SW	<i>Monarda citriodora</i>	Lemon Beebalm	1-2ft.	May-July	Full Sun to Partial Shade	Forb
SW	<i>Monarda fistulosa</i>	Wild bergamont	2-5 ft.	May-September	Full Sun to Partial Sun	Subshrub/Forb
SW	<i>Packera cana</i>	Woolly groundsel	2 ft.	March-August	Full Sun	Subshrub/Forb
SW	<i>Packera plattensis</i>	Prairie groundsel	1-2 ft.	May-June	Full Sun to Shade	Forb
SW	<i>Phlox caespitosa</i>	Tufted phlox	0.5ft.	April-June	Full Sun	Shrub/Subshrub/Forb
SW	<i>Phlox diffusa</i>	Spreading phlox	2 ft.	May-August	Full Sun	Subshrub/Forb
SW	<i>Phlox hoodii</i>	Spiny phlox	0.5ft.	May-July	Full Sun	Forb
SW	<i>Phlox longifolia</i>	Longleaf phlox	2 ft.	May-June	Full Sun	Shrub/Subshrub/Forb
SW	<i>Phlox pulvinata</i>	Carpet phlox	0.5 ft.	April - July	Full Sun	Forb
SW	<i>Phlox speciosa</i>	Showy phlox	1 ft.	April-June	Full Sun to Partial Sun	Shrub/Subshrub/Forb





Region	Botanical Name	Common Name	Height	Bloom Period (range)	Light/Exposure	Plant Type
SW	<i>Ratibida columnifera</i>	Upright prairie coneflower	1-2ft.	May-October	Full Sun	Forb
SW	<i>Rhododendron macrophyllum</i>	Pacific rhododendron	6-12 ft.	April-July	Full Sun to Partial Shade	Shrub
SW	<i>Rhododendron occidentale</i>	Western azalea	6-10 ft.	May-July	Full Sun to Shade	Shrub
SW	<i>Rhus trilobata</i>	Skunkbush sumac	3-8 ft.	March-April	Full Sun to Partial Shade	Shrub
SW	<i>Rudbeckia hirta</i>	Blackeyed Susan	3 ft.	May-August	Full Sun to Partial Sun	Forb
SW	<i>Rudbeckia laciniata</i>	Cutleaf coneflower	2-8 ft.	July-October	Full Sun to Partial Shade	Subshrub/Forb
SW	<i>Rudbeckia occidentalis</i>	Western coneflower	2-3 ft.	June-November	Full Sun	Forb
SW	<i>Rudbeckia triloba</i>	Browneyed Susan	2-5 ft.	July-October	Full Sun to Partial Shade	Forb
SW	<i>Salvia azurea</i>	Blue sage	3-6 ft.	September-November	Full Sun to Partial Shade	Forb
SW	<i>Salvia columbariae</i>	Chia sage	0.5-1.5 ft.	March-June	Full Sun	Forb
SW	<i>Salvia dorrii</i>	Purple sage	2-3 ft.	May-June	Full Sun	Shrub/Subshrub/Forb
SW	<i>Salvia leucophylla</i>	Purple sage	3-6 ft.	May-June	Full Sun	Shrub/Subshrub/Forb
SW	<i>Salvia mellifera</i>	Black sage	3-6 ft.	April-July	Full Sun	Shrub/Subshrub
SW	<i>Senecio integerrimus</i>	Lambstounge ragwort	1-2 ft.	March-May	Full Sun	Forb
SW	<i>Senecio serra</i>	Tall ragwort	2-6 ft.	July-August	Full Sun	Subshrub/Forb
SW	<i>Solidago californica</i>	California goldenrod	1-4 ft.	July-October	Partial Sun to Shade	Forb
SW	<i>Solidago canadensis</i>	Tall goldenrod	3-6 ft.	September-November	Full Sun to Partial Shade	Forb
SW	<i>Solidago gigantea</i>	Giant goldenrod	3-5 ft.	July-Nov	Full Sun to Partial Sun	Forb
SW	<i>Solidago missouriensis</i>	Missouri goldenrod	1-3 ft.	July-September	Full Sun	Forb
SW	<i>Solidago velutina</i>	Threenerve goldenrod	2-5 ft.	August-October	Full Sun	Subshrub/Forb
SW	<i>Symphotrichum ericoides</i>	White heath aster	5 ft.	August-October	Full Sun to Partial Sun	Forb
SW	<i>Symphotrichum laeve</i>	Smooth blue aster	1-3 ft.	August-October	Full Sun to Partial Sun	Forb
SW	<i>Symphotrichum lanceolatum</i>	Panicle white aster	1-5 ft.	September-October	Full Sun	Forb
SW	<i>Symphotrichum novae-angliae</i>	New England aster	2-5 ft.	August-October	Full Sun to Partial Sun	Forb
SW	<i>Vaccinium cespitosum</i>	Dwarf bilberry	1-3 ft.	May-August	Full Sun	Shrub/Subshrub
SW	<i>Vaccinium membranaceum</i>	Mountain huckleberry	3-6 ft.	April-June	Full Sun to Shade	Shrub



# Milkweeds



Region	Botanical Name	Common Name	Height	Flower Season	Light/Exposure
NE, SE	<i>Asclepias amplexicaulis</i>	clasping milkweed	3 ft.	May-July	Sun to Partial Sun
NE, SE, SW	<i>Asclepias arenaria</i>	sand milkweed	3 ft.	May-June	Sun to Partial Sun
SW, SE, NE	<i>Asclepias engelmanniana</i>	Engelmann's milkweed	4 ft.	June-August	Sun
NE, SE	<i>Asclepias exaltata</i>	poke milkweed	2-6 ft.	June-August	Sun to Partial Shade
SW	<i>Asclepias fascicularis</i>	Mexican wholed milkweed	up to 5 ft.	June-August	Sun
NE, SE	<i>Asclepias hirtella</i>	green milkweed	1-4 ft.	July-September	Sun to Partial Shade
NE, SE, SW, NW	<i>Asclepias incarnata</i>	swamp milkweed	1-5 ft.	June-October	Sun to Partial Shade
NE	<i>Asclepias lanuginosa</i>	sidecluster milkweed	1-2 ft.	June-July	Sun
SE, NE	<i>Asclepias longifolia</i>	longleaf milkweed	2-3 ft.	May-June	Sun
NE	<i>Asclepias ovalifolia</i>	oval-leaf milkweed	2 ft.	June - July	Sun
SE, NE	<i>Asclepias perennis</i>	aquatic milkweed	1-2 ft.	May-September	Sun
NW, NE, SE, SW	<i>Asclepias pumila</i>	plains milkweed	1 ft.	July-August	Sun
SE, NE	<i>Asclepias purpurascens</i>	purple milkweed	3-4 ft.	June-August	Sun to Partial Shade
SE, NE	<i>Asclepias quadrifolia</i>	fourleaf milkweed	1-2 ft.	May-July	Sun to Partial Shade
NW, SW, NE, SE	<i>Asclepias speciosa</i>	showy milkweed	1-3 ft.	May-September	Sun
SE, NE	<i>Asclepias stenophylla</i>	slimleaf milkweed	up to 3 ft.	June-August	Sun
NE, SE	<i>Asclepias sullivantii</i>	prairie milkweed	2-3 ft.	June-July	Sun
NE, SE	<i>Asclepias syriaca</i>	common milkweed	2-5 ft.	May-August	Sun
NE, SE, SW	<i>Asclepias tuberosa</i>	butterfly milkweed	1-2 ft.	May-September	Sun
SE, NE	<i>Asclepias variegata</i>	redring milkweed	1-4 ft.	May-July	Sun to Partial Shade
NW, SW, NE, SE	<i>Asclepias verticillata</i>	whorled milkweed	1-3 ft.	May-September	Sun
SW, NW, NE, SE	<i>Asclepias viridiflora</i>	green comet milkweed	1-3 ft.	June-September	Sun
SE, NE	<i>Asclepias viridis</i>	green antelopehorn	1-2 ft.	May-August	Sun



**How to use this chart:**

Use the chart below to evaluate each site being considered for monarch habitat development. Circle the description that matches your site and note the score (found at the top of the column) in the last column on the right. Total the scores at the bottom and use the scores as guidance for selecting a site.

**How to evaluate the scores:**

- Sites with the lowest scores will be more challenging to develop into habitat. Sites with higher scores will generally pose the least challenges. Sites that score over 70 will have far fewer challenges. Sites with scores under 60 will be very challenging to develop into monarch habitat.
- Remember it is easier to start small and to scale up, than start big and scale down.

**NOTE:** Sites with a pH below 4 and above 7.5 should be eliminated and not considered for review, it will be extremely challenging to correct the pH to make the area hospitable to milkweeds.

Score	1	2	3	4	
Existing Vegetation Management Regime	The vegetation is mowed weekly to about 3 inches and there is little flexibility for change.		There is not an existing vegetation management regime and the majority of plants are not desirable.	The vegetation is mowed weekly but this practice can be changed.	
Site Size				10+ acres	
Sunlight			Full Shade		
Water Availability					
Slope	46-90 degrees, extreme slope (inaccessible)	16-45 degrees, steep slope			
Soil Texture		Compacted			
Existing Nectar Plants				No existing nectar plants.	
Existing Host Plants				No existing host plants.	
Ability to Procure Additional Planting Material	Additional planting material will not be procured.	Ability to procure seeds to plant a few species but will not be able to maintain bloom during key monarch migration periods.			
Ability to Reduce Undesirable Plant Species	No ability to reduce undesirable plant species.			Initial removal of undesirable species will be incorporated into the project.	
Volunteer Potential				Several groups have expressed interest in participating but have not made commitments.	
Accessibility	Difficult to access for land managers.		Only visible and accessible only to land managers.	Visible to the public and accessible to land managers.	





Site Name:	Green Valley	Notes:
Date:	October 15, 2013	
Evaluator:	Louis Curran	
Total Score:	71	

	5	6	7	Score
	The vegetation is mowed once or twice a year, invasives are not removed outside this period.		The vegetation is mowed once or twice a year and invasive are removed regularly.	5
	3-10 acres	1.1-3 acres	0.1-1 acre	6
	Partial Shade		Full Sun	7
	No water available	No water on site, but ability to bring it in via truck or other means.	Accessible water sources (spigots with hoses).	5
		6-15 degrees, moderate slope	0-5 degrees, gentle slope	6
	Clay, gravel, or sand		Well drained loam	7
	1-2 identifiable nectar plants blooming in one phase of the growing season.	2-4 identifiable nectar plants blooming in two phases of the growing season.	4+ identifiable nectar plants blooming in three phases of the growing season.	5
	1-2 identifiable host nectar plants blooming at one phase of the growing season.	2-3 identifiable host plants blooming in two phases of the growing season.	3+ identifiable host plants blooming in all parts of the growing season.	6
	Ability to procure seeds to plant a variety of species to maintain a nearly continuous bloom on the site.		Ability to procure plugs and seeds to plant a variety of species to maintain a nearly continuous bloom on the site.	7
			Aggressive and sustained removal of undesirable species can and will be incorporated into the management of the site.	4
	A core group of dedicated volunteers have committed to assist with planting.	A core group of dedicated volunteers have committed to assist with planting and some maintenance	A core group of dedicated volunteers have committed to assist with planting and weekly maintenance.	6
	Visible to the public and accessible to land managers and some of the public.	Visible to the public and accessible to land managers and some of the public. However, the site will be fully accessible with the completion of the monarch habitat development project.	Visible to the public and easily accessible to the land managers and public (including children and persons with disabilities)	7
<b>Total Score</b>				<b>71</b>



**How to use this chart:**

Use the chart below to evaluate each site being considered for monarch habitat development. Circle the description that matches your site and note the score (found at the top of the column) in the last column on the right. Total the scores at the bottom and use the scores as guidance for selecting a site.

**How to evaluate the scores:**

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- Remember it is easier to start small and to scale up, than start big and scale down.

**NOTE:** Sites with a pH below 4 and above 7.5 should be eliminated and not considered for review; it will be extremely challenging to correct the pH to make the area hospitable to milkweeds.

Score	1	2	3	4	
Existing Vegetation Management Regime	The vegetation is mowed weekly to about 3 inches and there is little flexibility for change.		There is not an existing vegetation management regime and the majority of plants are not desirable.	The vegetation is mowed down weekly but this practice can be changed.	
Site Size				10+ acres	
Sunlight			Full Shade		
Water Availability					
Slope	46-90 degrees, extreme slope (inaccessible)	16-45 degrees, steep slope			
Soil Texture		Compacted			
Existing Nectar Plants				No existing nectar plants.	
Existing Host Plants				No existing host plants.	
Ability to Procure Additional Planting Material	Additional planting material will not be procured.	Ability to procure seeds to plant a few species but will not be able to maintain bloom during key monarch migration periods.			
Ability to Reduce Undesirable Plant Species	No ability to reduce undesirable plant species.			Initial removal of undesirable species will be incorporated into the project.	
Volunteer Potential				Several groups have expressed interest in participating but have not made commitments.	
Accessibility	Difficult to access for land managers.		Only visible and accessible only to land managers.	Visible to the public and accessible to land managers.	



Site Name:		Notes:
Date:		
Evaluator:		
Total Score:		

	5	6	7	Score
	The vegetation is mowed once or twice a year, invasives are not removed outside this period.		The vegetation is mowed once or twice a year and invasive are removed regularly.	
	3-10 acres	1.1-3 acres	0.1-1 acre	
	Partial Shade		Full Sun	
	No water available	No water on site, but ability to bring it in via truck or other means.	Accessible water sources (spigots with hoses).	
		6-15 degrees, moderate slope	0-5 degrees, gentle slope	
	Clay, gravel, or sand		Well drained loam	
	1-2 identifiable nectar plants blooming in one phase of the growing season.	2-4 identifiable nectar plants blooming in two phases of the growing season.	4+ identifiable nectar plants blooming in three phases of the growing season.	
	1-2 identifiable host nectar plants blooming at one phase of the growing season.	2-3 identifiable host plants blooming in two phases of the growing season.	3+ identifiable host plants blooming in all parts of the growing season.	
	Ability to procure seeds to plant a variety of species to maintain a nearly continuous bloom on the site.		Ability to procure plugs and seeds to plant a variety of species to maintain a nearly continuous bloom on the site.	
			Aggressive and sustained removal of undesirable species can and will be incorporated into the management of the site.	
	A core group of dedicated volunteers have committed to assist with planting.	A core group of dedicated volunteers have committed to assist with planting and some maintenance.	A core group of dedicated volunteers have committed to assist with planting and weekly maintenance.	
	Visible to the public and accessible to land managers and some of the public.	Visible to the public and accessible to land managers and some of the public. However, the site will be fully accessible with the completion of the monarch habitat development project.	Visible to the public and easily accessible to the land managers and public (including children and persons with disabilities).	
			<b>Total Score</b>	



# Appendix 4 Monarch Habitat Development

A blank form is found on the next page

Use this form as a guide to evaluate the success and record challenges of your monarch habitat project. Recognize what went well, and look for ways to improve on challenges that might have prevented the accomplishment of a goal. List each goal and associated actions that your team established at the beginning of the project.

Before determining if the project's main objective has been met, begin by evaluating each goal set out in your habitat development plan. Review each of the actions listed under each goal to determine whether a goal was satisfactorily accomplished, and what challenges prevented success.

Project Name: Green Acres	Project Start Date: 08 / 2012
Location: 1407 Montague	
Evaluator: James Clarence	Evaluation Date: 09 / 2014
Title, Organization: VP Health & Saftery, Tricor	

Goal	Actions Completed	Challenges / Comments	Accomplished or Not Accomplished	NEXT STEP to COMPLETION (if the goal was marked as 'not accomplished')
<b>Habitat Development and Maintenance</b>				
Restore 90% of X area with beneficial monarch plant species within 2 years.	7 of 7	90% of the project area was planted with beneficial monarch plants, but invasives are still a challenge. See below.	Accomplished	
Maintain a threshold of 80% native plant species/20% introduced species on the site.	4 of 4	Japanese honeysuckles has proven very challenging to remove, and a threshold of 70/30 has been achieved and maintained.	Not Accomplished	Continue to monitor and remove invasive species. Re-evaluate threshold, possibly adjust to 70/30 for 3 years and then 80/20 thereafter depending on progress.
<b>Certification</b>				
Attain Wildlife Habitat Council's Corporate Habitat Certification	5 of 6	Working to obtain remaining educational credits for certification.	Not Accomplished	Contacted a local school and organized seasonal field trips. Remaining educational hours will be obtained by Spring 2015.
<b>Outreach</b>				
Hold an annual National Pollinator Week Event.	11 of 11	None	Accomplished	
<b>Project Evaluation</b>				
Evaluate the project for success, weaknesses, and potential for improvement.	7 of 7	Increase of pollinator diversity by 300%, and abundance by 200% since the start of the project.	Accomplished	

Overall Project Review : (Briefly describe major accomplishments and challenges to determine is the objective was met.)

Project Objective: Create monarch habitat while maintaining regulatory compliancy in the designated project area.

Project Review: Community participation was successful and is ongoing, and the plants installed in the initial planting have established leading to an increase in pollinator diversity while maintaining regulatory compliance (plants less than 12' in height were used). While Wildlife Habitat Council Certification has not yet been attained, certification is on track to happen next year. Invasive species have been a challenge, but we are finding new and better ways for dealing with them and continue to be vigilant about monitoring. Overall, the project objective has been met.





# Project Evaluation: blank

# Appendix 5 Monarch Habitat Development

Use this form as a guide to evaluate the success and record challenges of your monarch habitat project. Recognize what went well, and look for ways to improve on challenges that might have prevented the accomplishment of a goal. List each goal and associated actions that your team established at the beginning of the project.

Before determining if the project's main objective has been met, begin by evaluating each goal set out in your habitat development plan. Review each of the actions listed under each goal to determine whether a goal was satisfactorily accomplished, and what challenges prevented success.

Project Name:	Project Start Date:
Location:	
Evaluator:	Evaluation Date:
Title, Organization:	

Goal	Actions Completed	Challenges / Comments	Accomplished or Not Accomplished	NEXT STEP to COMPLETION (if the goal was marked as 'not accomplished')
Habitat Development and Maintenance				
Certification				
Outreach				
Project Evaluation				

Overall Project Review : *(Briefly describe major accomplishments and challenges to determine if the objective was met.)*

Project Objective:

Project Review:



# Basic Pollinator Checklist

## Become familiar with pollinators in your landscape.

- Watch for activity at different times during the day and throughout the seasons.
- Keep a simple notebook recording what comes to your landscape. NOTE: It is not necessary to identify each species when you first get started. If you don't know the specific name of an insect or plant, simply note if it is a bee that likes the yellow flower that blooms in the fall. Date your observations.
- Consult a local field guide or web site when you are ready to learn more details.

## Add native plants to attract more native pollinators.

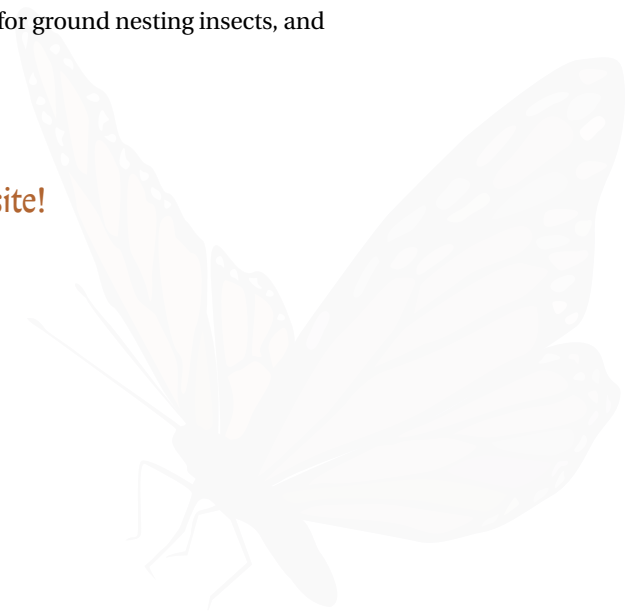
- List the plants you currently have in your landscape.
- Determine when you need additional flowers to provide nectar and pollen throughout the growing season.
- Add plants that provide additional seasons of bloom, create variable heights for shelter, and attract the types of pollinators you want.
- Don't forget to include host plants that provide food and shelter for larval development.
- Contact your local native plant society or extension agent for help.

## Use pollinator friendly landscape practices to support the pollinators you attract.

- Use Integrated Pest Management Practices to address pest concerns.
- Tolerate a little mess – leave dead snags and leaf litter, keep areas bare for ground nesting insects, and leave some weeds that provide food for pollinators.
- Provide safe access to clean water.

## Notice the changes that you have helped to create! Enjoy the site!

- Take photographs.
- Write observations.
- Enjoy the life in the landscape!



# Basic Pollinator Resources



Many books, websites, and people were consulted to gather information for this guide. Use this list as a starting point to learn more about pollinators and plants in your area.

## Bailey's Ecoregion Maps

### USDA Forest Service

[http://www.fs.fed.us/land/ecosysmgmt/ecoreg1\\_home.html](http://www.fs.fed.us/land/ecosysmgmt/ecoreg1_home.html)

## Pollination/Pollinators

### Pollinator Partnership

[www.pollinator.org](http://www.pollinator.org)

### Natural Resources Conservation Service

[www.nrcs.usda.gov](http://www.nrcs.usda.gov)

### North American Pollinator Protection Campaign

[www.nappc.org](http://www.nappc.org)

### USDA Forest Service

[www.fs.fed.us/wildflowers/pollinators/](http://www.fs.fed.us/wildflowers/pollinators/)

### Wild Farm Alliance

[www.wildfarmalliance.org](http://www.wildfarmalliance.org)

### The Xerces Society

[www.xerces.org](http://www.xerces.org)

### Illinois Natural History Survey

[www.inhs.uiuc.edu](http://www.inhs.uiuc.edu)

Buchmann, S.L. and G.P. Nabhan. 1997.

*The Forgotten Pollinators*

Island Press: Washington, DC.

Committee on the Status of Pollinators in North America. 2007. *Status of Pollinators in North America The National Academies Press*: Washington, DC.

## Native Plants

### Plant Conservation Alliance

[www.nps.gov/plants](http://www.nps.gov/plants)

### Seeds of Success

[www.nps.gov/plants/sos](http://www.nps.gov/plants/sos)

### Lady Bird Johnson Wildflower Center

[www.wildflower.org/plants/](http://www.wildflower.org/plants/)

### USDA Hardiness Zone Map

[www.usna.usda/Hardzone/](http://www.usna.usda/Hardzone/)

### U.S. National Arboretum

[www.usna.usda.gov/Hardzone/ushzmap.html](http://www.usna.usda.gov/Hardzone/ushzmap.html)

### USDA, NRCS. 2007. The PLANTS Database

[www.plants.usda.gov](http://www.plants.usda.gov), 19 July, 2007  
National Plant Data Center,  
Baton Rouge, LA 70874-4490 USA

### BONAP

### Biota of North America Program

[www.bonap.org](http://www.bonap.org)

## Native Bees

### National Sustainable Information Service

"Alternative Pollinators: Native Bees" by Lane Greer, NCAT Agriculture Specialist, Published 1999, ATTRA Publication #IP126

[www.attra.ncat.org/attra-pub/nativebee.html](http://www.attra.ncat.org/attra-pub/nativebee.html)

### Agriculture Research Service

*Plants Attractive to Native Bees* table

[www.ars.usda.gov/Research/docs.htm?docid=12052](http://www.ars.usda.gov/Research/docs.htm?docid=12052)

## Butterflies and Moths

Opler, Paul A., Harry Pavulaan, Ray E. Stanford, Michael Pogue, coordinators. 2006. *Butterflies and Moths of North America*. Bozeman, MT: NBII Mountain Prairie Information Node.

[www.butterfliesandmoths.org/](http://www.butterfliesandmoths.org/) (Version 07192007)

Pyle, Robert Michael. 1981. *National Audubon Society Field Guide to Butterflies*. Alfred A. Knopf: New York, NY.

### North American Butterfly Association

[www.naba.org](http://www.naba.org)

### North American Monarch Conservation Plan

### Monarch Joint Venture

[www.monarchjointventure.org/](http://www.monarchjointventure.org/)

### University of Minnesota Monarch Lab

[www.monarchlab.org](http://www.monarchlab.org)

### Monarch Watch

[www.monarchwatch.org/](http://www.monarchwatch.org/)

### Wildlife Habitat Council

[www.wildlifehc.org/about-whc/](http://www.wildlifehc.org/about-whc/)

## Feedback

We need your help to create better guides for other parts of North America.

Please e-mail your input to [feedback@pollinator.org](mailto:feedback@pollinator.org) or fax to 415-362-3070.

- How will you use this guide?
- Do you find the directions clear? If not, please tell us what is unclear.
- Is there any information you feel is missing from the guide?
- Any other comments?



Thank you for taking the time to help!





***Photos courtesy of:***

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Chip Taylor  
Dave Wendelken

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