

Butterflies

(Order: Lepidoptera)

January 2000

Fish and Wildlife Habitat Management Leaflet

Number 15

General Information

Butterflies have been admired for centuries for their physical beauty and behavioral display. These colorful insects frequent open, sunny wildflower gardens, grassy fields and orchards, feeding on nectar from flowering plants. Butterflies belong to the order Lepidoptera, which means scale-winged. The order contains over 19,000 species of butterflies and 100,000 species of moths worldwide. Over 700 butterfly species occur in North America.

The life history of butterflies includes extremely short adult life spans in some species, a four-staged life cycle, and migration and hibernation activity in some species. The complex butterfly life cycle includes existence as an egg, larva (caterpillar), and pupa before developing into an adult butterfly. The resiliency of some butterfly species is illustrated by their ability to travel great distances. The Monarch, perhaps the most commonly known species in the United States, journeys more than 2,000 miles to winter in warmer climates. The life span of adult butterflies ranges between one week and eight months, and averages two to three weeks in length.



Land use changes and development have resulted in significant losses of native butterfly habitat across the United States. As a result, the popularity of wildflower gardens and plantings to attract butterflies and other valuable pollinating insects and birds has increased. Historically, butterfly enthusiasts collected butterflies with nets and preserved them in display cases for viewing. Fortunately, during the past few decades appreciation for butterflies has been evolving from these consumptive uses to conservation measures. An increased knowledge and understanding of the importance of butterflies and the symbiotic balance that exists between them and the plant species they pollinate and rely on for food has helped to foster this transition.

This leaflet is designed to highlight the ecological and aesthetic importance of butterfly species found within the United States, serve as an introduction to butterfly habitat requirements, and assist land managers in butterfly management planning. The success of management efforts depends on consideration of the needs of the desired species and analyzing and managing the available habitat to ensure that all required habitat elements are present. This leaflet provides a number of practical habitat management activities that can be conducted to attract butterflies and help support existing populations.

Distribution and Range

Distribution: Butterflies have nearly global distribution, present on every continent except Antarctica. The butterfly species found in North America that are covered in this leaflet belong to six families containing numerous subfamilies.

Range: Within the United States, the ranges of individual butterfly species, as well as individual butterflies within those species, vary with migration habits and geographic region. A species inhabiting a warmer region may have a small range, whereas a species inhabiting a region with a winter season may migrate to warmer climates in colder months, thus possessing a much larger range. Monarch butterflies range from the northern

United States in summer to Central America in winter. While adult Monarchs migrate south in the fall, it is their offspring that complete the return trip in the spring.

Butterflies of the United States

There are over 700 species of butterflies in the United States belonging to six different families. Butterflies occur in all 50 states.

Family	Subfamilies/Member Species	
Hesperiidae (skippers)	skippers, longtails, agunas, flashers, dashes, cloudywings, flats, pellicias, bolla, sootywings, scallopwings, duskywings, skipperlings	 Least Skipper
Lycaenidae (gossamer-wings)	coppers, hairstreaks, elfins, blues, azures	 Mariposa Copper
Nymphalidae (brush-footed butterflies)	snouts, fritillaries, buckeyes, silverspots, queens, heliconians, checkerspots, zebra, ladies, Julia crescents, commas, crackers, tortoiseshells, peacocks, purples, mimic, admirals, sisters, bluewings, sailors, beauties, purplewings, satyrs, browns, daggerwings, leafwings, emperors, elf, monarch, soldiers, pearlyeyes, wood nymphs, alpine, arctic, question mark, Baltimore	 Western Checkerspot
Papilionidae (swallowtails)	swallowtails, parnassians	 Black Swallowtail
Pieridae (whites and sulphurs)	whites, sulphurs, marbles, orangetips, yellows, dogfaces	 Dogface
Riodinidae (metalmarks)	metalmarks	 Arizona Metalmark

Habitat Requirements

General

Throughout the United States, butterflies can be found in and around a multitude of habitats ranging from sunny, dry open meadows to shaded, damp woods. Among the many habitats in which butterflies live are backyards, wildflower gardens and meadows, open brushy areas, old fields, open grassy woodlands, wooded stream-sides, hardwood and coniferous forests, willow swales, birch-aspen forests, citrus groves, marshes, wet meadows, woodland edges, disturbed areas, roadsides, cut-over and second-growth forests, mountainous regions, lowlands, still canyons, deserts, flats, sand dunes, and shore areas. In order to complete its life cycle, an individual butterfly may require multiple vegetation types to satisfy its food and cover needs. Host plants (plants fed upon by caterpillars) often differ completely from the vegetation required by adult butterflies, which are commonly nectar sources. Caterpillars feed on a variety of trees, shrubs, herbs, legumes, forbs, grasses, and sedges; whereas adult butterflies feed from a variety of flowering plants and wildflowers. Because Lepidopterans are so widely

distributed and diverse in the types of foods they eat, butterflies forage in nearly all habitat types in the regions they inhabit. The cover provided by crevices in tree bark, log piles, cracks in buildings, and butterfly boxes provide hibernacula for overwintering butterflies.

The removal and alteration of flowering trees, shrubs, vines, natural wildflower meadows, native prairies, woodlands, wetlands, brushy areas, hedgerows, and other natural vegetation and the general intensification of rural land uses has reduced habitat quality and availability for many butterfly species. By preserving woodlands, open grassy areas, and wildflower meadows, and providing additional food and cover sources through tree, shrub, grass, and wildflower plantings, landowners can assist in the survival of butterflies and other species that rely on similar habitat.

Food

With the exception of a few species whose caterpillars feed on aphids and ants, butterflies rely nearly entirely on plants for food. Hundreds of different plant foods are eaten by butterflies in the United States. Plant foods preferred by the caterpillar of a butterfly species often differ from those preferred by the adult. Caterpillars feed on the leaves of trees and shrubs, garden perennials, vegetables, wild legumes, wildflowers, grasses and weeds. Adult butterflies rely almost solely on nectar for food. Adults of some species also obtain nutrients and minerals from rotting fruit, tree sap, animal dung and urine, and carrion. Although some butterfly species prefer one food plant over another, many species are generalists, opportunistically feeding on whatever plants are available. On the other hand, some species specialize on particular plants, and only occur where these host plants exist. Lists of common caterpillar food plants and adult nectar sources are provided in the appendices on pages 9-11.

Cover - Plants

Cover needs of butterfly caterpillars are typically met by host food plants. Feeding caterpillars often blend in with host plants or are hidden by their foliage. Leaves of trees and shrubs provide adult perching sites for feeding, sunning and loafing and provide overhead cover from wind and rain. Leaves and branches of trees, shrubs, wildflowers and other plant types serve as substrates for butterfly eggs as well. Grasses and soil harbor eggs of butterflies that broadcast them over an area rather than laying them directly on vegetation. Grasses and soil also provide perching and roosting sites for adults. Adults may hibernate in tree bark crevices or under exfoliating bark. Tangled thickets, hedgerows, and vines also conceal butterflies from predators and provide protective cover from wind and rain.

Cover - Other

Rock piles, log piles, and open buildings are a few structures that provide protective cover and hibernacula for butterflies. Their adaptive nature enables butterflies to occupy virtually any dry structure or area that provides protection from wind and predators and a warm or sunny environment.

Cover - Winter

Most North American butterflies spend the winter in larval stages in various types of leaf litter and plant material. Those species that over-winter as adults generally require cover in the cold season similar to that required in other months. Thick vegetation located in valleys, lowlands, or on southeast facing slopes provides necessary protection from cold winds. Most North American butterflies spend winter in the larval stages in various types of leaf litter and plant materials.

Water

Water requirements of caterpillars are partially met by consumption of green vegetation, whereas nectar provides adult butterflies with adequate water. However, adult butterflies will "puddle," or gather to drink, at small mud puddles, birdbaths, and damp sandy areas. Butterflies will also puddle around campfire rings, urine spots,

salt licks, or other areas where valuable nutrients can be gathered. Puddling may be more a function of nutrient uptake than water requirements.

Interspersion of Habitat Components

In order to ensure successful butterfly reproduction and survival, all required habitat components must be available in close proximity. Vegetation diversity is most important in areas that support overwintering butterflies, as the area must provide all vegetation types necessary to support all four life cycle stages. Ideal interspersion of butterfly habitat components consists of a closely-spaced complex of diverse vegetation consisting of caterpillar food and nectar-producing plants (trees, shrubs, wildflowers, legumes, and grasses), open water and puddling areas, rock and log piles, and other structures that provide cover.

Minimum Habitat Area

Although butterflies may forage in areas as large as several square miles, no reasonable estimate of minimum habitat size exists for butterflies as a group. A species can potentially be found anywhere within its range where adequate caterpillar and adult food and cover plants exist. These ranges vary greatly by species. Also, large colonies of butterflies may require proportionally greater foraging areas than individuals. Because most adult butterflies share similar ecological requirements as adults, many different species may inhabit the same habitat type. Territoriality exists among adult male butterflies, and is most commonly seen around puddling sites. Males establish territories to improve chances of mating, and compete for space both inter- and intraspecifically. Territories are not large in size (sometimes as small as one or two square yards); thus, many territories may exist within a single group of butterflies in an area. Minimum habitat size is not usually a limiting factor for most generalist species.

Butterfly Habitat Requirements Summary Table

Habitat Component	Habitat Requirements
Food – Caterpillar	<ul style="list-style-type: none"> Leaves and foliage of native plants including quaking aspen, elm, ash, hawthorn, poplar, cottonwood, hackberry, willow, winter cress, false nettle, viburnum, mallows, cinquefoil, asters, rock cress, carrots, clovers, vetch, nettle, grasses, and others. Non-native plants consumed include fruit trees, alfalfa, cabbage, lilacs, parsley, dill, sweet pea, and others.
Food – Adult	<ul style="list-style-type: none"> Nectar-producing flowers of butterfly bush, butterfly weed, purple coneflower, asters, Joe-Pye weed, coreopsis, black-eyed Susan, liatris, pentas, and many others.
Cover – Plants	<ul style="list-style-type: none"> Leaves and branches of trees, shrubs, wildflowers and other plants. Grasses. Tree bark, tangled thickets, hedgerows, vines.
Cover – Other	<ul style="list-style-type: none"> Rock piles, log piles, cracks in buildings, virtually any dry structure or area that provides protection from wind and predators and a warm or sunny environment.
Cover – Winter	<ul style="list-style-type: none"> Similar to other cover requirements. Diversity of plant types as thick vegetation located in valleys, lowland, or on southeast facing slopes.
Water/Nutrients	<ul style="list-style-type: none"> Water requirements are met primarily through nectar and other foods consumed. Small mud puddles, birdbaths, and damp sandy spots are used as puddling areas.
Interspersion	<ul style="list-style-type: none"> Prefer a closely-spaced complex of diverse vegetation (caterpillar food plants and nectar-producing plants such as trees, shrubs, wildflowers, legumes and grasses), open water and puddling areas, rock and log piles, and other plants and structures that provide food and cover.
Minimum Habitat Size	<ul style="list-style-type: none"> No reasonable estimate of minimum habitat size exists for butterflies. Territoriality varies by species.

Butterfly Habitat Management

Wildflower plantings – Planting wildflower gardens or meadows that contain an assortment of native trees, shrubs, and grasses is one of the easiest means of attracting butterflies to an area. Because adult butterflies rely heavily on nectar as their primary food source, wildflower gardens are most beneficial when planted with a variety of native wildflower species that bloom in different months throughout the growing season. Small backyards, porches, and office courtyards may be made attractive to butterflies simply by providing a few flower boxes or small plantings. Larger areas can be planted to expansive wildflower, tree, and shrub gardens or meadows.



Wildflowers can be planted in herbaceous riparian areas and other buffer practices to enhance butterfly habitat quality.

Plants selected should be native to the area and seed sources should be from plants adapted to the local climate. Extreme care should be taken to **avoid use of invasive species** when establishing horticultural plantings for butterflies and other wildlife (see Marinelli and Hanson 1996, in References section). Both broadcast seeding (spreading seed over an area by hand or hand-held spreader) or mechanical seeding using a no-till drill can be employed to plant wildflowers, depending on the planting area's size and topography. Application rates may differ among species planted. Preparing the seedbed is crucial. Where broadcast seeding is used, the soil surface should be disturbed by raking or shallow disking to promote good seed to soil contact. Raking the soil following broadcast seeding (when practical) will aid with this as well. No-till drills can be used to sow seeds directly into existing vegetation that is either dead-standing or growing at a height of eight inches or less. Seed

can be sown directly into stubble when wildflower meadows are planted in harvested crop fields. Areas covered by dense grassy vegetation can be prepared for no-till seeding by applying a biodegradable, broad-spectrum herbicide (e.g., Glyphosate) in the spring, and again two to three weeks prior to planting if vegetation persists. Consult federal or state conservation professionals before planning a wildflower meadow project. These professionals can help with preparation activities (especially herbicide application) and may be helpful in obtaining plant seed and seeding equipment.

Garden design - Wildflower gardens that include taller trees and shrubs behind shorter species (as shown in the picture on the right) can be aesthetically pleasing. Wildflower meadows generally cover a larger area and can be planted with any mixture of native wildflowers. Adding a small amount of native prairie grass seed into the wildflower mixture can be beneficial. Garden and meadow edges should be irregular to give the plantings a natural look. Irregular edges also create more usable edge for wildlife.

Create "puddles" - Provide a source of water in the form of shallow, lined depressions or puddles, small fish ponds, birdbaths, or simply a sand-filled bowl buried in the ground that will collect water to help attract butterflies to wildflower plantings.

Plants selected should be native to the area and seed sources should be from plants adapted to the local climate. Extreme care should be taken to **avoid use of invasive species** when establishing horticultural plantings for butterflies and other wildlife (see Marinelli and Hanson 1996, in References section). Both broadcast seeding (spreading seed over an area by hand or hand-held spreader) or mechanical seeding using a no-till drill can be employed to plant wildflowers, depending on the planting area's size and topography. Application rates may differ among species planted. Preparing the seedbed is crucial. Where broadcast seeding is used, the soil surface should be disturbed by raking or shallow disking to promote good seed to soil contact. Raking the soil following broadcast seeding (when practical) will aid with this as well. No-till drills can be used to sow seeds directly into existing vegetation that is either dead-standing or growing at a height of eight inches or less. Seed



Wildflower gardens can be enhanced by including taller trees and shrubs.

Maintenance - Wildflowers may grow little in the year they are sown, as plants expend most of their energy on establishing root systems. Wildflowers should not be mown the first year; however, hand-pulling weeds from beds may be necessary if practical. Mowing wildflower meadows once annually in the early spring (March-April according to region) to a height of eight to ten inches will help reduce competition from weeds. Mowing on this schedule will also leave good residual cover at year's end for caterpillars and other wildlife that may use the wildflowers for winter cover. Pesticide use should be kept to a minimum to support the full range of native insects, including butterflies.

Species to Plant - Planting native vegetation that grows at varying rates, blooms at different times of the year, and contains a multitude of colors will create the most attractive garden or meadow possible. Experimenting with a wide variety of plantings is recommended to attract a diversity of butterfly species. Whenever possible, a combination of the plant foods listed on page three should be planted. Appendices 1 and 2 provide a more exhaustive list of plants that support various butterfly species. Native grasses comprise an important component of butterfly habitat and should be included in large wildflower plantings. Common native grass species include: big bluestem (*Andropogon gerardii*), little bluestem (*A. scoparius*), broom sedge (*A. virginicus*), side-oats grama (*Bouteloua curtipendula*), switch grass (*Panicum virgatum*), purple love grass (*Eragrostis spectabilis*), Indian grass (*Sorghastrum nutans*), and buffalo grass (*Buchloe dactyloides*).

Butterfly Boxes -- Butterfly boxes are easy to assemble and can provide cover for overwintering butterflies in areas of high visibility or that lack hibernation habitat. Butterfly boxes can be constructed of practically any type of wood and can be placed vertically on trees, within wildflower gardens, or on buildings. Exterior surfaces of boxes should be painted, caulked and sealed to provide a dry, draft-free interior.

Dimensions: Standard butterfly box dimensions are three feet tall by six inches wide by six inches deep. However, box dimensions (height, width and depth) can be adjusted to accommodate placement of the box. Two 3/4-inch wide slits should be cut vertically into the front of the box, extending at least 2/3 of the box height, to enable butterflies to enter and exit. A hinge can be placed on the lid to monitor box use.

Limiting Factors

For planning purposes, use the table below to subjectively rate the availability and quality of butterfly habitat within a planning area, based on descriptions of the above habitat requirements. Habitat communities and components that are absent or rated low are likely limiting butterfly habitat quality. Land uses on adjacent properties may need to be considered to accurately rate the quality of the planning area as butterfly habitat, and management goals should focus on addressing habitat components that are absent, in short supply, and not found nearby.

Habitat Component	Availability/Quality			
	High	Medium	Low	Absent
Food - Caterpillar				
Food - Adult				
Cover - Plants				
Cover - Other				
Water				
Interspersion of habitat components				

Management Prescriptions

Management treatments should address the habitat components that are determined to be limiting butterfly habitat potential. For planning purposes, select among the possible action items listed below to raise the quality or availability of each habitat component determined to be limiting. Applicable NRCS conservation practices and various programs that may provide financial or technical assistance to carry out specific management actions are listed.

Habitat Component	Management Options for Increasing Habitat Quality or Availability	Assistance Programs
Food	<ul style="list-style-type: none"> Plant or encourage trees such as quaking aspen, elm, ash, hawthorn, poplar, fruit trees, cottonwood, hackberry, and willow; plant native forbs. 	327, 380, 386, 390, 391, 422, 645, 647, 650
	<ul style="list-style-type: none"> Plant wildflower meadows and gardens to include nectar-producing plants such as butterfly bush, butterfly weed, purple coneflower, asters, Joe-Pye weed, coreopsis, black-eyed Susan, liatris, pentas and others. 	
	<ul style="list-style-type: none"> Encourage native legumes (clovers, partridge pea, lespedeza), dock, milk weed, nettle, and native grasses. 	WHIP, EQIP, PFW, CRP
	<ul style="list-style-type: none"> Reduce pesticide and herbicide use in agricultural areas when possible; limit herbicide and insecticide use on grassland, forb and orchard communities to small areas or use mechanical means of pest control to minimize loss of nectar-producing trees, shrubs, flowers, and forbs. 	
	<ul style="list-style-type: none"> Maintain natural and planted grassland/forb communities by conducting prescribed rotational burning and rotational mowing when and where appropriate. 	338, 645, 647 WHIP, EQIP, PFW, CRP
Cover	<ul style="list-style-type: none"> Restore hydrology and vegetation in herbaceous and forested wetlands. 	657 WRP, PFW
	<ul style="list-style-type: none"> Preserve existing trees, shrubs, vines, hedgerows, and wildflowers; preserve vegetational diversity in open meadows, woodlots, hedgerows, field borders and other natural vegetative communities. 	327, 386, 650 CRP, EQIP
	<ul style="list-style-type: none"> In regions where trees are part of natural landscapes, plant or encourage quaking aspen, elm, ash, hawthorn, poplar, fruit trees, cottonwood, hackberry, and willow trees within wildflower meadows and gardens. 	380, 391 WHIP, EQIP, CRP
	<ul style="list-style-type: none"> Preserve or create rock piles, log piles, and thickets. 	
Water	<ul style="list-style-type: none"> Create small ponds or puddles, birdbaths, and damp sandy areas within wildflower gardens and backyards. 	
	<ul style="list-style-type: none"> Restore hydrology and vegetation in herbaceous and forested wetlands. 	657 WRP, PFW
Interspersion	<ul style="list-style-type: none"> Combine above prescriptions to increase interspersion of habitat components or amount of suitable butterfly habitat. 	

NRCS Conservation Practices that may be useful in undertaking the above management actions.

Code	Conservation Practice	Code	Conservation Practice
327	Conservation Cover	422	Hedgerow Planting
338	Prescribed Burning	645	Upland Wildlife Management
380	Windbreak/Shelterbelt Establishment	647	Early Successional Habitat Development
386	Field Border	650	Windbreak/Shelterbelt Renovation
390	Riparian Herbaceous Cover	657	Wetland Restoration
391	Riparian Forest Buffer		



Tiger Swallowtail



Pacific Checkerspot

Programs that provide technical and financial assistance to develop fish and wildlife habitat on private lands.

Program	Land Eligibility	Type of Assistance	Contact
Conservation Reserve Program (CRP)	Highly erodible land, wetland, and certain other lands with cropping history. Stream-side areas in pasture land.	50% cost-share for establishing permanent cover and conservation practices, and annual rental payments for land enrolled in 10 to 15-year contracts. Additional financial incentives are available for some practices.	NRCS or FSA State or County Office
Environmental Quality Incentives Program (EQIP)	Cropland, range, grazing land & other agricultural land in need of treatment.	Up to 75% cost-share for conservation practices in accordance with 5 to 10-year contracts. Incentive payments for certain management practices.	NRCS State or County Office
Partners for Fish and Wildlife Program (PFW)	Most degraded fish and/or wildlife habitat.	Up to 100% financial and technical assistance to restore wildlife habitat under minimum 10-year cooperative agreements.	Local office of the U.S. Fish and Wildlife Service
Waterways for Wildlife	Private land	Technical and program development assistance to coalesce habitat efforts of corporations and private landowners to meet common watershed level goals.	Wildlife Habitat Council (301-588-8994)
Wetlands Reserve Program (WRP)	Previously degraded wetland and adjacent upland buffer, with limited amount of natural wetland, and existing or restorable riparian areas.	75% cost share for wetland restoration under 10-year contracts, and 30-year easements, and 100% cost-share on restoration under permanent easements. Payments for purchase of 30-year or permanent conservation easements.	NRCS State or County Office
Wildlife at Work [®]	Corporate land.	Technical assistance on developing habitat projects into a program that will allow companies to involve employees and the community	Wildlife Habitat Council (301-588-8994)
Wildlife Habitat Incentives Program (WHIP)	High-priority fish and wildlife habitat in your state.	Up to 75% cost-share for conservation practices under 5 to 10-year contracts.	NRCS State or County Office
State fish and wildlife agencies, private groups such as the Xerces Society and the North American Butterfly Association (NABA) may also have assistance programs, available literature, or other useful tools in your state.			State or local contacts

References

- Gunnarson, L. and F. Haselsteiner. 1990. Butterfly gardening. The Xerces Society/Smithsonian Institution. Sierra Club Books, San Francisco. The National Wildlife Federation, Washington, DC. 191 pp.
- Henry, P. 1994. Gardening to attract birds and butterflies. Avon Books, New York. 80 pp.
- Marinelli, J., and B. Hansen, eds. 1996. Invasive plants: weeds of the global garden. Brooklyn Botanical Garden Handbook No. 149. Brooklyn Botanical Garden, Inc., Brooklyn, NY. 111 pp.
- Opler, Paul A., H. Pavulaan, and R. E. Stanford. 1995. Butterflies of North America. Jamestown, ND: Northern Prairie Wildlife Research Center
- Schneck, M. 1990. Butterflies - How to identify and attract them to your garden. Rodale Press, Emmaus, PA. 160 pp.
- Stokes, D., L. Stokes, and E. Williams. 1991. Butterfly book: the complete guide to butterfly gardening, identification, and behavior. Little, Brown and Company Limited, Toronto, Canada. 96 pp.
- Tufts, C. and P. Loewer. 1995. Gardening for wildlife. The National Wildlife Federation. Round Stone Press, Inc. Rodale Press, Inc. Emmaus, PA. 192 pp.