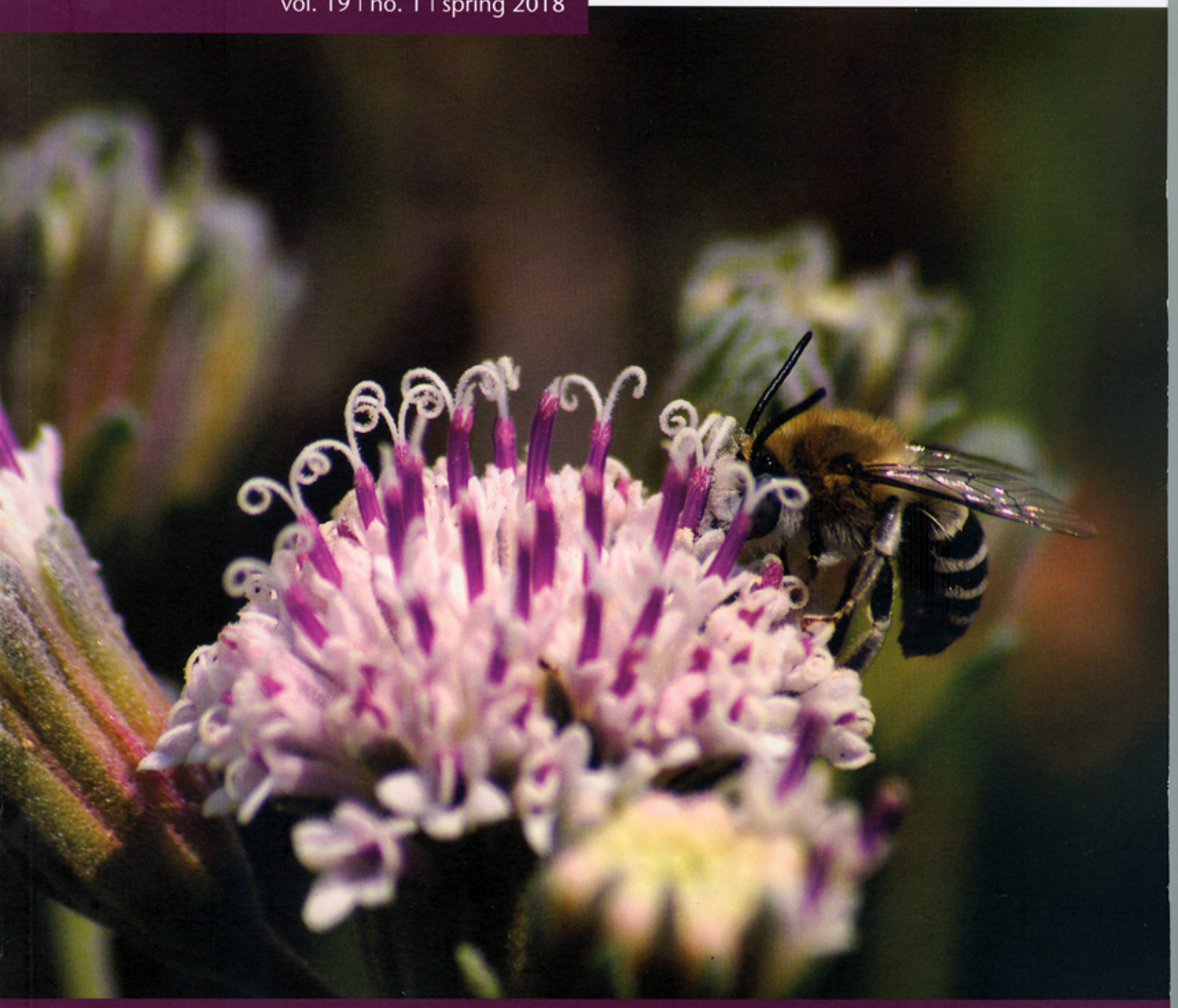
NATIVEPLANTS

JOURNAL

vol. 19 | no. 1 | spring 2018



includes POLLINATOR GARDENS AND GERMPLASM RELEASES

Using native plants to create pollinator habitat in southwest Oregon: lessons learned

Thomas D Landis and Suzie Savoie

Creating pollinator habitat works: Monarch caterpillars were found 5 mo after native milkweeds were planted at this monarch waystation at Coyote Trails Nature Center in Medford, Oregon. Photo by Robert Coffan

ABSTRACT

Worldwide pollinator decline has led to efforts in southwest Oregon to grow locally adapted native plants in pollinator gardens and landscape-scale pollinator habitat restoration projects. Pollinators depend on native plants for their life cycles. Native plants provide food for adults and larvae, and many pollinators are dependent on very specific plant genera, such as the monarch butterfly (*Danaus plexippus* Linnaeus [Lepidoptera: Nymphalidae]), which uses only milkweed (*Asclepias* L. [Asclepiadaceae]) as a larval host plant. Characteristics of desirable pollinator plants should be considered when creating pollinator habitat. Native plants support more biodiversity than do non-native plants or native plant cultivars. Selecting a palette of pollinator plants that bloom throughout the growing season ensures sufficient food for pollinators when they are active. Early-season and late-season blooming plants are especially important. A local guidebook, Native Pollinator Plants for Southern Oregon, was written to help gardeners and land managers in southern Oregon choose native pollinator plants. A National Fish and Wildlife Foundation grant has funded the Southwest Oregon Monarch Habitat Restoration Initiative, which will enable planting more than 120 ha (300 ac) with native milkweed and other source-identified and locally adapted native plants to help create breeding habitat for the western monarch butterfly in southwestern Oregon. The 2-y project will occur on 6 project areas on public and private lands and will establish a minimum of 50 surviving milkweed plants per acre.

Landis TD, Savoie S. 2018. Using native plants to create pollinator habitat in southwest Oregon: lessons learned. Native Plants Journal 19(1): 27–39.

KEY WORDS

native bees, butterfly, pollinator plant, habitat restoration, monarch waystation, source-identified seed, locally adapted native plants, larval host plant, nectar plant, bloom period

NOMENCLATURE

Plants: USDA NRCS (2017)
Insects: ITIS (2017)

Photos by the authors except as noted otherwise

When it comes to pollinators, we have bad news and good news. First, the bad news: Almost 90% of flowering plants in the world need pollination to reproduce, yet recent studies concluded that 40% of invertebrate pollinators are facing extinction (Procopiou 2016). The colony collapse disorder that has been devastating honey bees (*Apis mellifera*) (throughout article, see appendices for full taxonomic nomenclature) is well documented, but there has been less emphasis on the plight of native bees, butterflies, and other pollinators. All of the 4000 species of bees native to North America are in serious decline (Stark 2014), and bumble bees are of special concern. Franklin's bumble bee (*Bombus franklini*), with the most restricted range of a bumble bee in the world, has been in decline since the 1990s and was last seen in southern Oregon in 2006 (Xerces Society 2017).

Now the good news: Creating pollinator habitat can be effective in conserving our native pollinators. Many articles and books have been written about how to create pollinator gardens, and several emphasize the use of native plants (Stark 2014). Organizations such as the Xerces Society have been advocating the creation of pollinator habitat by growing and planting native plants, and they have published several comprehensive books on the subject (for example, Mader and others 2011; Lee-Mader and others 2016). Other excellent books describe important native pollinator plants from across the US and are well-illustrated with color photographs of corresponding native pollinating insects (for example, Holm 2014).

Waystations for monarch butterflies (*Danaus plexippus*) are specialized pollinator gardens that provide habitat for these butterflies, including native milkweed plants (*Asclepias* spp.), the requisite host plant for the adult monarch butterflies (Landis 2014; Monarch Watch 2017). We began constructing monarch waystations in southwestern Oregon in 2013 to help recover monarch butterflies that were formerly common in our area. Often, we found monarch caterpillars on our native milkweeds at the end of the first season after waystation establishment. For example, the monarch waystation at the Coyote Trails Nature Center in south Medford (article-opening photo) was established in April 2015 on a weed-infested road right-of-way. In September 2015, 2 monarch caterpillars from that waystation were reared into monarch butterflies, tagged (Figure 1A), and released a month later (Coffan 2017). On New Year's Day 2016, one of the tagged monarchs (A2045) was spotted in an overwintering colony along the California coast near Bolinas, California (James and others 2018; Figure 1B). This success proves that creating pollinator habitat with native plants has considerable potential.

CREATING POLLINATOR GARDENS WITH LOCAL NATIVE PLANTS

Habitat for pollinators, like for all living creatures, consists of providing food, shelter, and water.

Native Plants as Food

Pollinator gardens need native plants because 90% of the insects that eat plants will thrive and reproduce only on plants with which they share an evolutionary history (Tallamy 2013). Both adult butterflies and their caterpillar larvae use plants for food: The adults need plant nectar for energy, and the caterpillars receive nourishment by feeding on the foliage of specific host plants. Monarch caterpillars feed only on milkweeds, whereas the caterpillars of butterflies, such as swallowtails (*Papilio* spp.), can utilize several different plant genera (Table 1; see also Appendix A and Appendix B for insect and plant taxonomy and nomenclature.)

At least 37 milkweed species grow in the western US (Fallon and others 2015), and we recommend including a couple of native milkweeds in monarch waystations. In southwestern Oregon, we plant both common native milkweeds: showy

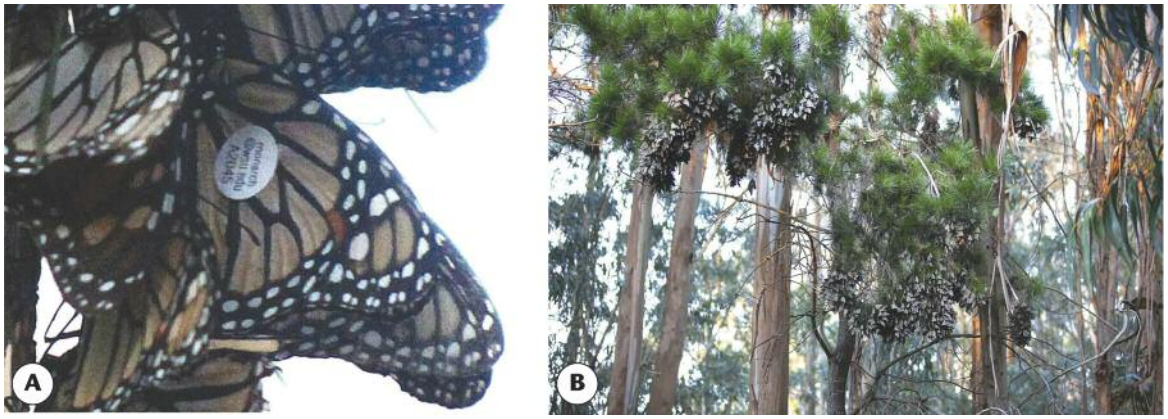


Figure 1. The functionality of pollinator gardens is evidenced by recent recovery of tagged monarch butterflies. Two monarch caterpillars were found at the Coyote Trails Nature Center after only 5 mo, and 1 butterfly was tagged (A); less than 3 mo later, that tagged monarch (A2045) was located in an overwintering colony in Bolinas, California (B). Figure photos by David James

TABLE 1

Specific host plants for caterpillars of butterflies that are obligate feeders (Lotts and Naberhaus 2017).

Common name	Scientific name	Example host plants
Monarch butterfly	*Danaus plexippus*	Milkweed (*Asclepias* L.)
Pale swallowtail butterfly	*Papilio eurymedon*	Ceanothus (*Ceanothus* L.), buckthorn (*Rhamnus* L.), and alder (*Alnus* L.)
Anise swallowtail	*Papilio zelicaon*	Parsley family (Apiaceae)
Western white butterfly	*Pontia occidentalis*	Mustard family (Brassicaceae)
Mourning cloak butterfly	*Nymphalis antiopa*	Uses 6 different plant genera, including willow (*Salix* L.) and cottonwood (*Populus* L.)
Painted lady	*Vanessa cardui*	Thistle (*Cirsium* L.), nettles (*Urtica* L.)
Oregon silverspot	*Speyeria zerene hippolyta*	Violet (*Viola* L.)
California tortoiseshell	*Nymphalis californica*	Deerbrush (*Ceanothus* L.)
California sister	*Adelpha californica*	Canyon live oak (*Quercus chrysolepis* Liebm. [Fagaceae])

Notes: See Appendix A for additional nomenclature.

milkweed (*Asclepias speciosa*) and narrowleaf milkweed (*A. fascicularis*). Narrowleaf milkweed is the most common and grows on a variety of soil types, from heavy clays to sand and even cobble, and is found on drier sites. Showy milkweed can also grow on many soils but occurs on more mesic sites, often along waterways.

Adult butterflies and other insect pollinators obtain energy from the pollen and nectar of a wide variety of flowering plants (Figure 2A, 2B). Nectar is high in sugars but also contains other important food components, such as amino acids (Nicolson and others 2007). Although not widely appreciated, milkweeds are excellent nectar plants that attract many types of pollinators (Figure 2B). Keep in mind that although all flowering plants have pollen, not all produce nectar. In southern Oregon, California poppy (*Eschscholzia californica*) is a hardy native plant that blooms early and late in the growing season; however, poppy flowers do not have nectaries (Thorp 2014) so they will not attract butterflies. California poppy pollen is attractive to many bee species, such as bumble bees, sweat bees, and mining bees (Figure 2C) (Smith 2010). A list of other plants that do not produce nectar can be found in beekeeping publications (for example, Root and Root 1919).

Although backyard pollinator gardens can use native and introduced plants, it is not widely known that native plants support 29 times more biodiversity than do non-native ornamental plants (Tallamy 2013). Therefore, we recommend using native plants in gardens to support local pollinator and wildlife species and to prevent the possibility of introduced plants escaping and becoming invasive. Lists of beneficial, non-native nectar plants can be found online (for example, Monarch

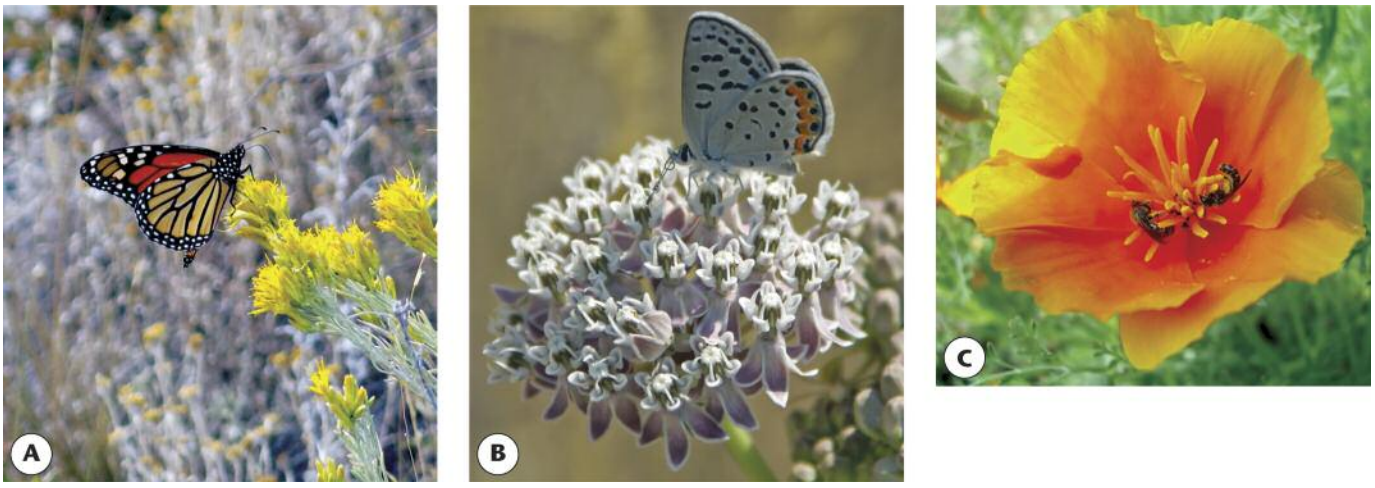


Figure 2. Native plants provide nectar for all types of pollinators: monarch butterfly on rubber rabbitbrush (*Ericameria nauseosa*) (A); Acmon blue butterfly (*Plebejus acmon*) on narrowleaf milkweed (B); and native bees on California poppy (*Eschscholzia californica*) (C). Figure 2A photo by Jakob Shockey

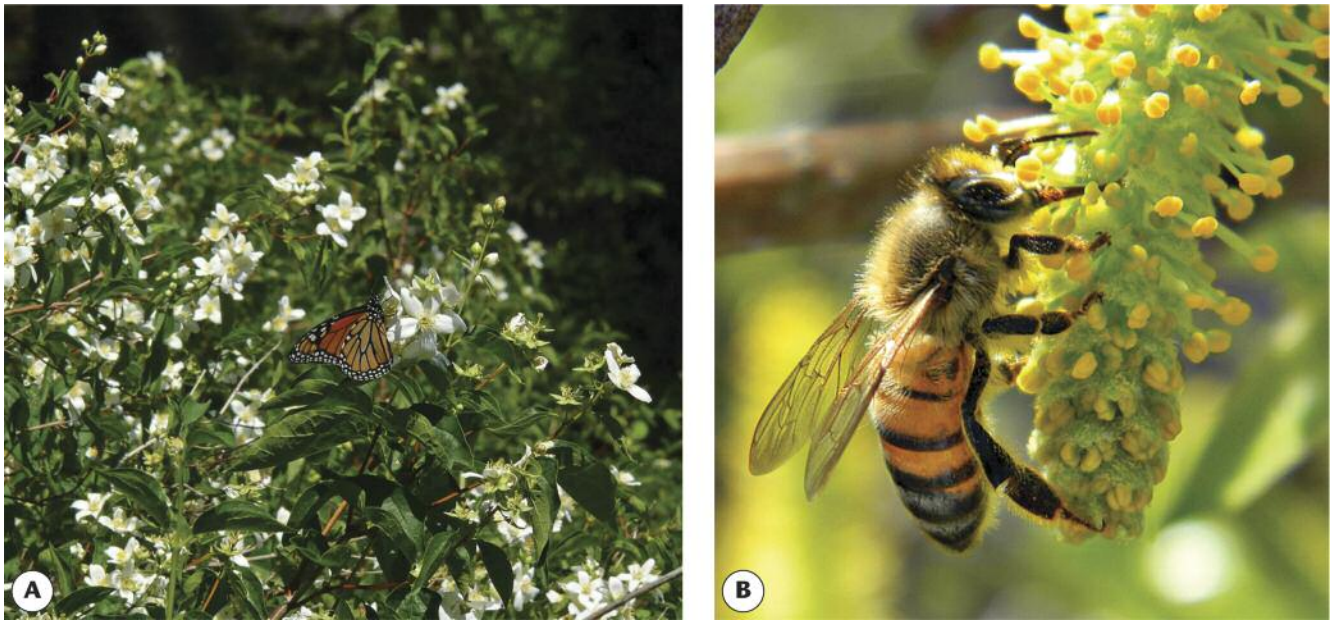


Figure 3. Large woody shrubs, such as Lewis' mock orange (*Philadelphus lewisii*) (A), and small trees, such as willows (*Salix* spp.) (B), provide both shelter and nectar for pollinators. Figure 3A photo by Tanya Harvey; Figure 3B photo courtesy of Wikipedia Commons

Watch 2017) and in books (for example, Mader and others 2011; Holm 2014). Much more difficult, however, is to find information on the best native nectar species for a specific region. For this reason, we have developed the publication Native Pollinator Plants for Southern Oregon (Landis and Savoie 2016), which will be referenced throughout this article.

Shelter: A Mix of Sunlight and Shade

Because all insect pollinators are cold-blooded, pollinator gardens should be located in a sunny location and receive direct sunlight for at least 6 to 8 h each day (Monarch Watch 2017). Monarchs (and most pollinators) are most active in temperatures above 50 °F (10 °C), and most fly during daylight hours (Monarch Joint Venture 2017). Southeast aspects are ideal because they receive morning sun for a quick warm-up but do not become too hot during summer afternoons. Pollinator gardens should also be sheltered from prevailing winds by woody trees and shrubs. Conifers or evergreen hedges are ideal because they provide wind protection and a place for pollinators to rest overnight. Multiple habitat considerations may be required to meet the needs of various pollinators. On one hand, it may be beneficial to position woody plants so they do not shade your pollinator plants, as many species require full sunlight. On the other hand, some native pollinator plants are adapted to grow in the partial or full shade of woodland or forest habitat. Incorporating shade-tolerant plants into a shady part of a pollinator garden can increase the habitat complexity and overall biodiversity of the garden. Although not as widely appreciated, moths are important pollinators so sunlight is not a limiting factor. To attract nocturnal pollinators, such as moths, include night-scented plants and plants with pale-colored or white flowers in your pollinator garden (Mader and others 2011).

Some woody shrubs and trees can serve a double function in pollinator gardens: Their flowers provide pollen and nectar to feed pollinators, while their woody foliage provides shelter from wind and rain. We recommend Lewis' mock orange (*Philadelphus lewisii*; Figure 3A) and oceanspray *(Holodiscus discolor*) as pollinator plants (Landis and Savoie 2016), and willow catkins (*Salix* spp. [Salicaceae]) furnish an important early season source of nectar before most plants begin to flower (Mader and others 2011; Figure 3B).

CHARACTERISTICS OF DESIRABLE POLLINATOR PLANTS AND GARDENS

Perennials Compared with Annuals

Perennial native plants have several advantages in comparison with annuals. Perennials stay where you put them much longer than annual plants do; and annuals may spread and become weedy due to their abundant seed production. Perennial nectar plants also have a longer functional life: Woody pollinator plants can live for decades (Figure 4A), and perennial forbs such as milkweeds will provide abundant nectar and host monarch caterpillars for more than 5 y. In a recent study, perennial meadows produced up to 20 times more nectar and up to 6 times more pollen and produced these resources earlier in the season compared to annual meadows (Hicks and others 2016). In one of our pollinator gardens, we introduced 2 annual species—chick lupine (*Lupinus microcarpus*) and winecup clarkia (*Clarkia purpurea*)—as seedlings during the first season

and, just 1 y later, their offspring had spread throughout the garden and overtopped other desirable plants (Figure 4B). Large, perennial, nectar-producing woody shrubs and small trees established around the border of a pollinator garden produce a windbreak and provide shelter for pollinators, such as monarch butterflies that roost at night and in inclement weather (see Figure 3A). Annual native plants can be useful in xeric landscapes and drought-tolerant pollinator gardens where their ability to reseed themselves year after year can be beneficial, without the risk of unwanted spread or aggressiveness associated with annuals in irrigated gardens.

Selecting a Palette of Pollinator Plants That Bloom throughout the Growing Season

The timing of flowering, and therefore nectar and pollen production, is of critical importance. Select a suite of plants that will provide flowers during the entire season when pollinators are active; in southern Oregon, this is generally February to October. We recommend planting a minimum of 9 different species of pollinator plants—3 for each blooming period (early season, mid-season, and late season) (Pendergrass and others 2008). Selecting such a palette of plants that will bloom throughout the season will ensure a continued source of pollen and nectar while attracting a wide diversity of pollinators. For our region of southwestern Oregon, the CalFlora (http://www

Figure 4. Flowers of perennial plants, such as redflower currant (*Ribes sanguineum*) (A), produce pollen and nectar for many years. Annual plants, such as chick lupine (*Lupinus microcarpus*), produce an abundance of seeds and may become weedy (B).

.calflora.org/) and Oregon Flora Project (http://www.oregonflora.org) websites cover most native plant species, and CalFlora features handy pie charts that show each species' bloom time by month. Note that plants from the same genus can have significantly different flowering periods (Figure 5A, 5B). We were pleased to find that the flowering period of some native plants can be extended when grown under cultivation in pollinator gardens (Figure 5C).

Favor Early-Blooming and Late-Blooming Pollinator Plants

A wide variety of plants bloom during spring and summer, providing an abundance of pollen and nectar at the height of the growing season; however, fewer plants flower early or late in the season. Bumble bee queens emerge from overwintering to forage on warm days in February and March when floral resources are scarce. Early-season forbs such as Pacific hound's tongue (*Cynoglossum grande*) and shrubs such as redflower currant (*Ribes sanguineum*) provide food for these early pollinators. Willows (*Salix* spp.) have already been mentioned (see Figure 3B) as an important early-season nectar source.

Fewer species of native plants flower late in the season when western monarch butterflies are migrating south to their overwintering sites on the California coast. Monarchs depend on nectar during early autumn to build up fat reserves for the long flights to their overwintering locations, and because they do not feed regularly during the winter, their fat reserves must sustain them until spring. Rubber rabbitbrush (*Ericameria nauseosa*) is a very common native shrub of the drier parts of Oregon (see Figure 2A) and is also an excellent nectar source for southbound migrating monarchs (Pyle 2014) at a time when most flowering native plants have senesced or become dormant for the season. Coyotebrush (*Baccharis pilularis*) blooms particularly late in the season—well into November—along the southern Oregon coast. A 1951 study identified a whopping 221 species of insects associated with coyotebrush, making it a premiere pollinator plant within its range (Tilden 1951).

Combo Plants

Many native plants provide a double benefit for pollinators: Their flowers produce pollen and nectar, and their foliage provides food for the caterpillars of native butterflies. Milkweeds, of course, are combo plants for monarchs but other forbs and woody natives also qualify. Oceanspray flowers are good sources of nectar, plus the foliage is food for 4 different native butterflies (Bentler Ullman 2014). Mountain lilac or deerbrush (*Ceanothus integerrimus*) is another excellent nectar plant that is a host for the pale swallowtail butterfly (*Papilio eurymedon*) and California tortoiseshell (*Nymphalis californica*) (see Table 1). The Acmon blue (*Plebejus acmon*) butterfly (see Figure 2B) uses various species of buckwheat (*Eriogonum* Michx. [Polygonaceae]) as larval host plants, and many adult butterflies—and a wide array of pollinators in general—also use buckwheat flowers for food. Similarly, American lady (*Vanessa virginiensis*) butterflies use plants such as pearly everlasting (*Anaphalis margaritacea*) as larval hosts, and many adult butterflies favor the flowers.

Native Plants and Their Cultivars

Whereas many lists of nectar plants can be found, the only true test of whether a plant is used by pollinators is by direct observation (Table 2). We selected the native plants included in Native Pollinator Plants for Southern Oregon because we had directly observed their function as nectar plants for monarch

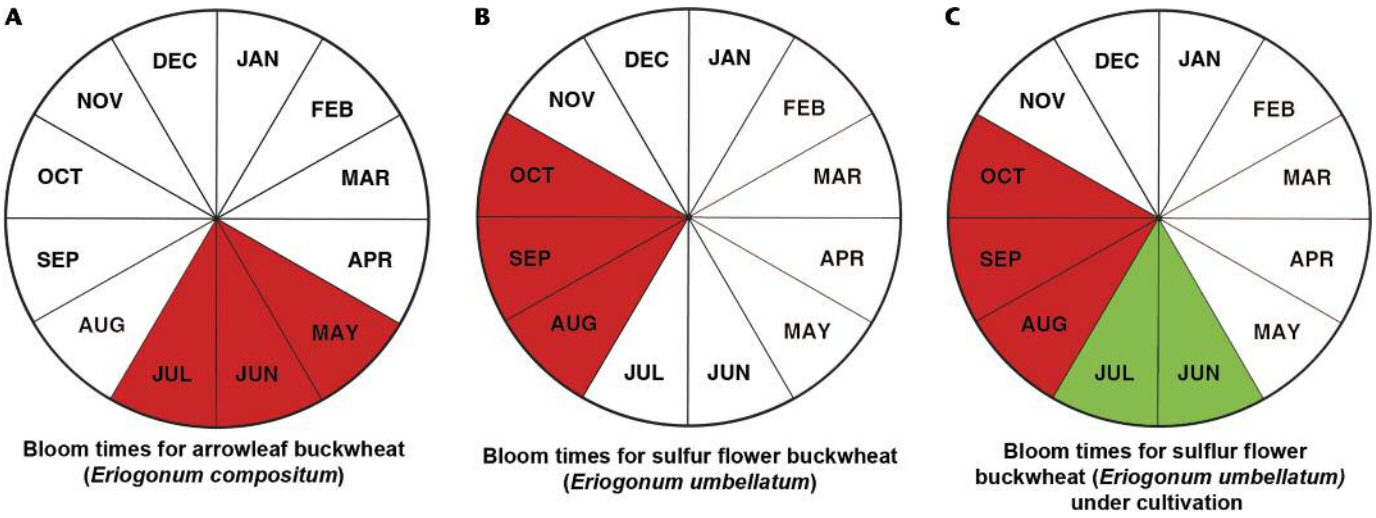


Figure 5. When considering native plants for pollinator gardens, be sure to select a palette that will bloom throughout the growing period: early season, mid-season, and late season. Note that different species in the same genus may have different flowering periods (A and B) and that growing natives under cultivation may extend the bloom period (C).

TABLE 2

Observations of actual pollinator activity have shown that wild-collected Echinacea purpurea *plants are visited more often than cultivated varieties (White 2016).*

Plant origin	Average pollinator visits
Purple coneflower (*Echinacea purpurea* (L.) Moench [Asteraceae]), wild collection	14.6
E. purpurea cv. White Swan	6.0
E. purpurea cv. Sunrise Big Sky	2.4
E. purpurea cv. Pink Double Delight	1.8

butterflies, or such use was well documented by others. Common yarrow (*Achillea millefolium*) is often included in pollinator plant lists, but we have not observed it being used as a nectar plant by monarchs. This finding may be a result of planting several horticultural varieties, and these cultivars are not good pollinator plants. In addition, yarrow spreads aggressively by rhizomes and has become a nuisance in some of our irrigated monarch waystations.

Planting Pattern

The pattern in which pollinator plants are planted is critical for creating a more natural and visually pleasing appearance. As gardeners, most of us have learned to install plants at uniform spacing and in rows. Although uniform patterns ensure that all plants have equal growing space, it does not appear natural. Because ecological restoration is our objective, random outplanting of individual plants or groups of plants is more representative of natural vegetation patterns (Landis and others 2010). Research suggests that clump-plantings in at least 1 m × 1 m (3 ft × 3 ft) blocks of an individual plant species are more attractive to pollinators than when a species is widely and randomly dispersed in smaller clumps (Pendergrass and others 2008). Scatter these clumps randomly rather than outplanting in rows to make the site appear more natural (Mader and others 2011). Small groups of plants, such as milkweeds, are best because large outplantings attract predators and parasites (Taylor, as quoted in Conniff 2013).

Maintenance of Pollinator Gardens

Installing a new monarch waystation or pollinator garden generally creates a lot of buzz in the community, but enthusiasm can wane when it comes to long-term maintenance of the site. Before a project is implemented be sure to have a long-term maintenance plan in place, with an idea of who will complete the maintenance, where the funding sources for maintenance will come from, and on what schedule. Project design should take long-term maintenance into consideration, with design criteria that makes maintenance as easy as possible into the foreseeable future.

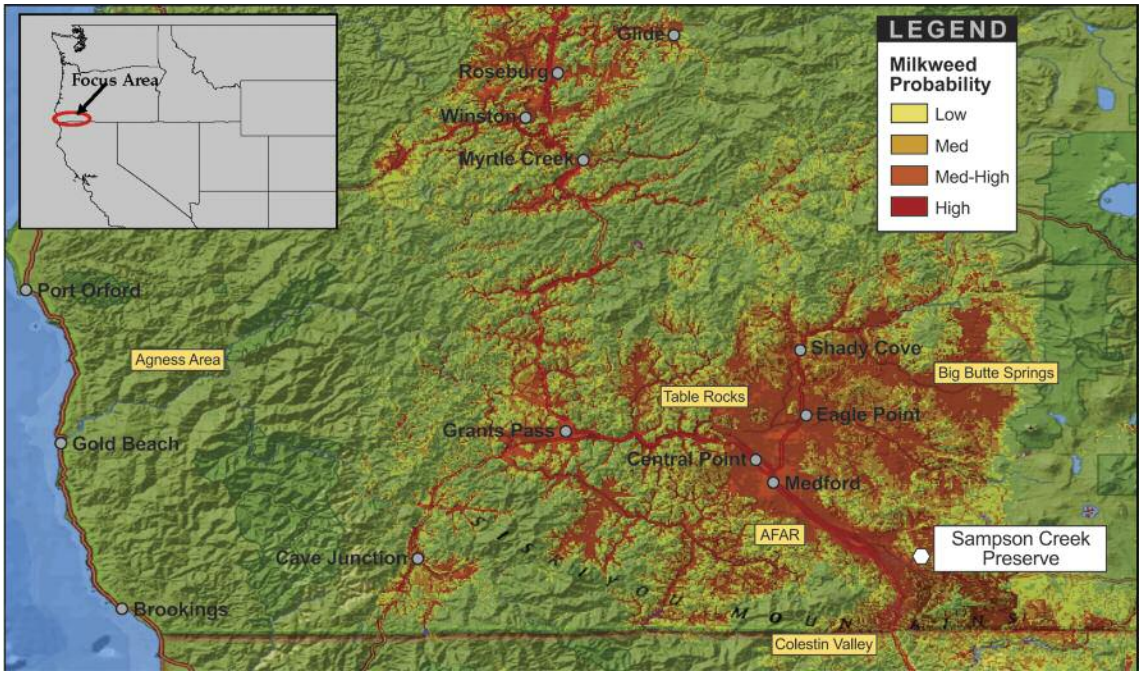


Figure 6. A National Fish and Wildlife Foundation grant will enable the planting of native milkweed and other source-identified and locally adapted native plants on 120 ha (300 ac) of land to help create breeding habitat for the western monarch butterfly in southwestern Oregon. Modified from Clint Emerson

TABLE 3

Pollinator Plant Palette for Sampson Creek Preserve Project Area

Common name	Scientific name	Blooming period	Woody shelter plant	Plant materials used
Tall Oregon grape	*Mahonia aquifolium*	Spring	No	Container nursery stock
Nineleaf biscuitroot	*Lomatium triternatum*	Spring	No	Container nursery stock
Chokecherry	*Prunus virgininana*	Late spring	Yes	Container nursery stock
Fernleaf biscuitroot	*Lomatium dissectum*	Early summer	No	Container nursery stock
Deerbrush	*Ceanothus integerrimus*	Early summer	Yes	Container nursery stock
Lewis' mock orange	*Philadelphus lewisii*	Early summer	Yes	Container nursery stock
Narrowleaf milkweed	*Asclepias fascicularis*	Summer	No	Seeds, rhizomes, container nursery stock
Showy milkweed	*Asclepias speciosa*	Summer	No	Seeds, rhizomes, container nursery stock
Ashland thistle	*Cirsium ciliolatum*	Summer	No	Container nursery stock
Western virgin's bower	*Clematis ligusticifolia*	Summer	No	Container nursery stock
Common woolly sunflower, or Oregon sunshine	*Eriophyllum lanatum*	Summer	No	Container nursery stock
Oceanspray	*Holodiscus discolor*	Summer	Yes	Container nursery stock
Coyote mint	*Monardella odoratissimum*	Summer	No	Container nursery stock
Narrowleaf mule's ears	*Wyethia angustifolia*	Summer	No	Container nursery stock
Rubber rabbitbrush	*Ericameria nauseosa*	Fall	No	Container nursery stock

Notes: See Appendix B for additional nomenclature.

POLLINATOR PROJECTS IN SOUTHWESTERN OREGON

In 2016, the National Fish and Wildlife Foundation awarded a grant of nearly $194,000 to the Southwest Oregon Monarch Habitat Restoration Initiative. A coalition including the USDA Forest Service, USDI Bureau of Land Management and US Fish and Wildlife Service, the Selberg Institute, and the Southern Oregon Monarch Advocates will restore and enhance approximately 120 ha (300 ac) of degraded monarch habitat in southwestern Oregon (Figure 6). To our knowledge, this project is the largest ever undertaken to help restore habitat for the western monarch butterfly.

An additional goal of this project is to expand the nursery supply of source-identified and locally collected milkweeds and other pollinator plants that can be used in local gardens and restoration projects. The Lomakatsi Restoration Project will administer the 2-y project, and most of the outplanting was done during fall 2017 on 6 project areas.

Defining the Target Plant Material

The principal deliverable on these restored sites is to establish a minimum of 50 surviving milkweed plants per acre, and we will evaluate 3 different establishment techniques: spot and broadcast seeding, transplanting rhizomes, and outplanting nursery stock. Milkweed seeds and rhizomes were all collected locally, and the nursery plants were grown from local seed sources. Because all these sites have the wet winters and dry summers of a typical Mediterranean climate, seeding and planting occurred during late fall.

Plant palettes were developed for each site based on species lists for that area. Most sites had both common species of native milkweeds, showy and narrowleaf, and several also contained the uncommon heartleaf milkweed (*Asclepias cordifolia*). Nectar-rich plant palettes varied between the project areas. For example, for the Sampson Creek Preserve, 15 different species were established from seeds collected from the project site and nearby areas (Table 3).

Both showy and narrowleaf milkweed stratified seeds (Figure 7A, 7B) and rhizomes (Figure 7C, 7D) were outplanted in fall 2016 and late winter 2017. Planting sites were checked for emergence in spring 2017 and, although both methods were initially successful (Figure 7A, 7D), these plants died back during the subsequent summer dry season. The sites will be checked again but the plants presumably died due to drought on these sunny southern slopes.

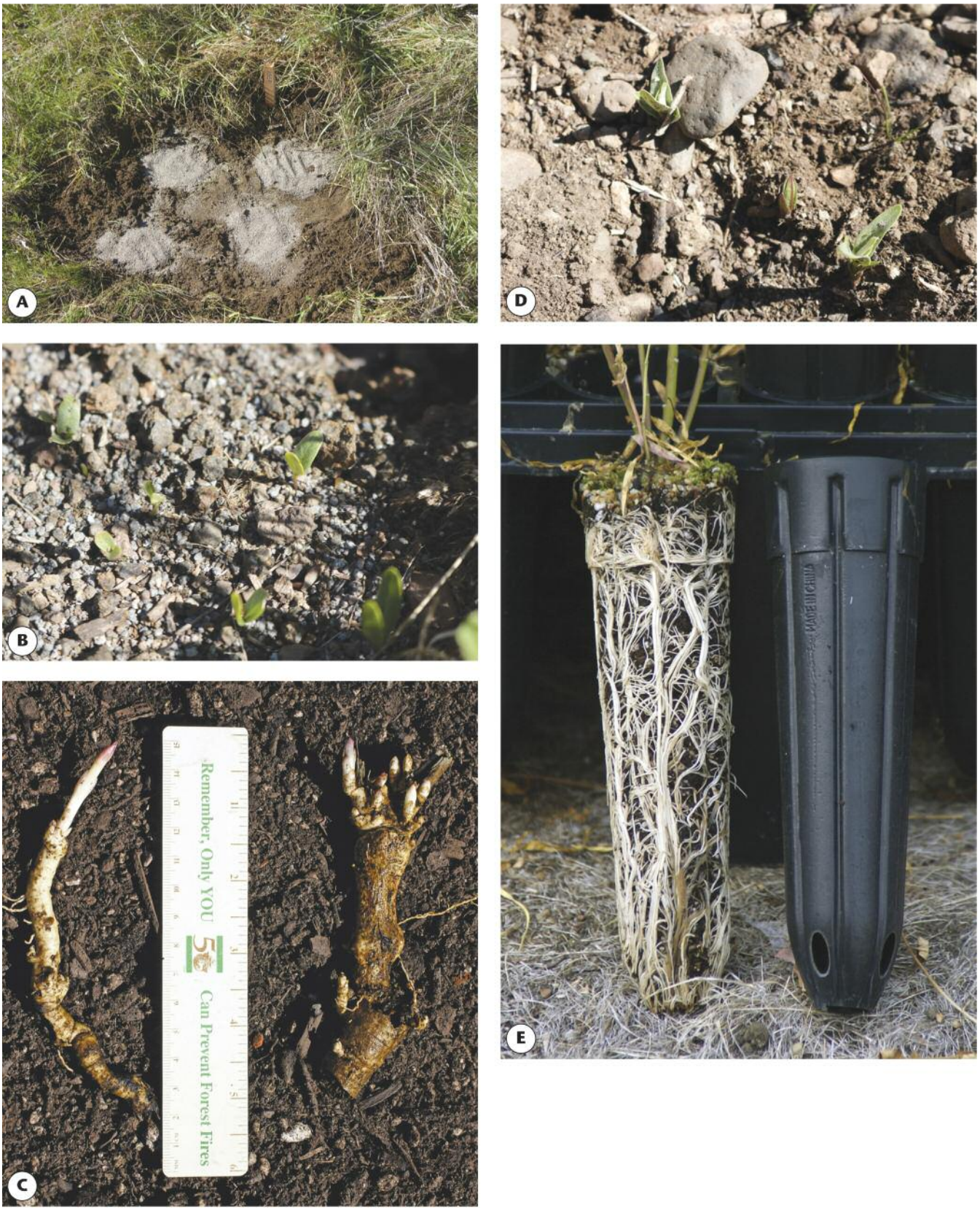


Figure 7. Native milkweed can be established by direct seeding (A, B), planting rhizomes (C, D), and nursery stock (E). Although some sprouting did occur from direct seeding (B) and rhizomes (D), these plants did not survive the summer drought. The extensive fibrous root development of the nursery plants, like this narrowleaf milkweed (E), should survive and grow on these outplanting sites. Figure 7B and 7D photos by Maia Black

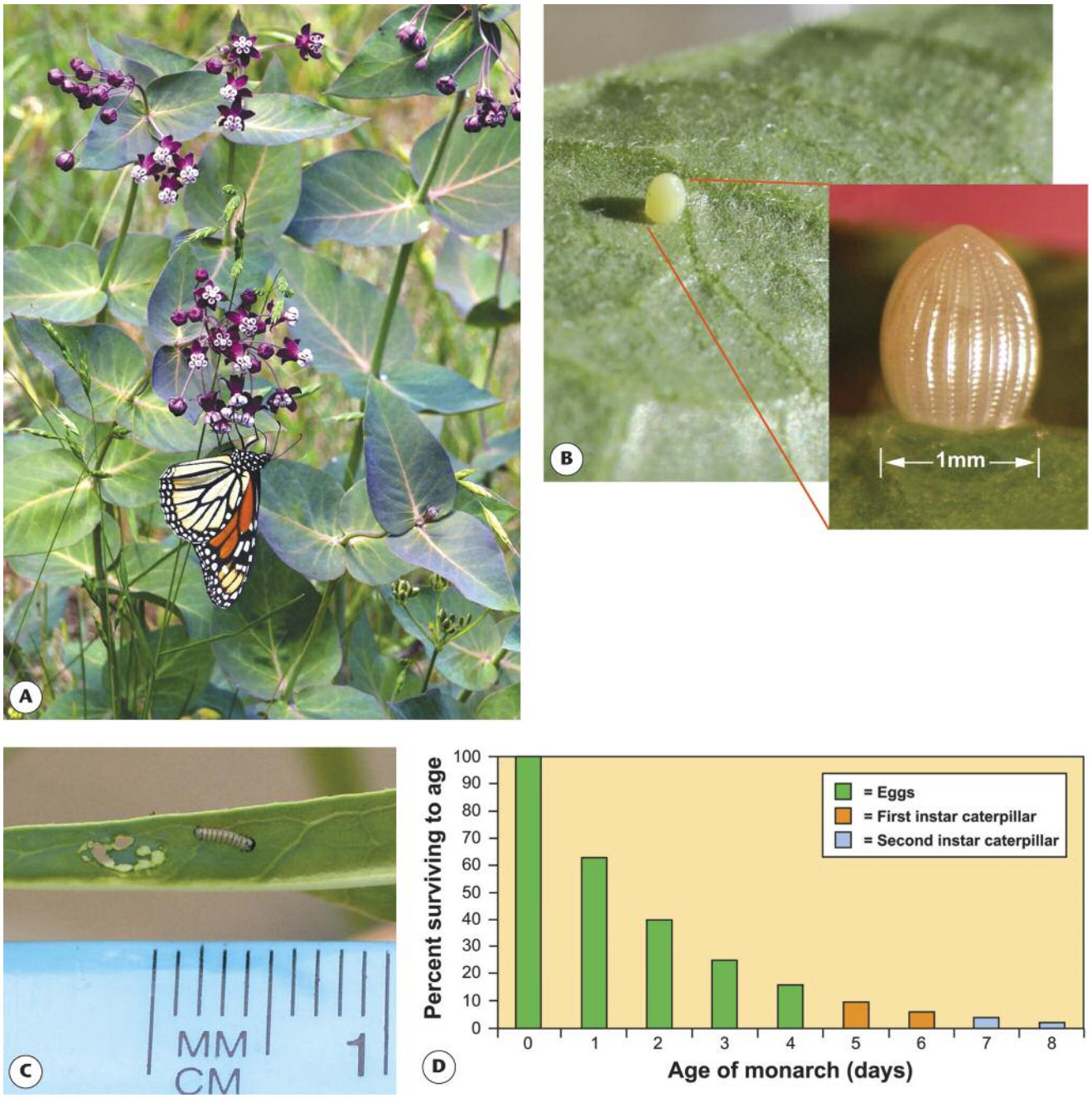


Figure 8. Documenting monarch butterfly use will be challenging. Adult butterflies are wanderers so photographs will be necessary (A). Monarch eggs (B) and early instar caterpillars (C) are heavily predated by other insects, and only around 5% of eggs survive to become butterflies (D) (modified from De Anda and Oberhauser 2015). The Figure 8B inset emphasizes the small size of monarch butterfly eggs. Figure 8A photo by Tanya Harvey; Figure 8B photo by Robert Coffan

Container nursery plants (Figure 7E) were outplanted during fall 2017, and survival and growth will be monitored during the following summer and fall.

Measuring Success

The success of this restoration project will be assessed through evaluation of 2 deliverables: establishment of 50 milkweed plants per acre and documented monarch use.

Number of Milkweed Plants

All 6 sites will be periodically monitored during spring and summer 2018, and surviving milkweed plants will be counted and recorded.

Documenting Monarch Use

Monarch butterflies are nomadic and individuals can cover a wide range, stopping only occasionally to nectar on flowers

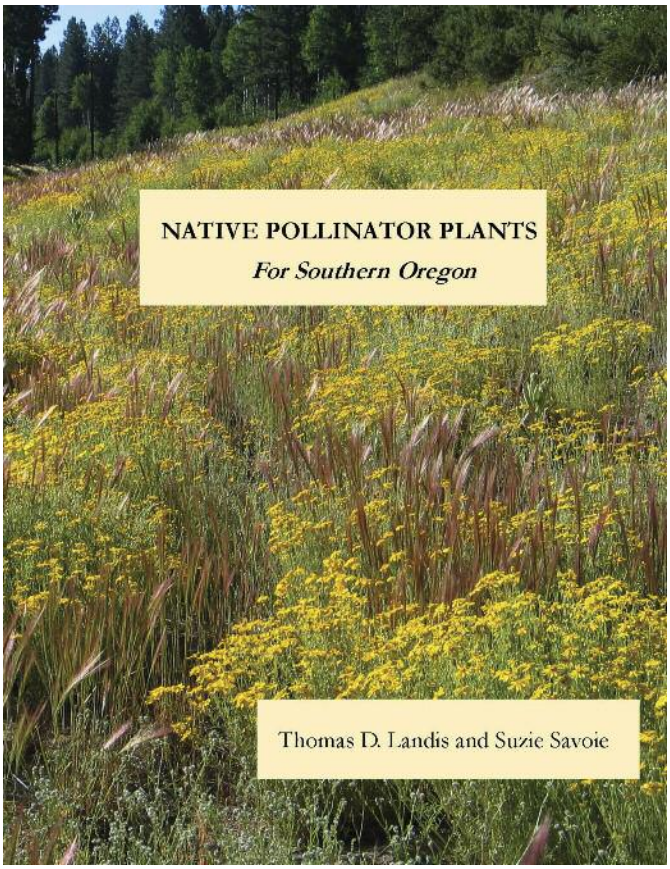


Figure 9. One of the first steps in pollinator restoration is to develop a plant palette of source-identified, locally adapted native plants that can be used to achieve the stated restoration objectives. This booklet is how we shared our list of desirable native pollinator plants.

or to lay eggs on milkweeds, which means documenting their presence will be by far the more challenging measurement of success. Because all project locations are wildland sites that are not easily accessed, volunteers will hike in weekly or biweekly and look for monarch butterflies, eggs, or caterpillars (Figure 8A–8C). Unfortunately, monarch eggs and young caterpillars suffer severe predation and only about 5% of eggs make it to adult butterflies (Figure 8D; De Anda and Oberhauser 2015).

RECOMMENDATIONS

Our work with native plant restoration has convinced us of the importance of utilizing source-identified, locally adapted native plants. An important first step in the restoration process is to develop a palette of native plants to achieve stated objectives. For our efforts, we compiled and published Native Pollinator Plants for Southern Oregon (Figure 9; Landis and Savoie 2016), which contains a list of early-season, mid-season, and late-season natives that provide food and create shelter for all types of pollinators. We strongly recommend this process to others who want to create functional pollinator habitat in their local area.

APPENDIX A

Insect Taxonomy and Nomenclature

Common name	Scientific name
Monarch butterfly	*Danaus plexippus* Linnaeus, 1758 (Lepidoptera: Nymphalidae)
Pale swallowtail butterfly	*Papilio eurymedon* Lucas, 1852 (Lepidoptera: Papilionidae)
Anise swallowtail butterfly	*Papilio zelicaon* Lucas, 1852 (Lepidoptera: Papilionidae)
Western white butterfly	*Pontia occidentalis* Reakirt, 1866 (Lepidoptera: Pieridae)
Mourning cloak butterfly	*Nymphalis antiopa* Linnaeus, 1758 (Lepidoptera: Nymphalidae)
Painted lady butterfly	*Vanessa cardui* Linnaeus, 1758 (Lepidoptera: Nymphalidae)
American lady	*Vanessa virginiensis* Drury, 1773 (Lepidoptera: Nymphalidae)
Oregon silverspot butterfly	*Speyeria zerene hippolyta* W.H. Edwards, 1879 (Lepidoptera: Nymphalidae)
California tortoiseshell butterfly	*Nymphalis californica* Boisduval, 1852 (Lepidoptera: Nymphalidae)
California sister butterfly	*Adelpha californica* Butler, 1865 (Lepidoptera: Nymphalidae)
Honey bee	*Apis mellifera* Linnaeus, 1758 (Hymenoptera: Apidae)
Franklin's bumble bee	*Bombus franklini* Frison, 1921 (Hymenoptera: Apidae)
Acmon blue	*Plebejus acmon* Westwood, 1851 (Lepidoptera: Lycaenidae)

Source: The Integrated Taxonomic Information System (ITIS) online database. 2017. URL: http://www.itis.gov (accessed 16 Jan 2018).

APPENDIX B

Plant Taxonomy and Nomenclature

Common name	Scientific name
Narrowleaf milkweed	*Asclepias fascicularis* Decne. (Asclepiadaceae)
Heartleaf milkweed	*Asclepias cordifolia* (Benth.) Jeps. (Asclepiadaceae)
Showy milkweed	*Asclepias speciosa* Torr. (Asclepiadaceae)
California poppy	*Eschscholzia californica* Cham. (Papaveraceae)
Rubber rabbitbrush	*Ericameria nauseosa* (Pall. ex Pursh) G.L. Nesom & Baird (Asteraceae)
Lewis' mock orange	*Philadelphus lewisii* Pursh (Hydrangeaceae)

(continued)

APPENDIX B *(continued)*

Plant Taxonomy and Nomenclature

Common name	Scientific name
Oceanspray	*Holodiscus discolor* (Pursh) Maxim. (Rosaceae)
Chick lupine	*Lupinus microcarpus* Sims (Fabaceae)
Winecup clarkia	*Clarkia purpurea* (W. Curtis) A. Nelson & J.F. Macbr. (Onagraceae)
Redflower currant	*Ribes sanguineum* Pursh (Grossulariaceae)
Pacific hound's tongue	*Cynoglossum grande* Douglas ex Lehm. (Boraginaceae)
Coyotebrush	*Baccharis pilularis* DC. (Asteraceae)
Deerbrush	*Ceanothus integerrimus* Hook. & Arn. (Rhamnaceae)
Pearly everlasting	*Anaphalis margaritacea* (L.) Benth. (Asteraceae)
Common yarrow	*Achillea millefolium* L. (Asteraceae)
Tall Oregon grape	*Mahonia aquifolium* (Pursh) Nutt. (Berberidaceae)
Nineleaf biscuitroot	*Lomatium triternatum* (Pursh) J.M. Coult. & Rose (Apiaceae)
Chokecherry	*Prunus virgininana* L. (Rosaceae)
Fernleaf biscuitroot	*Lomatium dissectum* (Nutt.) Mathias & Constance (Apiaceae)
Ashland thistle	*Cirsium ciliolatum* (L.F. Hend.) J.T. Howell (Asteraceae)
Western virgin's bower	*Clematis ligusticifolia* Nutt. (Ranunculaceae)
Oregon sunshine, or Common woolly sunflower	*Eriophyllum lanatum* (Pursh) Forbes (Asteraceae)
Coyote mint	*Monardella odoratissimum* Benth. (Lamiaceae)
Narrowleaf mule's ears	*Wyethia angustifolia* (DC.) Nutt. (Asteraceae)

Source: USDA NRCS. 2018. The PLANTS database. URL: http://plants.usda.gov (accessed 16 Jan 2018). Greensboro (NC): National Plant Data Team.

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