STATE OF THE BUTTERFLIES IN THE UNITED STATES

A Roadmap for Butterfly Conservation in the 21st Century

XERCES SOCIETY
for Invertebrate Conservation

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Front cover—clockwise from top left: 1: female Cassius Blue (*Leptotes cassius*) ovipositing; 2: Common Buckeye (*Junonia coenia*) on black-eyed Susan (*Rudbeckia hirta*); 3: close-up of Black Swallowtail (*Papilio polyxenes*) caterpillar; 4: a mix of perennials and annuals provides a long season of flowers for pollinators. (Photos: Bryan E. Reynolds [1–3]; Bee Campus USA—University of Vermont [4].)

Back cover—clockwise from top left: 1: female Queen (*Danaus gilippus*) on mist flower (*Conoclinium* sp.); 2: hayed native tallgrass prairie; 3: male Blue Metalmark (*Lasaia sula*); 4: Orange Sulphur (*Colias eurytheme*) on purple coneflower (*Echinacea angustifolia*). (Photos: Bryan E. Reynolds [1, 3, 4]; Ray Moranz, Xerces Society [2].)

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Executive Summary

Butterflies, perhaps the best-loved of all insects, are in decline. A recently published study (Edwards et al. 2025) shows that between 2000 and 2020, the overall abundance of butterflies in the contiguous United States fell by more than one-fifth: for every ten butterflies in 2000, by 2020 there were only eight. More than 70% of the assessed butterfly species suffered declines, with, alarmingly, over 140 species dropping by more than a half. These findings are the outcome from the first systematic effort to evaluate butterfly population trends across the country.

In 2022, the Status of Butterflies in the U.S. Working Group was formed to develop a picture of the health of butterfly populations across the country. Nearly two-dozen researchers participated in the working group to compile long-term monitoring data from all available datasets to produce the most comprehensive understanding of the status of butterflies in the U.S. to date.

The analyses by the Working Group were conducted using data from 2000 to 2020, and included over 12.6 million observations of butterflies from thousands of researchers, biologists, and community scientists, who participated in nearly 77,000 individual surveys across 35 monitoring programs. These data included observations for 554 of the approximately 650 butterfly species resident (those with breeding populations) within the contiguous U.S. (all states except Hawaii and Alaska) (Grames et al., in review). Of the 554 species with observations, 342 had sufficient data to estimate trends. Using these data, the Working Group calculated the change in total butterfly abundance and estimated species-level changes in abundance.

The study found a rapid rate of decline in diversity and abundance across those species for which adequate data were available to conduct analyses. Butterflies in the contiguous U.S. are declining at a rate of 1.3% per year, leading to a 22% reduction in combined

Key Findings on the State of the Butterflies in the United States

Overall, butterflies across the U.S. are declining at a rate of 1.3% per year—leading to a 22% reduction in combined abundance over the 20-year time period.

Out of 342 species analyzed:

- ⓘ 245 species (72%) declined in abundance by 10% or more. Of these:
  - ❗ 71 species declined by 10–40%
  - ❗ 31 species declined by 40–50%
  - ❗ 84 species declined by 50–75%
  - ❗ 35 species declined by 75–90%
  - ❗ 24 species declined by 90% or more
- ⓘ 32 species had populations with little detectable change.
- ⓘ 65 species increased in abundance by 10% or more.
- ⓘ More species declined than increased in every region, but every region includes at least one increasing species.

There are solutions—we have sufficient information to take action now.

Left: Field Crescent (*Phyciodes pulchella*) butterfly. Right: Sheridan's Hairstreak (*Callophrys sheridanii*) butterfly. (Photos: David Robichaud / Flickr CC BY 2.0.)

abundance from 2000 to 2020. More concerning, 40% of species analyzed declined by more than 50%—their abundances in 2020 were less than half what they were in 2000.

These findings, in concert with recent research on butterflies and knowledge of both drivers of decline and conservation efforts, form the basis for a roadmap for butterfly conservation. This roadmap envisions a collaborative network of scientists, practitioners, and the public working across all landscapes and all species. Everyone can contribute to solutions.

The future of butterflies in the U.S. hinges on the protection, management, creation, and restoration of habitat to meet the needs of all butterfly species, from specialist or narrowly distributed species to wide-ranging generalists. Butterflies require not just nectar plants but also the presence of caterpillar host plants, habitat to support all stages of their life cycle, and refuge from insecticides and other pesticides and pollutants.

It is our intention that this analysis is used to raise awareness and spur collaborative action across sectors, including wildlife agencies, policymakers, land managers, researchers, gardeners, farmers, landowners, apartment renters—anyone interested in supporting and protecting wild butterflies and the habitats upon which they depend.

Butterflies Are Adaptable, Given the Chance

Some aspects of butterfly biology, such as the number of generations per year or flexibility in host plant choice, may help butterflies adapt to environmental change.

Many butterfly species complete more than one generation per year. These are known as multivoltine species as opposed to univoltine species that complete a single generation. With a warming climate and extending growing seasons, some multivoltine species are emerging earlier, allowing them to complete an additional generation. These extra generations are generally beneficial to populations, as long as there are host and nectar plants to support them through development, and may even facilitate northern range expansion.

In some cases, over the course of a few years (or 5–10 generations), butterfly populations have evolved the ability to eat new host plants, tolerate new thermal conditions, and escape new predators (Higgins et al. 2014; Parmesan & Singer 2022; Singer & Parmesan 2022). Responses like this can help butterflies adapt to new and changing environments. This rapid evolution is only possible in large, genetically diverse populations, something that also helps butterflies thrive in the face of extreme conditions, so maintaining high-quality, connected habitat is key!

1. Introduction

Butterflies are the charismatic fauna of the insect world. We see and appreciate them in our backyards and parks, as well as when walking in mountain meadows or through tallgrass prairies. They evoke images of beauty and are widely depicted in art. As pollinators, they are an essential part of the ecological network of species that supports reproduction of wild plants and global food and fiber production for peoples around the world.

Despite their popularity, value, and ecological importance, butterflies are disappearing from our landscapes. Reports of declines are widespread across different insect groups and across the world. Although there are many reports of falling numbers of butterflies, the United States has lacked a comprehensive analysis of butterfly trends across the country. To correct this, the Status of Butterflies in the U.S. Working Group was formed in 2022 with support from the U.S. Fish and Wildlife Service (USFWS) and the U.S. Geological Survey (USGS) John Wesley Powell Center for Analysis and Synthesis. A multi-disciplinary group of scientists assembled the most comprehensive butterfly monitoring dataset to date to evaluate the status and trends of U.S. butterflies. The compiled dataset includes data from 35 monitoring programs resulting in 76,957 surveys and over 12.6 million individual butterfly records. With this dataset, the group analyzed trends in abundance from 2000–2020 for 342 butterfly species, more than half of the 650 resident species in the contiguous U.S. (Edwards et al. 2025). Of the 342 assessed species:

- → 301 species had sufficient data to estimate reliable trends at the regional scale, which could be used to calculate a nationwide trend for each species.
- → 41 species had enough data for a national trend estimate, but insufficient data for regional analyses.

Of the remaining 308 resident species, 186 were in the dataset but had insufficient data to estimate trends. The other 122 species lacked observations and were not included in the dataset.

(Note: In this report, we report mean trend estimates for all analyzed species. For details of statistical models and their results, refer to Edwards et al. 2025).

Overall, butterflies across the United States are declining at an average rate of 1.3% per year—a more than 20% decline in abundance over twenty years. That means, collectively, for every ten butterflies seen two decades ago, now there are only eight.

Notably, these changes are not limited to select groups of butterflies. Declines are occurring in species from all butterfly families and in all regions, with almost three-quarters of the species (245 of 342) declining at their range-wide (country-level) scale by 10% or more. In addition to range-wide analyses, the team assessed status within each region when there were sufficient data. Over half of the butterfly species (193 of 342) were significantly declining in at least one region. (Refer to map on page 13 for regional boundaries.)

In the face of this evidence of such widespread and pervasive declines, we identify ways to reverse these trends. Most promising is a focus on species that are not declining: At the continental range-wide scale, 65 species increased over the 20-year period by 10% or more.

At the regional level, 65 species significantly increased in at least one region. While many of the increasing species have ranges that are predominantly in Mexico, suggesting a northern shift in response to climate change, there are signals that some of these species are doing well due to other factors. For example, the Gulf Fritillary (*Agraulis vanillae*) is increasing in the Pacific Southwest; its passionflower (*Passiflora* spp.) host plants have been planted extensively in urban gardens, likely giving the species a boost to expand its range throughout the western U.S. (Halsch et al. 2020). Ensuring that host and nectar plants are available throughout the entire growing season may help butterflies respond to climate change; data collected during droughts in the western U.S. have also indicated that multivoltine species (those with more than one generation in a year) living at low elevations can take advantage of a longer growing season and may be more resilient to extended drought (Forister et al. 2018).


Dr. Thomas G. Barnes, USFWS / Wikimedia Commons CC0

In this report, we highlight findings from our analysis of the status and trends of butterfly species across the lower 48 U.S. states, as well as more detailed profiles for each of seven regions. (map on page 13). We use these findings, and the collective learning from scientists and practitioners working to advance butterfly conservation within the U.S. and around the world, to put forth a vision to rebuild butterfly populations. Our intention is to advance a broad-reaching effort to embed the needs of butterfly species within the wide-ranging work being done to build a landscape that enhances pollinator communities and habitats, and support nature-based climate solutions.

Butterflies in Art Over Time

Photos (clockwise top left): Illuminated medieval manuscript; pre-Columbian Aztec stone carving of the goddess Itzpapalotl's symbol, the clawed or obsidian butterfly; Royal Mail postage stamps; Monarch in Moda mural painted by Jane Kim of Ink Dwell; tattoo on arm; mixed media wall decorations.


Cleveland Museum of Art CC0


Gary Todd / Flickr CC0


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Male Fender's Blue (*Icaricia* [=*Plebejus*] *icarioides fenderi*)—the first butterfly species in the history of the Endangered Species Act to show sufficient evidence of recovery to be downlisted from "endangered" to "threatened." (Photo: © Cheryl Schultz.)

2. Why Care About Butterflies?

Butterflies in Culture and as Inspiration

For millennia butterflies have attracted the attention and admiration of people around the world. These eye-catching insects are important to many Indigenous groups, such as the Pueblo, Hopi, and Blackfeet cultures in which butterflies embody beauty, joy, and good health. Butterfly metamorphosis from caterpillar to winged adult has captured the imagination of many writers and artists, and this process has come to symbolize transformation and freedom.

The Ecological Value of Butterflies

Butterflies play a significant role in the pollination of flowering plants: their bodies collect and deposit pollen as they travel from flower to flower in search of nectar. Many plants benefit from the pollination efforts of butterflies. For example, the Columbia tiger lily (*Lilium columbianum*) is largely pollinated by swallowtail butterflies (*Papilio* spp.). Butterflies also help agriculture. In the Texas cotton industry, butterflies provide $100 million of pollination services per year, visiting flowers that would otherwise go unpollinated (Cusser et al. 2021). These plant–animal relationships are integral to the beauty of our landscape and contribute to the diversity and resilience of our ecosystems.

Butterflies are a key link in the transfer of energy through the food chain, converting plant matter into protein that can be eaten by other animals, from birds to spiders to lizards to small mammals. Ninety-nine percent of all butterflies feed on plants as caterpillars. While some caterpillars are crop pests, others help to regulate wild or invasive plant populations—but all transfer nutrients stored in plants to other animals when they are eaten. Birds are a principal predator of butterflies—particularly caterpillars—which are a vital food source for developing chicks; even seed-eating birds and hummingbirds feed their young caterpillars (Grames et al. 2023). On a less visible scale, many insects including wasps and flies are parasitoids of caterpillars. These insects lay their eggs on or in caterpillars. After hatching, the parasitic larvae burrow into their host, eventually killing it before emerging as adults. These flies and wasps are crucial to biocontrol that can keep other insect populations down, some of which are in our crop fields.

It is safe to say that butterflies play an important role in supporting many lives on the planet.

The Societal Value of Caterpillars

Beyond their intrinsic, ecological, and cultural values, butterflies provide a number of economic, scientific, and health benefits to humans. For example, butterfly tourism—including travel to monarch overwintering grounds, public butterfly houses, arboretums, preserves, and botanic gardens—is a growing industry attracting visitors from around the world and giving people a chance to experience butterflies from their own communities as well as faraway lands.

Butterflies have long been used as model taxa for education and scientific research. They are frequently employed to teach children about scientific concepts like insect life cycles, migration, and conservation. Groups of butterfly species form some of the best-studied examples of evolutionary processes such as mimicry, sexual selection, and the expression of color. In the current era of rapid environmental change, butterflies have become models for understanding how animals respond to climate warming, droughts, and extreme weather events, as well as how animals respond to changes in availability and location of available habitat.

In our own communities, more and more gardeners are welcoming butterflies and other pollinators into their backyards with a diversity of nectar-rich wildflowers and butterfly host plants. An ever-growing body of research finds that access to gardens—and the insects they support—promotes connection to nature, reduces stress, and otherwise improves people's health (Vanderstock et al. 2022). In addition, a niche market in the home gardening world has opened up to provide "pollinator-friendly plants," labeled to inform gardeners about which species are best for attracting butterflies, bees, and hummingbirds. In 2022, U.S. residents spent over $10.8 billion on plantings to support pollinators and other wildlife on and around their homes (DOI, FWS 2022), illustrating the vast demand and market potential for these products.

Value of Caterpillars as Food for Birds

Photos, clockwise from top: Julie Falk / Flickr CC BY-NC 2.0; Andy Reago & Chrissy McClarren / Flickr CC BY 2.0; Chad Horwedel / Flickr CC BY-NC-ND 2.0; Debra Breton / Flickr CC BY-NC 2.0; kansasphoto / Flickr CC BY-NC 4.0.

What do Butterflies Need?

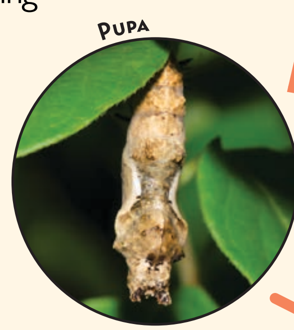
Nearly all butterflies need the same things: plants to feed on as caterpillars, nectar as adults, habitat to support all stages throughout their annual life cycle, and a refuge from pesticides, especially insecticides.

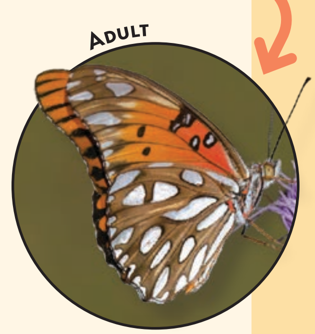
Host plants: Although caterpillars of some butterfly species eat a wide range of plants from multiple families, the typical species can only feed on plants from one or two plant groups as caterpillars (Forister et al. 2015). Some species are even more particular, eating only one plant species. Host plants need to be plentiful enough locally to support a healthy butterfly population, and widespread enough that butterflies encounter hosts as they move across the landscape.

Nectar sources: Energy-rich nectar from flowers is the primary food source for most adult butterflies (and many moths). Both native and non-native plants attract butterflies with their nectar. Many native plants providing high-quality nectar are also host plants for caterpillars. Examples are buckwheats (*Eriogonum*), milkweeds (*Asclepias*), thistles (*Cirsium*), wild indigos (*Baptisia*), asters (*Symphyotrichum*), goldenrods (*Solidago*), Joe Pye weeds (*Eutrochium*), and wild lilacs (*Ceanothus*).

Year-round habitat: Most U.S. butterflies are non-migratory or engage in relatively local, seasonal movements, meaning that even when adults are not present, eggs, caterpillars, or chrysalises are. This continual presence means butterfly habitat needs to be protected year-round, so that butterflies have shelter in all life stages. In particular, butterflies need safe places to overwinter, whether tucked into leaf litter, attached to a twig, or nestled just below the surface of the soil.

Pesticide-free space: Butterflies can be exposed to pesticides in numerous ways, including direct contact with spray residue on plants or through ingestion of contaminated nectar or plant tissue. Insecticides, as the term implies, kill insects and can kill butterflies. Insecticides are applied in many landscapes, with particularly widespread and intensive use in agricultural and residential areas (Pimentel & Levitan 1986; Atwood & Paisley-Jones 2017). Broadcast use and drift of herbicides can kill the host and nectar plants on which butterflies depend. Fungicides, commonly used to kill fungi that damage plants, can also negatively affect butterfly development and survival (Olaya-Arenas et al. 2020). Some water-soluble pesticides are “systemic” in plants, moving up from soil, seed coatings, and roots into leaves and flowers, where they can expose feeding caterpillars or nectaring adults. Systemic pesticides can also be more harmful because they tend to have longer residence times in plants—other pesticides may wash off the plant with a rain event—and very long half-lives, meaning they can take many years to break down in soil or waterways. Systemic insecticides include neonicotinoids and anthranilic diamides. Many fungicides, as well as many herbicides, are also systemic. Protecting butterfly habitat from pesticide application and drift is also key to promoting healthy butterfly populations.

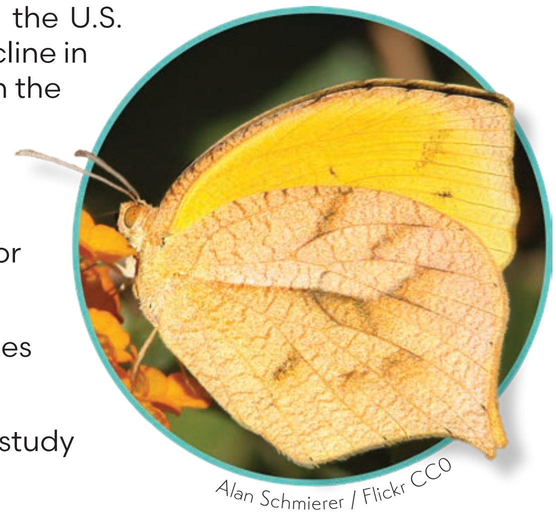




Gulf fritillary photos: © Bryan E. Reynolds

3. Extent of Butterfly Declines

Between 2000 and 2020, the total number of butterflies in the U.S. declined at an annual rate of 1.3%, for a cumulative 22% decline in butterfly abundance. The study by the Status of Butterflies in the U.S. Working Group estimated individual species trends for 342 U.S. butterfly species. Overall, almost four times as many species are declining as increasing (Figure 1):



- 245 species (72%) declined in abundance by 10% or more over the study period.
  - ⚠ 114 of these were statistically significant declines (see Figure 2).
- 65 species (19%) increased by 10% or more over the study period.
  - ⚠ 9 of these were statistically significant increases.
- 32 species (9%) did not change more than 10% in either direction.

A further 186 species lacked sufficient data to be included in the analyses (the dataset included 554 of the 650 resident butterfly species in the contiguous U.S.).

Figure 1. Summary of species trends from 2000 to 2020.

Species are grouped by mean species trends, regardless of statistical significance.

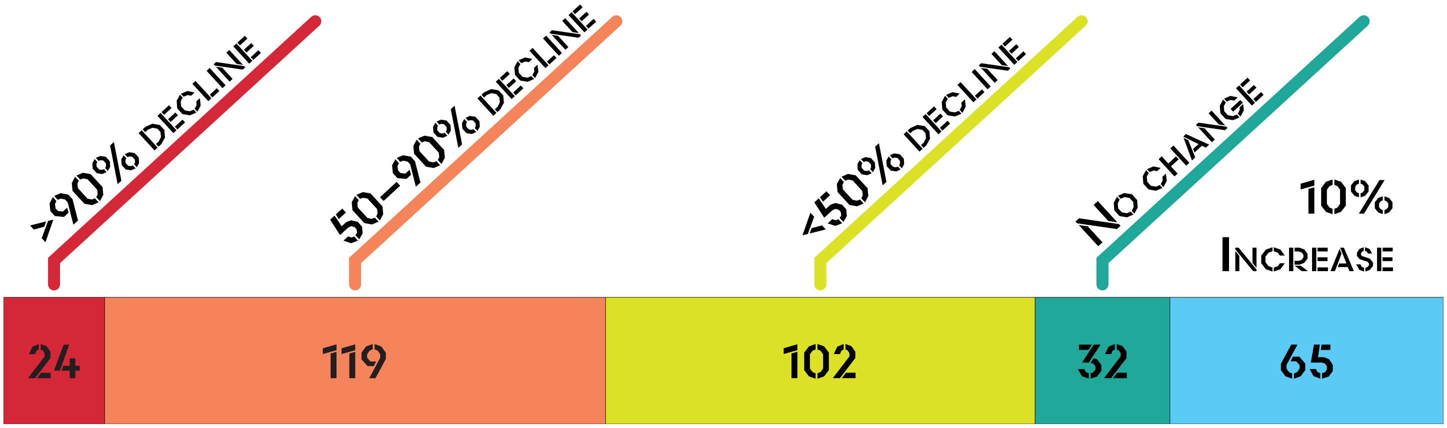
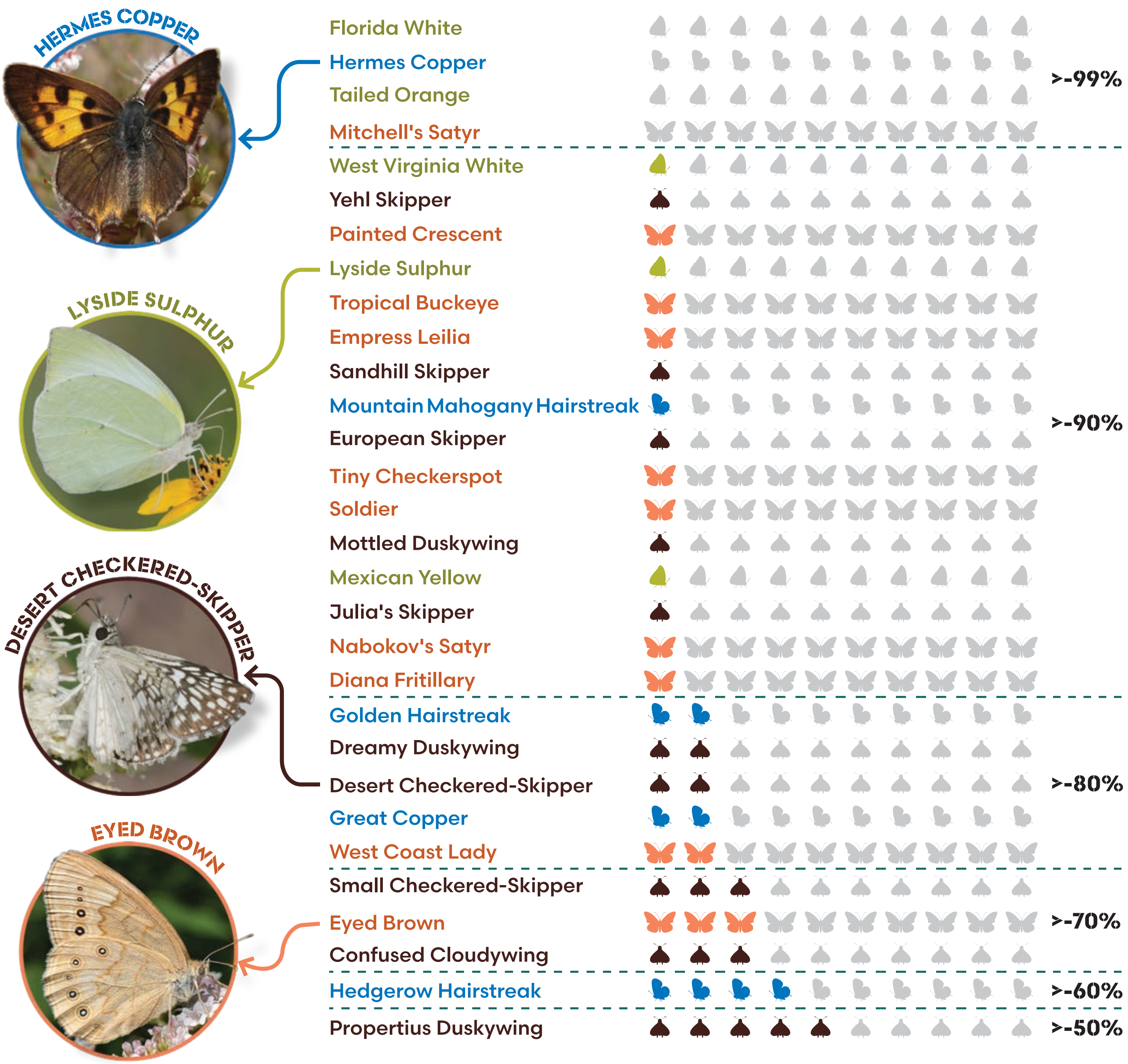


Figure 2. For every 10 butterflies existing in 2000, how many are left now?

Shown are 30 of the 81 species with the highest, statistically significant ($p<0.05$) rates of decline over the study period. Colored butterflies represent those that remain, gray butterflies are those lost, color coded by butterfly family (**Blue** = Lycaenidae, **Orange** = Nymphalidae, **Green** = Pieridae, **Brown** = Hesperiidae).



Photos (top to bottom): John Martin, USFWS / Flickr CC0; © Bryan E. Reynolds; © Bryan E. Reynolds; Nathaniel Sharp (CC BY-NC 4.0)

The American lady (***Vanessa virginiensis***), found throughout the U.S., declined by 4.3% per year over the two decades from 2000 to 2020. (Photo: © Bryan E. Reynolds.)

4. Regional Profiles

This section presents more details on the population trends for butterflies in each region (which are based on U.S. Fish and Wildlife Service regions). Each profile documents statistically significant species trends for that region; species that could only be analyzed at the national level are omitted. Profiles also highlight stories of butterflies that are doing well, as well as efforts that are making a difference and show practical ways to bring back butterflies.

NOTE: The tables in the following profiles include only those species that increased or decreased at a statistically significant level ($p<0.05$). The charts include trend lines for all species for which sufficient data was available to assess their status.

REGIONAL PROFILES

Pacific Northwest ... p. 14

Southwest ... p. 18

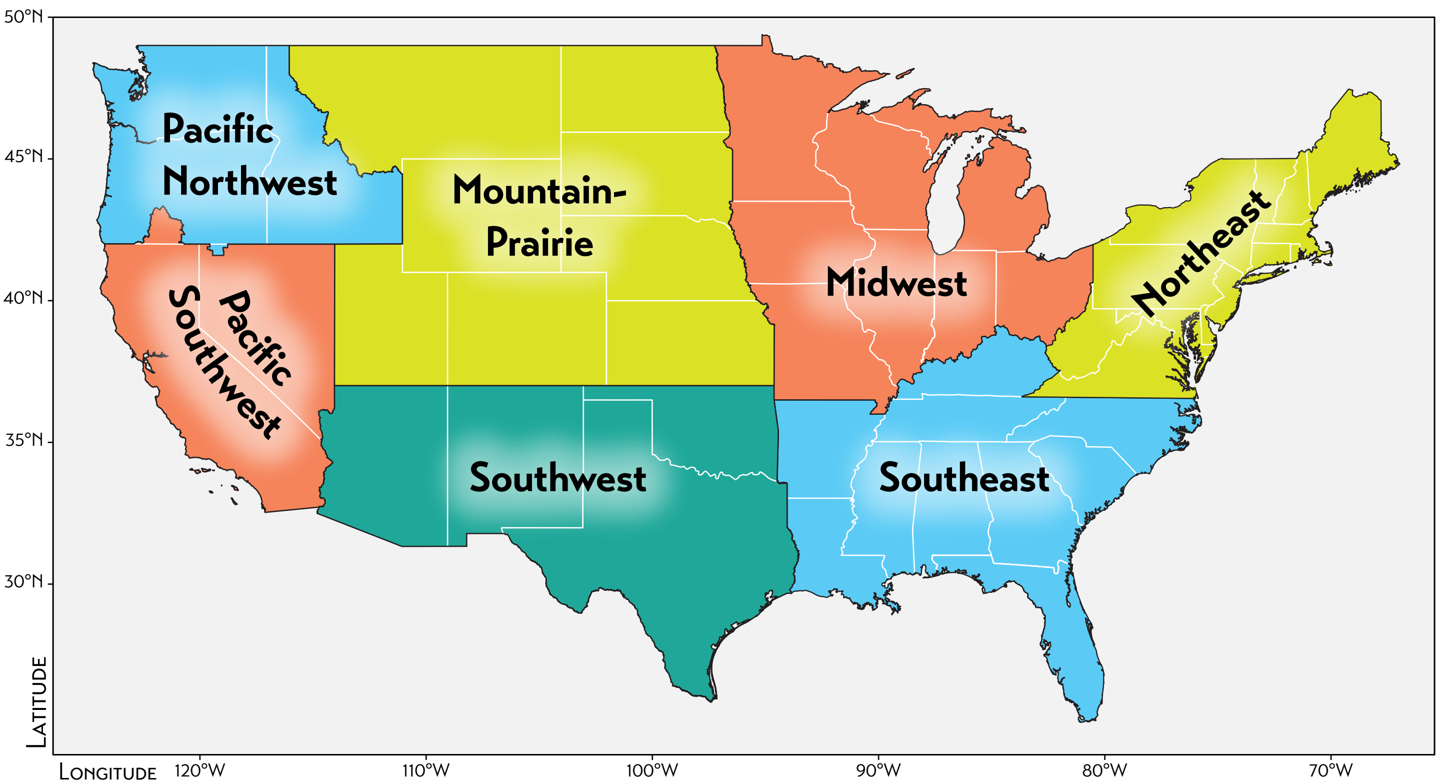
Midwest ... p. 24

Southeast ... p. 32

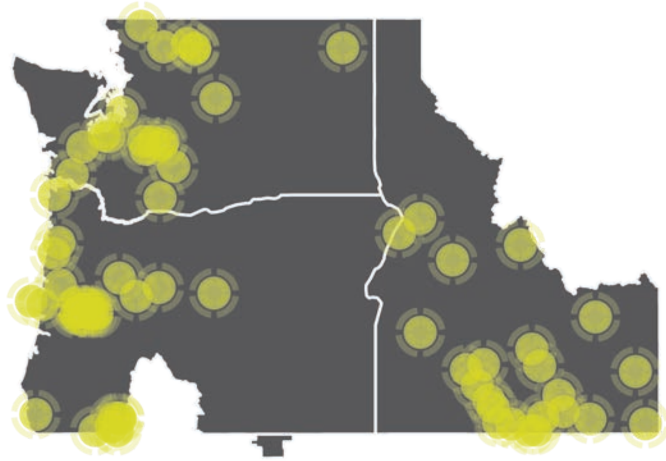
Northeast ... p. 38

Mountain-Prairie ... p. 44

Pacific Southwest ... p. 48



Pacific Northwest



Monitoring sites across the Pacific Northwest region. [Credit: Edwards et al. (2025)]

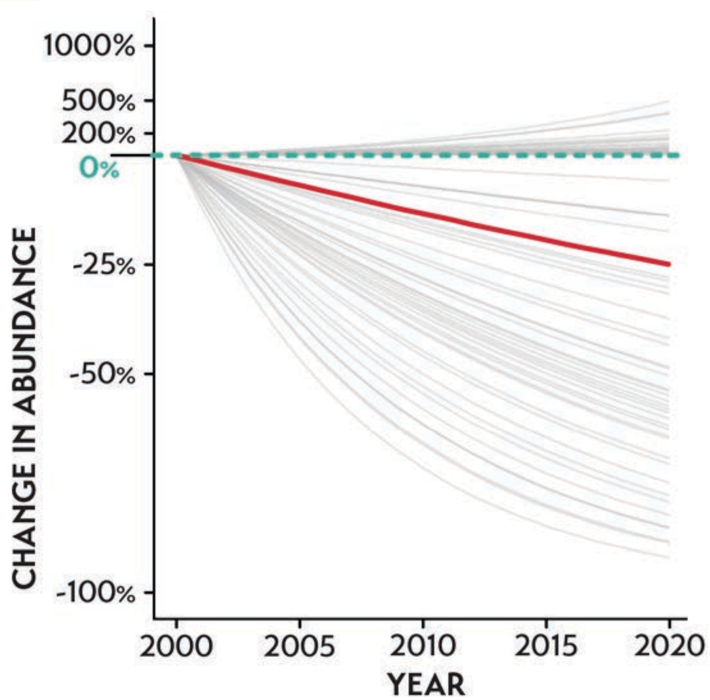
TAKEAWAYS

- 2.7% decrease in abundance overall
- 17 species declining
- 7 species increasing
- Pollard walk-style programs needed in ID, eastern OR, and eastern WA

The Pacific Northwest (USFWS Region 1) includes Washington, Oregon, and Idaho. This region includes large agricultural areas such as the Willamette Valley and the Palouse. Major ecoregions include the coastal forests, several mountain ranges, and Columbia Basin shrub-steppe. Models of butterfly abundance in the Pacific Northwest indicate declines are not as severe as in every other region in the United States. The models suggest a 0.13% annual decline or 2.7% cumulative decline from 2000 to 2020 after accounting for a highly irruptive species, the California tortoiseshell. This region has the lowest percentage of species in decline: of the 67 species with sufficient data, approximately 25% of the species from this region included in the study have statistically significant evidence for declines, while 10% show evidence of increasing abundances.

STATE OF THE DATA

Abundance counts were estimated for 67 of the approximately 182 species that are expected to occur in the region (see chart right, median in red [credit: Edwards et al. 2025]).



Monitoring programs for this region include the nationwide NABA Butterfly Counts, as well as the Cascades Butterfly Project; Cascade-Siskiyou Butterfly Monitoring Program; programs conducted by Carolyn Menke, Institute for Applied Ecology / USFWS Oregon Field Office; Greg Fitzpatrick, USFWS Oregon Field office; Paul Severns, USFWS Oregon Field Office; Deborah Pickering, The Nature Conservancy; and Mary Linders, Washington Department of Fish and Wildlife.

There are few community-based monitoring programs in the region, with just 3% of the sites in NABA or Pollard walk-style programs despite the region being almost 9% of the land area of the contiguous U.S.

INCREASING SPECIES HIGHLIGHT

Mormon Fritillary (*Speyeria mormonia*)

Alan Schmierer / Flickr CC0

- **Host Plant[s]:** Caterpillars feed on multiple violet species (*Viola* spp.), including *V. adunca*, *V. bakeri*, *V. nephrophylla*, *V. palustris*, and others.
- **Habitat[s]:** Found at a range of elevations in montane environments surrounding meadows where its violet host plants grow.
- **Life History:** Adults fly between June and September in a single generation. As with other species in the genus *Speyeria*, eggs are laid near the base of violet plants, and first instar caterpillars diapause through the winter. Caterpillars feed when host plants begin to grow in the spring.

DECREASING SPECIES HIGHLIGHTS

Ruddy Copper (*Lycaena rubidus*)

Tom Koerner, USFWS / Flickr CC0

- **Host Plant[s]:** Docks (*Rumex* spp.) in the buckwheat family (Polygonaceae).
- **Habitat[s]:** Arid stream washes, meadows, and montane riparian regions.
- **Life History:** This species has one flight generation per year. Eggs are the overwintering life stage.
- **Conservation Concerns:** Annual counts by NABA suggest this species is in steep decline in the Pacific Northwest, although population trends for this species appear more stable in the Mountain-Prairie and Pacific Southwest regions.

Sara Orangetip | 'Pacific' Sara Orangetip | 'Stella' Sara Orangetip (*Anthocharis sara*)

Alan Schmierer / Flickr CC0

- **Host Plant[s]:** Plants in the mustard (Brassicaceae) family, including both native and non-native species.
- **Habitat[s]:** Orchards, fields, meadows, riparian corridors, open oak woodlands in hills, and canyons.
- **Life History:** Males patrol, mostly in valleys, for females. Eggs are laid singly near tops of host plants. Young caterpillars feed on flower buds, older ones on flowers and fruits. Chrysalids diapause.
- **Conservation Concerns:** Though caterpillars of this species feed on relatively common plants in the mustard family, trends from monitoring sites reveal steep declines across the Pacific Northwest region. Many non-native mustard host plants used by *A. sara* caterpillars are targeted for removal across the species' range because they are considered noxious or unwanted plants by farmers

and land managers. Many of these species grow in areas where humans typically remove vegetation and are generally considered undesirable in most settings, including in rangelands or in landscape restoration projects that might otherwise prioritize host plants for imperiled pollinators.

Butterfly Population Trends Over Time in the Pacific Northwest

SCIENTIFIC NAME	COMMON NAME		SE	20-YR Δ	ID	OR	WA	
Lycaena rubidus	Ruddy Copper	-0.126	0.049	↓ -91.93%	✓	✓	✓	
Anthocharis sara	Sara Orangetip	-0.109	0.026	↓ -88.68%	✓	✓	✓	2
Nymphalis (=Aglais) milberti	Milbert's Tortoiseshell	-0.107	0.028	↓ -88.33%	✓	✓	✓	
Colias philodice	Clouded Sulphur	-0.096	0.024	↓ -85.30%	✓	✓	✓	
Pieris napi	Mustard White	-0.095	0.024	↓ -85.17%	✓	✓	✓	
Lycaena helloides	Purplish Copper	-0.087	0.023	↓ -82.34%	✓	✓	✓	
Polites sonora	Sonoran Skipper	-0.079	0.023	↓ -79.34%	✓	✓	✓	
Euchloe ausonides	Large Marble	-0.069	0.028	↓ -74.97%	✓	✓	✓	1
Cercyonis sthenele	Great Basin Wood-Nymph	-0.061	0.027	↓ -70.76%	✓	✓	✓	
Parnassius clodius	Clodius Parnassian	-0.059	0.019	↓ -69.43%	✓	✓	✓	
Boloria epithore	Pacific Fritillary	-0.052	0.021	↓ -64.92%	✓	✓	✓	
Polygonia gracilis	Hoary Comma	-0.052	0.020	↓ -64.38%	✓	✓	✓	
Colias eurytheme	Orange Sulphur	-0.049	0.021	↓ -62.67%	✓	✓	✓	
Speyeria zerene	Zerene Fritillary	-0.046	0.016	↓ -60.17%	✓	✓	✓	
Pontia occidentalis	Western White	-0.044	0.020	↓ -58.11%	✓	✓	✓	
Polygonia satyrus	Satyr Comma	-0.041	0.018	↓ -56.23%	✓	✓	✓	
Pieris rapae	Cabbage White	-0.038	0.015	↓ -53.64%	✓	✓	✓	
Euphilotes battoides	Square-Spotted Blue	0.044	0.022	↑ 138.78%	✓	✓	✓	
Pyrgus communis	Common Checkered-Skipper	0.047	0.020	↑ 154.91%	✓	✓	✓	
Coenonympha tullia	Common Ringlet	0.052	0.021	↑ 180.92%	✓	✓	✓	
Euphydryas editha	Edith's Checkerspot	0.059	0.022	↑ 225.60%	✓	✓	✓	
Lycaena mariposa	Mariposa Copper	0.078	0.028	↑ 374.27%	✓	✓	✓	
Parnassius phoebus	Phoebus Parnassian	0.079	0.031	↑ 384.46%	✓	✓	✓	
Speyeria mormonia	Mormon Fritillary	0.089	0.027	↑ 488.65%	✓	✓	✓	

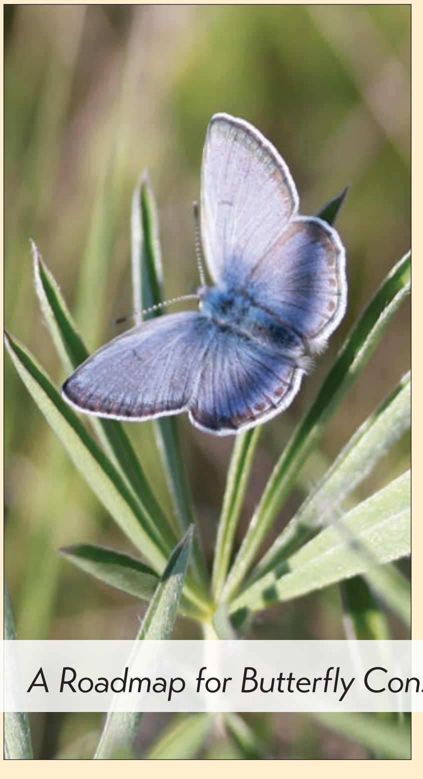
KEY —**GROWTH RATE** **SE—STANDARD ERROR** **20-YR Δ—TWENTY YEAR CHANGE** —**REGIONAL LISTS:**
1. Petitioned for Federal ESA Listing Status; **2.** WAFWA

SUCCESS STORIES AND SOLUTIONS

Fender's Blue (*Icaricia* [=*Plebejus*] *icarioides fenderi*) is endemic to prairies in Oregon's Willamette Valley, where it is threatened by habitat loss and degradation. By the early 1990s, there were fewer than 1,500 butterflies in existence, with only a fraction of 1% of the prairies used by this species remaining. It was listed as federally endangered in 2000. Compounding this extreme loss of habitat, the primary host plant is Kincaid's lupine (*Lupinus oreganus*), which itself is uncommon and listed as federally threatened.

Fender's Blue has been the focus of intensive conservation efforts. The steps to recover its populations required the patience and commitment to understand the biology of the butterfly in the context of potential conservation actions, as well as community engagement to build support for the butterfly and strong partnerships between agencies, nonprofit organizations, and private individuals. These efforts led to strategic selection of sites to restore while, at the same time, working with neighbors in the community to promote complementary use of the landscape. Almost 30 years of teamwork has resulted in over 30,000 individuals in recent years, and a conservation victory. In 2023, it became the first butterfly in the history of the Endangered Species Act to show sufficient evidence of recovery to be downlisted from "endangered" to "threatened."

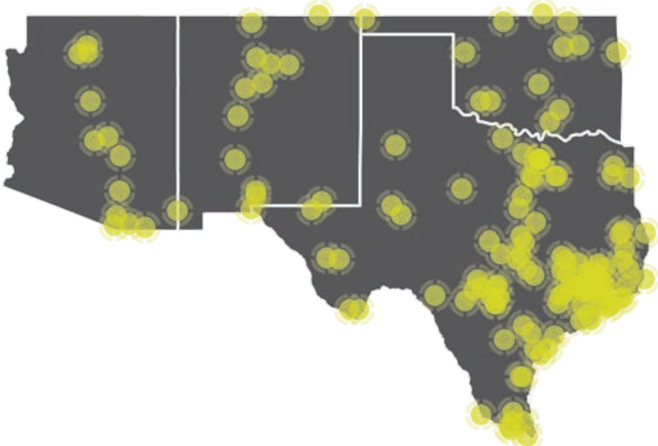
Clockwise from top left: Female Fender's Blue; Fender's Blue habitat with Kincaid's lupine adjacent to a farm; male Fender's Blue. (Photos: © Cheryl Schultz.)



Southwest

TAKEAWAYS

- 37% decline in abundance overall—the steepest decline in the country
- 69 species declining
- 1 species increasing
- Pollard walk-style programs needed in AZ and OK



Monitoring sites across the Southwest region. [Credit: Edwards et al. (2025)]

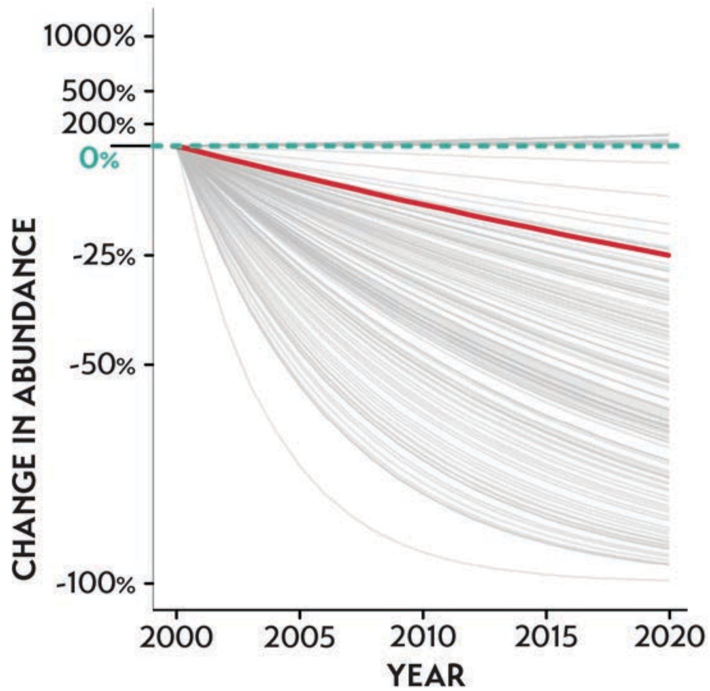
The Southwest (USFWS Region 2) includes Arizona, New Mexico, Oklahoma, and Texas, the state with the highest recorded butterfly diversity. Major ecoregions include the Colorado River Plateau, Arizona Mountains Forests, the Sonoran and Chihuahuan deserts, and both mixed and shortgrass prairies. This region is experiencing the most extreme butterfly declines in the United States. Models of butterfly abundance in this region suggest a decline of 2.3% per year, or roughly a 37% decrease in the number of butterflies observed between 2000 and 2020. Approximately 56% of the species with enough data to analyze in this region appear to be declining, while only one species shows evidence of increasing abundances at monitoring sites.

STATE OF THE DATA

Abundance counts were estimated for 123 of the approximately 491 species that are expected to occur in the region (see chart right, median in red [credit: Edwards et al. 2025]).

Monitoring programs include the nationwide NABA Annual Butterfly Counts, as well as the New Mexico Butterfly Monitoring Network and the Texas Butterfly Monitoring Network.

While the region contains about 19% of the total land area of the contiguous U.S., only 9% of the country's NABA and Pollard walk-style programs are found here.



INCREASING SPECIES HIGHLIGHT

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Gulf Fritillary (*Agraulis vanillae*)

- **Host Plant[s]:** Various species of passion vine, including maypops (*Passiflora incarnata*) and running pop (*P. foetida*), which are increasingly grown in gardens.
- **Habitat[s]:** Yards, gardens, pastures, open fields, and second-growth subtropical forest and forest edges.
- **Life History:** Males patrol for females, who lay eggs on many parts of the host plant. This species produces several adult generations and can be found year-round in the southern portion of its range; adults overwinter in more northern locations. In addition to being able to take advantage of warmer temperatures, especially in urban areas, the butterfly uses a caterpillar food plant, passionflower (*Passiflora* spp.), that gardeners enjoy planting in their home gardens and whose populations have subsequently increased markedly in several regions. It is increasingly common to see this large colorful butterfly in gardens and urban areas in many parts of the country.

DECREASING SPECIES HIGHLIGHTS

Paul Switzer CC BY-NC 4.0

Painted Crescent (*Phyciodes picta*)

- **Host Plant[s]:** Plants in the sunflower family (Asteraceae) as well as field bindweed (*Convolvulus arvensis*).
- **Habitat[s]:** Wet areas in the arid Southwest, including stream edges and marshes, but also drier grasslands with asters, including roads and rights-of-way.
- **Life History:** This species has two adult generations each year and can be seen between March and October depending on the location. Eggs are laid in groups and young caterpillars also appear in groups. Partially grown caterpillars diapause through the winter.
- **Conservation Concerns:** Increasing temperatures and decreasing precipitation are major threats to southwestern butterfly populations, in addition to habitat degradation from agriculture or livestock grazing near wet areas.

Alan Schmierer / Flickr CC0

Empress Leilia (*Asterocampa leilia*)

- **Host Plant[s]:** This species is a host plant specialist, with caterpillars feeding mostly on spiny hackberry (*Celtis ehrenbergiana*) and possibly other *Celtis* species.
- **Habitat[s]:** Dry desert washes, canyons, and thorn-scrub habitats.
- **Life History:** This species has multiple adult generations each year, and can be seen between March and November in Arizona, and all year in southern Texas. Eggs are laid in groups on host plants, and partially grown caterpillars diapause in some regions. Adults are often seen in groups drinking from mud, sap, or dung.

Butterfly Population Trends Over Time in the Southwest

SCIENTIFIC NAME	COMMON NAME		SE	20-YR Δ	
Eurema (=Pyrisitia) proterpia	Tailed Orange	-0.264	0.041	↓ -99.49%	
Phyciodes picta	Painted Crescent	-0.159	0.030	↓ -95.85%	
Erynnis baptisiae	Wild Indigo Duskywing	-0.158	0.035	↓ -95.78%	
Kricogonia lyside	Lyside Sulphur	-0.155	0.023	↓ -95.50%	
Poanes zabulon	Zabulon Skipper	-0.147	0.033	↓ -94.76%	
Junonia genoveva	Tropical Buckeye	-0.140	0.031	↓ -93.88%	
Asterocampa leilia	Empress Leilia	-0.136	0.022	↓ -93.42%	
Dymasia dymas	Tiny Checkerspot	-0.127	0.027	↓ -92.14%	
Panoquina ocola	Ocola Skipper	-0.127	0.023	↓ -92.08%	
Pompeius verna	Little Glassywing	-0.124	0.042	↓ -91.57%	
Cyllopsis gemma	Gemmed Satyr	-0.123	0.021	↓ -91.37%	
Eurema mexicana	Mexican Yellow	-0.119	0.020	↓ -90.68%	
Nastra julia	Julia's Skipper	-0.117	0.025	↓ -90.41%	
Apodemia palmerii	Palmer's Metalmark	-0.113	0.030	↓ -89.64%	
Urbanus dorantes	Dorantes Longtail	-0.109	0.030	↓ -88.77%	
Mestra amymone	Common Mestra	-0.107	0.030	↓ -88.13%	
Heliopetes macaira	Turk's-Cap White-Skipper	-0.104	0.041	↓ -87.38%	
Anatrytone logan	Delaware Skipper	-0.097	0.027	↓ -85.64%	
Ancyloxypha numitor	Least Skipper	-0.095	0.021	↓ -84.91%	
Hermeuptychia sosybius	Carolina Satyr	-0.091	0.015	↓ -83.75%	
Pyrgus philetas	Desert Checkered-Skipper	-0.089	0.019	↓ -83.05%	
Chlosyne theona	Theona Checkerspot	-0.087	0.026	↓ -82.44%	
Polygonia interrogationis	Question Mark	-0.084	0.015	↓ -81.24%	
Libytheana carinenta	American Snout	-0.081	0.014	↓ -80.36%	
Megisto cymela	Little Wood-Satyr	-0.078	0.024	↓ -78.97%	
Thorybes bathyllus	Southern Cloudywing	-0.077	0.023	↓ -78.52%	
Polites themistocles	Tawny-Edged Skipper	-0.074	0.031	↓ -77.46%	
Colias philodice	Clouded Sulphur	-0.074	0.022	↓ -77.05%	
Celotes nessus	Common Streaky-Skipper	-0.071	0.022	↓ -76.01%	
Ascia monuste	Great Southern White	-0.071	0.034	↓ -75.92%	
Phyciodes vesta (=graphica)	Vesta Crescent	-0.069	0.024	↓ -74.88%	
Megisto rubricata	Red Satyr	-0.065	0.023	↓ -72.75%	
Calycopis cecrops	Red-Banded Hairstreak	-0.064	0.020	↓ -72.08%	
Achalarus casica	Desert Cloudywing	-0.064	0.027	↓ -72.08%	
Pyrgus communis	Common Checkered-Skipper	-0.059	0.014	↓ -69.13%	
Amblyscirtes celia	Celia's Roadside-Skipper	-0.057	0.020	↓ -67.98%	

KEY —**GROWTH RATE** **SE—STANDARD ERROR** **20-YR Δ—TWENTY YEAR CHANGE** —**REGIONAL LISTS:**
1. WAFWA; **2.** MW Watchlist Species

AZ	NM	OK	TX	
✓	✓		✓	
✓	✓	✓	✓	
		✓	✓	
✓	✓		✓	
		✓	✓	
✓	✓		✓	
✓	✓		✓	
✓	✓		✓	
		✓	✓	
		✓	✓	
		✓	✓	
✓	✓	✓	✓	
✓			✓	1
✓	✓		✓	1
✓	✓		✓	
✓	✓		✓	
			✓	
	✓	✓	✓	
	✓	✓	✓	1
		✓	✓	
✓	✓		✓	1
✓	✓		✓	
✓	✓	✓	✓	
✓	✓	✓	✓	
		✓	✓	1
		✓	✓	2
✓	✓	✓	✓	1
✓	✓	✓	✓	
✓	✓		✓	
✓	✓		✓	
✓	✓		✓	
✓	✓	✓	✓	
		✓	✓	
✓	✓		✓	1
✓	✓	✓	✓	
			✓	

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SUCCESS STORIES AND SOLUTIONS

Efforts to conserve butterflies in the Southwest include protecting existing habitats and expanding habitat that includes both caterpillar food plants and adult nectar plants. Launched in 2021, the Xerces Society's New Mexico Pollinator Habitat Kit program is assisting landowners, residents, and conservation practitioners create and improve butterfly habitat by offering native plants to shovel-ready projects on public and private lands at no cost to kit partners. The kit program has distributed nearly 30,000 regionally appropriate plants to hundreds of residential properties in Santa Fe and dozens of public spaces such as schools, community gardens, parks, and museums. A companion Pollinator Habitat Restoration Kit program launched in 2024, distributing plants to partners stewarding farms, rangelands, and public lands throughout northern New Mexico. Such area-specific programs can be helpful in sourcing native plants that are adapted to local conditions. At the regional level, the Western Association of Fish and Wildlife Agencies has created a Western Monarch and Native Insect Pollinator working group that includes some Southwest states and is targeting conservation efforts on imperiled species that cross state lines.

Urban parks can be valuable habitat for butterflies when suitable nectar flowers and caterpillar host plants are grown. (Photo: Xerces Society / Kaitlin Haase.)

Butterfly Population Trends Over Time in the Southwest *continued*

SCIENTIFIC NAME	COMMON NAME		SE	20-YR Δ	
Calpodes ethlius	Brazilian Skipper	-0.057	0.025	↓ -67.79%	
Ministrymon leda	Leda Ministreak	-0.056	0.025	↓ -67.15%	
Pholisora catullus	Common Sootywing	-0.055	0.018	↓ -66.90%	
Phyciodes (=Anthanassa) texana	Texan Crescent	-0.054	0.017	↓ -66.20%	
Adelpha bredowii	California Sister	-0.053	0.014	↓ -65.62%	
Asterocampa celtis	Hackberry Emperor	-0.053	0.013	↓ -65.49%	
Amblyscirtes nysa	Nysa Roadside-Skipper	-0.053	0.016	↓ -65.43%	
Copaeodes minimus (=minima)	Southern Skipperling	-0.052	0.018	↓ -64.86%	
Vanessa virginiensis	American Lady	-0.052	0.012	↓ -64.46%	
Wallengrenia otho	Southern Broken-Dash	-0.052	0.018	↓ -64.30%	
Urbanus proteus	Long-Tailed Skipper	-0.051	0.026	↓ -64.18%	
Amblyscirtes eos	Dotted Roadside-Skipper	-0.050	0.021	↓ -63.26%	
Papilio troilus	Spicebush Swallowtail	-0.049	0.015	↓ -62.82%	
Papilio glaucus	Eastern Tiger Swallowtail	-0.049	0.013	↓ -62.68%	
Brephidium exile (=exilis)	Western Pygmy-Blue	-0.048	0.023	↓ -61.97%	
Limenitis archippus	Viceroy	-0.047	0.011	↓ -61.27%	
Anaea andria	Goatweed Leafwing	-0.047	0.014	↓ -60.65%	
Lerodea eufala	Eufala Skipper	-0.046	0.012	↓ -60.27%	
Systasea zampa	Arizona Powdered-Skipper	-0.046	0.019	↓ -60.05%	
Colias eurytheme	Orange Sulphur	-0.043	0.011	↓ -58.01%	
Texola elada	Elada Checkerspot	-0.043	0.021	↓ -57.87%	
Phyciodes tharos	Pearl Crescent	-0.041	0.012	↓ -55.73%	
Euptoieta claudia	Variegated Fritillary	-0.040	0.013	↓ -55.19%	
Phoebis sennae	Cloudless Sulphur	-0.039	0.011	↓ -53.96%	
Nymphalis antiopa	Mourning Cloak	-0.037	0.017	↓ -52.68%	
Strymon melinus	Gray Hairstreak	-0.036	0.009	↓ -50.88%	
Colias (=Zerene) cesonia	Southern Dogface	-0.035	0.014	↓ -50.81%	
Vanessa cardui	Painted Lady	-0.034	0.017	↓ -48.98%	
Papilio cresphontes	Giant Swallowtail	-0.033	0.011	↓ -47.93%	
Asterocampa clyton	Tawny Emperor	-0.032	0.016	↓ -47.52%	
Vanessa atalanta	Red Admiral	-0.031	0.016	↓ -46.62%	
Eurema (=Abaeis) nicippe	Sleepy Orange	-0.028	0.012	↓ -43.42%	
Erynnis funeralis	Funereal Duskywing	-0.028	0.011	↓ -42.44%	
Agraulis vanillae	Gulf Fritillary	0.022	0.010	↑ 54.51%	

KEY —GROWTH RATE SE—STANDARD ERROR 20-YR Δ—TWENTY YEAR CHANGE —REGIONAL LISTS:
1. WAFWA; **2.** MW Watchlist Species

	AZ	NM	OK	TX	
	✓		✓	✓	
	✓	✓		✓	
	✓	✓	✓	✓	1
	✓	✓	✓	✓	1
	✓	✓		✓	
	✓	✓	✓	✓	
	✓	✓	✓	✓	
	✓			✓	
	✓	✓	✓	✓	
			✓	✓	
	✓	✓		✓	
	✓	✓	✓	✓	
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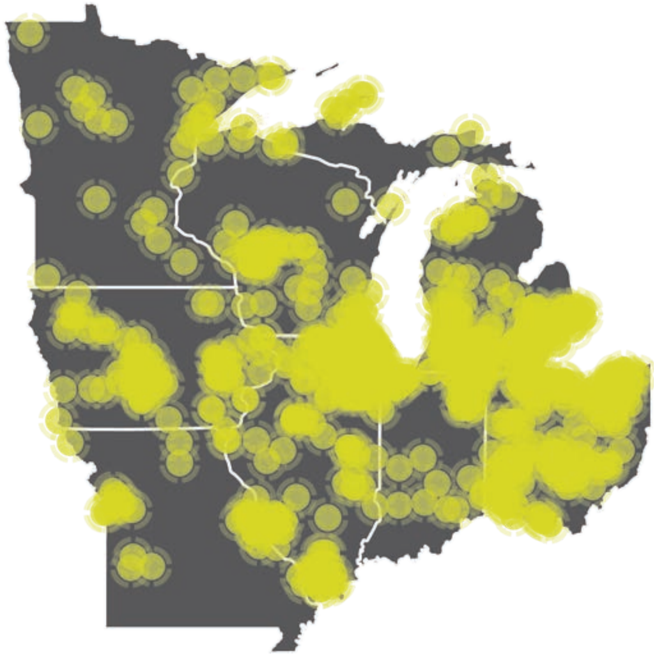
	✓	✓	✓	✓	
	✓	✓	✓	✓	
	✓	✓	✓	✓	
	✓	✓	✓	✓	

Midwest

TAKEAWAYS

- 17% decline in abundance overall
- 62 species declining
- 25 species increasing
- Pollard walk-style programs needed in IN and MN



Monitoring sites across the Midwest region. [Credit: Edwards et al. (2025)]

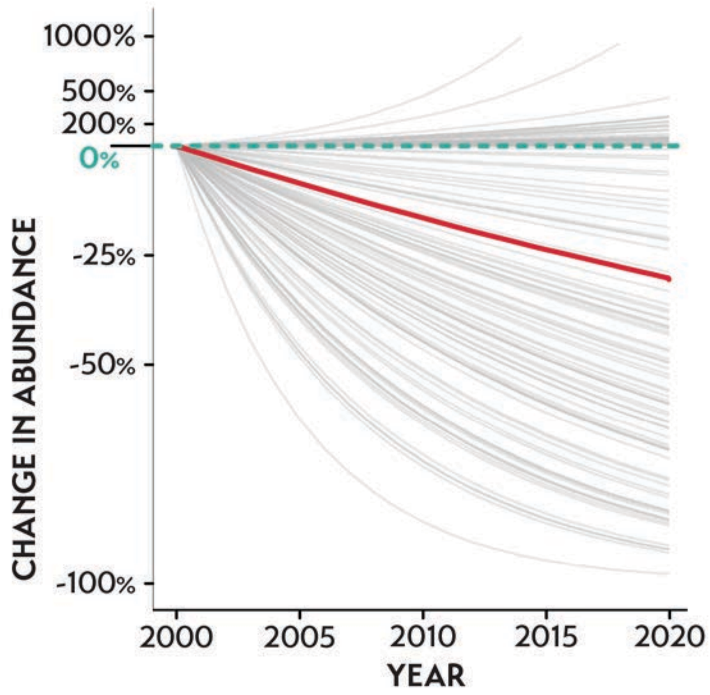
The Midwest (USFWS Region 3) includes Indiana, Illinois, Iowa, Michigan, Minnesota, Missouri, Ohio, and Wisconsin. The Midwest contains the most agricultural land of any USFWS region in the U.S., with 30% of the region in some form of agriculture. Major ecoregions in remaining natural areas include the Midwest deciduous forests and both mixed and shortgrass prairies. Models of butterfly abundance in this region suggest a decline of 0.94% per year, or a roughly 17% decrease in the number of butterflies observed between 2000 and 2020. Out of 119 species for which sufficient data were available for analysis, 52% are declining; one in five species in this region show evidence of increasing abundances at monitoring sites.

STATE OF THE DATA

Abundance counts were estimated for 119 species from approximately 191 that are expected to occur in the region (see chart right, median in red [credit: Edwards et al. 2025]).

Monitoring programs for this region include the nationwide NABA Butterfly Counts, as well as Illinois Butterfly Monitoring Network, Michigan Butterfly Network, Missouri Butterfly Monitoring Network, Ohio Lepidopterists, Reiman Gardens' Iowa Butterfly Survey Network, Wisconsin Butterfly Monitoring Network, and survey programs by Tim Wilder (U.S. Army Fort McCoy) and Scott and Ann Swengel.

This is the best monitored region. It covers about 17% of the total land area of the contiguous U.S., and hosts almost 40% of the country's NABA and Pollard walk-style programs.



INCREASING SPECIES HIGHLIGHTS

Gemmed Satyr (*Cyllopsis gemma*)

Kyle Warnacke CC BY-NC 4.0

- **Host Plant[s]:** Poaceae (grasses), likely including Bermuda grass (*Cynodon dactylon*).
- **Habitat[s]:** Wet woodlands and moist grassy areas, especially near streams and ponds.
- **Life History:** Caterpillars feed at night and hide in grass stems during the day. This is one of the earliest species to appear in spring in many places. Adults can breed for up to eight months of the year in the northern portion of the species' range, producing several generations per year. Adults are mostly attracted to rotting fruit. The fourth instar caterpillars diapause.

DECREASING SPECIES HIGHLIGHTS

West Virginia White (*Pieris virginiensis*)

Tom Murray CC BY-NC 4.0

- **Host Plant[s]:** Mustards, particularly *Dentaria diphylla* and *D. laciniata*.
- **Habitat[s]:** Moist deciduous forests.
- **Life History:** This species has one adult generation per year, and overwinters as a pupa.
- **Conservation Concerns:** The West Virginia White is threatened by development, logging, habitat fragmentation, and the spread of non-native garlic mustard, which outcompetes native nectar sources and upon which females will lay eggs even though it does not support larval development.

Harris' Checkerspot (*Chlosyne harrisii*)

Terry Mortier CC BY-NC 4.0

- **Host Plant[s]:** Flat-topped white aster (*Doellingeria umbellata*).
- **Habitat[s]:** Bogs, marshes, wet meadows, and pastures.
- **Life History:** This species is univoltine. It overwinters as a third instar caterpillar at the base of host plants.
- **Conservation Concerns:** Wet meadows and bogs are threatened by development, encroachment by invasive plant species, changes to the local hydrology, and pesticide exposure.

Butterfly Population Trends Over Time in the Midwest

SCIENTIFIC NAME	COMMON NAME		SE	20-YR Δ	IA	IL	IN
Pieris virginiensis	West Virginia White	-0.196	0.030	↓ -98.03%			✓
Chlosyne harrisii	Harris' Checkerspot	-0.132	0.022	↓ -92.92%		✓	✓
Nymphalis (=Aglais) milberti	Milbert's Tortoiseshell	-0.128	0.015	↓ -92.24%	✓	✓	✓
Thymelicus lineola	European Skipper	-0.128	0.006	↓ -92.21%	✓	✓	✓
Glaucopsyche lygdamus	Silvery Blue	-0.123	0.024	↓ -91.37%	✓	✓	✓
Lycaena phlaeas	American Copper	-0.101	0.005	↓ -86.86%	✓	✓	✓
Nastra lherminier	Swarthy Skipper	-0.099	0.015	↓ -86.29%		✓	✓
Anaea andria	Goatweed Leafwing	-0.097	0.028	↓ -85.65%	✓	✓	✓
Callophrys irus	Frosted Elfin	-0.097	0.017	↓ -85.52%		✓	✓
Speyeria aphrodite	Aphrodite Fritillary	-0.096	0.008	↓ -85.36%	✓	✓	✓
Hesperia leonardus	Leonard's Skipper	-0.092	0.016	↓ -84.18%	✓	✓	✓
Hesperia sassacus	Indian Skipper	-0.091	0.025	↓ -83.78%		✓	✓
Pontia protodice	Checkered White	-0.090	0.013	↓ -83.50%	✓	✓	✓
Phyciodes batesii	Tawny Crescent	-0.090	0.029	↓ -83.47%			
Amblyscirtes vialis	Common Roadside-Skipper	-0.082	0.014	↓ -80.48%	✓	✓	✓
Euphydryas phaeton	Baltimore Checkerspot	-0.080	0.009	↓ -79.76%	✓	✓	✓
Boloria selene	Silver-Bordered Fritillary	-0.075	0.012	↓ -77.75%	✓	✓	✓
Satyrodes (=Lethe) eurydice	Eyed Brown	-0.073	0.005	↓ -76.54%	✓	✓	✓
Lycaena dione	Gray Copper	-0.072	0.026	↓ -76.14%	✓	✓	
Cercyonis pegala	Common Wood-Nymph	-0.063	0.003	↓ -71.48%	✓	✓	✓
Speyeria atlantis	Atlantis Fritillary	-0.060	0.015	↓ -69.62%			
Anthocharis midea	Falcate Orangetip	-0.059	0.017	↓ -69.54%		✓	✓
Erynnis icelus	Dreamy Duskywing	-0.059	0.011	↓ -69.49%		✓	✓
Lycaena helloides	Purplish Copper	-0.059	0.021	↓ -69.06%	✓	✓	✓
Lycaena hyllus	Bronze Copper	-0.058	0.008	↓ -68.48%	✓	✓	✓
Thorybes pylades	Northern Cloudywing	-0.052	0.008	↓ -64.63%	✓	✓	✓
Poanes hobomok	Hobomok Skipper	-0.052	0.005	↓ -64.59%	✓	✓	✓
Pieris napi	Mustard White	-0.050	0.013	↓ -63.24%		✓	✓
Colias eurytheme	Orange Sulphur	-0.050	0.003	↓ -63.05%	✓	✓	✓
Polites mystic	Long Dash	-0.048	0.007	↓ -61.61%	✓	✓	✓
Pholisora catullus	Common Sootywing	-0.047	0.007	↓ -61.01%	✓	✓	✓
Thorybes bathyllus	Southern Cloudywing	-0.045	0.009	↓ -59.05%	✓	✓	✓
Pieris rapae	Cabbage White	-0.045	0.001	↓ -59.02%	✓	✓	✓
Poanes massasoit	Mulberry Wing	-0.045	0.010	↓ -59.00%	✓	✓	✓
Vanessa cardui	Painted Lady	-0.044	0.004	↓ -58.37%	✓	✓	✓
Euphyes conspicua	Black Dash	-0.043	0.008	↓ -57.36%	✓	✓	✓

KEY —**GROWTH RATE** **SE—STANDARD ERROR** **20-YR Δ—TWENTY YEAR CHANGE** —**REGIONAL LISTS:**
3. MW RSGCN; **4.** NE RSGCN; **5.** MW Watchlist Species; **6.** NE Watchlist Species

MI	MN	MO	OH	WI	
✓			✓	✓	
✓	✓		✓	✓	6
✓	✓		✓	✓	
✓	✓	✓	✓	✓	
✓	✓	✓	✓	✓	
✓	✓	✓	✓	✓	
		✓	✓		
		✓			
✓			✓	✓	1; 3; 4
✓	✓		✓	✓	
✓	✓	✓	✓	✓	3
✓	✓		✓	✓	
✓	✓	✓	✓	✓	2; 6
✓	✓			✓	2; 3
✓	✓	✓	✓	✓	2
✓	✓	✓	✓	✓	
✓	✓	✓	✓	✓	6
✓	✓		✓	✓	2
	✓	✓		✓	
✓	✓	✓	✓	✓	
✓	✓			✓	
		✓	✓		
✓	✓	✓	✓	✓	
✓	✓		✓	✓	
✓	✓	✓	✓	✓	6
✓	✓	✓	✓	✓	5
✓	✓	✓	✓	✓	2
✓	✓		✓	✓	
✓	✓	✓	✓	✓	
✓	✓		✓	✓	2
✓	✓	✓	✓	✓	2
✓		✓	✓	✓	5
✓	✓	✓	✓	✓	
✓	✓		✓	✓	
✓	✓	✓	✓	✓	
✓	✓		✓	✓	

1. USFWS workplan species; **2.** WAFWA;

(Continued on next page...)

SUCCESS STORIES AND SOLUTIONS

The Zabulon Skipper (*Poanes zabulon*) is faring well despite the congruence of threats influencing other butterfly species. At the national level, it has more than doubled in abundance in the last two decades, and at the regional level is increasing in the Midwest, Northeast, and Southeast.

The Zabulon Skipper is a grass skipper (subfamily Hesperiinae) whose caterpillars feed on a range of native and non-native grasses. Its adults tend to favor woodland edges and openings, but it is found in a range of habitats from woodlands to grasslands to roadsides to urban gardens, where the skippers nectar on a

(Continued on next page...)

Close-ups of male (top) and female (bottom) Zabulon skippers illustrating sexual dimorphism. (Photo:s Tom Murray / Flickr CC BY-NC 2.0.)

Butterfly Population Trends Over Time in the Midwest *continued*

SCIENTIFIC NAME	COMMON NAME		SE	20-YR Δ	IA	IL	IN
Speyeria idalia	Regal Fritillary	-0.041	0.013	↓ -56.06%	✓	✓	✓
Erynnis brizo	Sleepy Duskywing	-0.041	0.017	↓ -55.69%	✓	✓	✓
Vanessa virginiensis	American Lady	-0.038	0.004	↓ -53.10%	✓	✓	✓
Anatrytone logan	Delaware Skipper	-0.037	0.005	↓ -52.32%	✓	✓	✓
Megisto cymela	Little Wood-Satyr	-0.036	0.003	↓ -50.96%	✓	✓	✓
Nymphalis antiopa	Mourning Cloak	-0.034	0.003	↓ -49.74%	✓	✓	✓
Vanessa atalanta	Red Admiral	-0.034	0.003	↓ -49.42%	✓	✓	✓
Poanes viator	Broad-Winged Skipper	-0.032	0.012	↓ -47.00%	✓	✓	✓
Asterocampa clyton	Tawny Emperor	-0.028	0.007	↓ -43.20%	✓	✓	✓
Polygonia interrogationis	Question Mark	-0.028	0.003	↓ -42.67%	✓	✓	✓
Speyeria cybele	Great Spangled Fritillary	-0.027	0.002	↓ -41.91%	✓	✓	✓
Polites origenes	Crossline Skipper	-0.027	0.007	↓ -41.43%	✓	✓	✓
Euphyes dion	Dion Skipper	-0.027	0.008	↓ -41.32%	✓	✓	✓
Wallengrenia egeremet	Northern Broken-Dash	-0.025	0.005	↓ -39.80%	✓	✓	✓
Erynnis juvenalis	Juvenal's Duskywing	-0.025	0.007	↓ -39.62%	✓	✓	✓
Satyrium liparops	Striped Hairstreak	-0.024	0.009	↓ -38.16%	✓	✓	✓
Phyciodes selenis (=cocyta)	Northern Crescent	-0.024	0.011	↓ -37.59%			
Satyrium titus	Coral Hairstreak	-0.023	0.006	↓ -36.37%	✓	✓	✓
Polites themistocles	Tawny-Edged Skipper	-0.020	0.005	↓ -33.34%	✓	✓	✓
Polites peckius	Peck's Skipper	-0.018	0.003	↓ -30.24%	✓	✓	✓
Colias philodice	Clouded Sulphur	-0.018	0.002	↓ -30.03%	✓	✓	✓
Boloria bellona	Meadow Fritillary	-0.012	0.006	↓ -21.65%	✓	✓	✓
Papilio polyxenes	Black Swallowtail	-0.010	0.002	↓ -18.78%	✓	✓	✓
Limenitis archippus	Viceroy	-0.008	0.003	↓ -15.38%	✓	✓	✓
Papilio glaucus	Eastern Tiger Swallowtail	-0.007	0.002	↓ -13.80%	✓	✓	✓
Celastrina ladon	Spring Azure	-0.007	0.002	↓ -12.46%	✓	✓	✓
Strymon melinus	Gray Hairstreak	0.013	0.005	↑ 29.13%	✓	✓	✓
Phyciodes tharos	Pearl Crescent	0.014	0.002	↑ 33.27%	✓	✓	✓
Ancyloxypha numitor	Least Skipper	0.018	0.003	↑ 42.26%	✓	✓	✓
Erynnis horatius	Horace's Duskywing	0.020	0.006	↑ 48.59%	✓	✓	✓
Satyrium calanus	Banded Hairstreak	0.020	0.006	↑ 49.81%	✓	✓	✓
Epargyreus clarus	Silver-Spotted Skipper	0.022	0.002	↑ 55.85%	✓	✓	✓
Papilio cresphontes	Giant Swallowtail	0.022	0.005	↑ 56.78%	✓	✓	✓
Battus philenor	Pipevine Swallowtail	0.027	0.006	↑ 71.26%	✓	✓	✓
Euptoieta claudia	Variegated Fritillary	0.028	0.007	↑ 74.53%	✓	✓	✓
Poanes zabulon	Zabulon Skipper	0.029	0.004	↑ 77.48%	✓	✓	✓

KEY **—GROWTH RATE** **SE—STANDARD ERROR** **20-YR Δ—TWENTY YEAR CHANGE** **—REGIONAL LISTS:**
3. MW RSGCN; **4.** NE RSGCN; **5.** MW Watchlist Species; **6.** NE Watchlist Species

MI	MN	MO	OH	WI	
✓	✓	✓	✓	✓	
✓	✓	✓	✓	✓	2
✓	✓	✓	✓	✓	
✓	✓	✓	✓	✓	
✓	✓	✓	✓	✓	2
✓	✓	✓	✓	✓	
✓	✓	✓	✓	✓	
✓	✓	✓	✓	✓	
✓	✓	✓	✓	✓	
✓	✓	✓	✓	✓	
✓	✓	✓	✓	✓	
✓	✓	✓	✓	✓	2
✓	✓	✓	✓	✓	
✓	✓	✓	✓	✓	
✓	✓	✓	✓	✓	2
✓	✓	✓	✓	✓	
✓	✓		✓	✓	
✓	✓	✓	✓	✓	2
✓	✓	✓	✓	✓	2
✓	✓	✓	✓	✓	
✓	✓	✓	✓	✓	
✓	✓	✓	✓	✓	
✓	✓	✓	✓	✓	
✓	✓	✓	✓	✓	
✓	✓	✓	✓	✓	
✓	✓	✓	✓	✓	
✓	✓	✓	✓	✓	
✓	✓	✓	✓	✓	
✓	✓	✓	✓	✓	2
✓		✓	✓		
✓	✓	✓	✓	✓	
✓	✓	✓	✓	✓	
✓		✓	✓	✓	
✓		✓	✓		
✓	✓	✓	✓	✓	
✓		✓	✓		

1. USFWS workplan species; **2.** WAFWA;

(Continued on next page...)

diversity of native and non-native wildflowers.

Common in the early 20th century, the Zabulon Skipper appeared to diminish in numbers by late in that century and then started increasing in abundance again (Schlicht & Orwig 1998). The Zabulon Skipper has also been expanding its range in recent decades, with large numbers increasingly seen in community-science surveys in northern states like Massachusetts and Ohio.

Understanding factors which are allowing this skipper to increase in both range and abundance may help us to turn the tide for other butterfly species—especially other grass skippers, which, as a group, includes many highly at-risk species.

Prairie at Standing Cedars, Wisconsin. (Photo: Aaron Carlson / Flickr CC BY 2.0.)

SCIENTIFIC NAME	COMMON NAME		SE	20-YR Δ	IA	IL	IN
Atalopedes campestris	Sachem	0.032	0.008	↑ 90.89%	✓	✓	✓
Hylephila phyleus	Fiery Skipper	0.036	0.005	↑ 106.53%	✓	✓	✓
Eurema (=Pyrisitia) lisa	Little Yellow	0.044	0.007	↑ 139.07%	✓	✓	✓
Erynnis baptisiae	Wild Indigo Duskywing	0.045	0.005	↑ 148.18%	✓	✓	✓
Pyrgus communis	Common Checkered-Skipper	0.051	0.007	↑ 179.33%	✓	✓	✓
Chlosyne nycteis	Silvery Checkerspot	0.051	0.006	↑ 179.96%	✓	✓	✓
Nathalis iole	Dainty Sulphur	0.053	0.014	↑ 190.67%	✓	✓	✓
Feniseca tarquinius	Harvester	0.058	0.011	↑ 216.36%	✓	✓	✓
Amblyscirtes hegon	Pepper and Salt Skipper	0.059	0.024	↑ 223.20%	✓	✓	✓
Junonia coenia	Common Buckeye	0.064	0.004	↑ 261.99%	✓	✓	✓
Eurytides marcellus	Zebra Swallowtail	0.065	0.006	↑ 263.38%	✓	✓	✓
Phoebis sennae	Cloudless Sulphur	0.065	0.006	↑ 267.81%	✓	✓	✓
Hermeuptychia sosybius	Carolina Satyr	0.084	0.017	↑ 438.50%		✓	✓
Eurema (=Abaeis) nicippe	Sleepy Orange	0.130	0.012	↑ 1234.78%	✓	✓	✓
Cyllopsis gemma	Gemmed Satyr	0.171	0.012	↑ 2938.36%		✓	✓

KEY **—GROWTH RATE** **SE—STANDARD ERROR** **20-YR Δ—TWENTY YEAR CHANGE** **—REGIONAL LISTS:** **3.** MW RSGCN; **4.** NE RSGCN; **5.** MW Watchlist Species; **6.** NE Watchlist Species

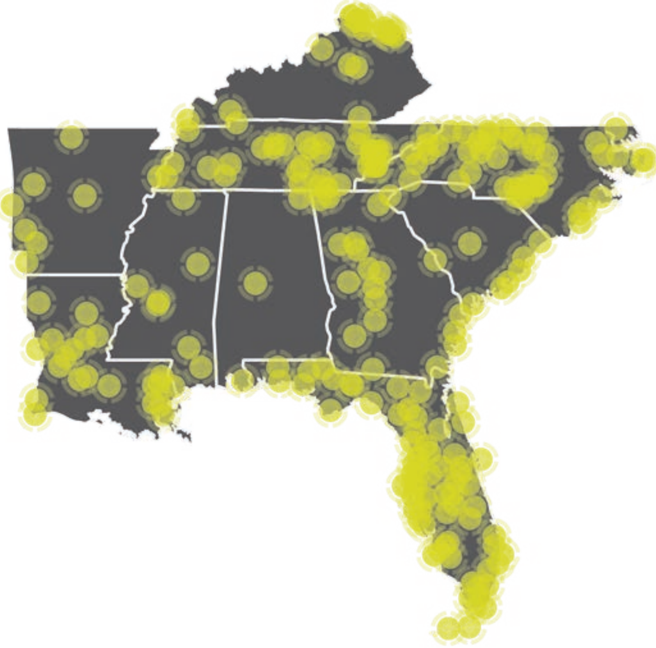
	MI	MN	MO	OH	WI	
		✓	✓	✓	✓	**2**
	✓	✓	✓	✓	✓	
	✓		✓	✓	✓	
	✓	✓	✓	✓	✓	
	✓	✓	✓	✓	✓	
	✓	✓	✓	✓	✓	**2; 6**
		✓	✓		✓	**2**
	✓	✓	✓	✓	✓	
	✓	✓	✓	✓	✓	
	✓	✓	✓	✓	✓	
	✓		✓	✓		
			✓	✓		
			✓	✓		
			✓	✓		
			✓	✓		

1. USFWS workplan species; **2.** WAFWA;

Southeast

TAKEAWAYS

- 4.8% decline in abundance overall
- 52 species declining
- 21 species increasing
- Pollard walk-style programs needed in AL, AR, FL, GA, KY, LA, MS, NC, and SC



Monitoring sites across the Southeast region. [Credit: Edwards et al. (2025)]

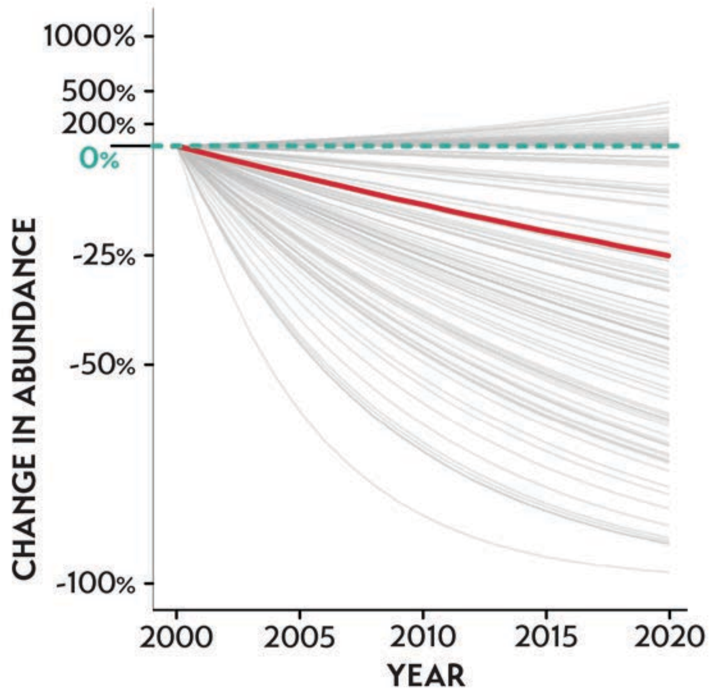
The Southeast (USFWS Region 4) includes Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, North Carolina, South Carolina, and Tennessee. This region is dominated by various hardwood forest communities and southeastern conifer forests, along with biodiverse and economically important coastal grasslands. Models of butterfly abundance in this region suggest a decline of 0.25% per year, or roughly a 4.8% decrease in the number of butterflies observed between 2000 and 2020. Approximately 42% of the species in this region are declining, while only 17% of species are increasing.

STATE OF THE DATA

Abundance counts were estimated for 125 of the approximately 220 species that are expected in the region (see chart right, median in red [credit: Edwards et al. 2025]).

Monitoring programs for this region include the nationwide NABA Annual Butterfly Counts, as well as the Tennessee Butterfly Monitoring Network and surveys by Nick Haddad in North Carolina.

While the region contains about 15% of the total land area of the contiguous U.S., only 9% of the country's NABA and Pollard walk-style programs are found here.



INCREASING SPECIES HIGHLIGHT

Ceraunus Blue (*Hemiargus ceraunus*)


Alan Schmierer / Flickr CC0

Host Plant[s]: Caterpillars can feed on several woody species of legumes (Fabaceae) including partridge pea (*Chamaecrista fasciculata*) and rosary pea (*Abrus precatorius*).

Habitat[s]: A large variety of habitats with disturbances including pastures, scrublands, open woodlands, urban lots, roads, and rights-of-way.

Life History: This species has multiple adult generations each year and adults can be seen almost the entire year in Florida. Caterpillars feed on flowers and seed pods of host plants. Adults expand into Georgia and South Carolina in good years.

DECREASING SPECIES HIGHLIGHTS

Yehl Skipper (*Poanes yehl*)


Rob Van Epps CC BY-NC 4.0

Host Plant[s]: Likely grasses (Poaceae), most likely including giant cane (*Arundinaria gigantea*) and others.

Habitat[s]: Openings and edges of wet southeastern woodlands.

Life History: This species has two adult generations each year and can be seen from May through October. Adults nectar on several flower species. The overwintering stage has not been documented.

Conservation Concerns: This species is threatened by historical and ongoing drainage of wetland habitats.

Soldier (*Danaus eresimus*)


Roger Rittmaster CC BY-NC 4.0

Host Plant[s]: Plants in the milkweed family (Apocynaceae), including white twinevine (*Funastrum clausum*) and possibly the regionally non-native roostertree or giant milkweed (*Calotropis procera*); and the Loganiaceae family, including West Indian pinkroot (*Spigelia anthelmia*).

Habitat[s]: Open areas with host plants, including forest edges and fields. These habitats can also include roads and rights-of-way.

Life History: This species has multiple adult generations per year and can be seen between February and December in Florida.

Conservation Concerns: This species is threatened by habitat loss caused by urban and suburban development, which is often accompanied by the loss of host plants.

Butterfly Population Trends Over Time in the Southeast

SCIENTIFIC NAME	COMMON NAME		SE	20-YR Δ	AL	AR	FL
Poanes yehl	Yehl Skipper	-0.187	0.024	↓ -97.61%	✓	✓	✓
Danaus eresimus	Soldier	-0.120	0.019	↓ -90.99%			✓
Brephidium (exilis) isophthalma	Eastern Pygmy-Blue	-0.120	0.031	↓ -90.93%	✓		✓
Speyeria diana	Diana Fritillary	-0.117	0.018	↓ -90.29%	✓	✓	
Satyrium favonius	Oak Hairstreak	-0.113	0.030	↓ -89.66%	✓	✓	✓
Nymphalis antiopa	Mourning Cloak	-0.101	0.024	↓ -86.81%	✓	✓	✓
Pholisora catullus	Common Sootywing	-0.089	0.016	↓ -83.02%	✓	✓	✓
Euphyes berryi	Berry's Skipper	-0.080	0.033	↓ -79.74%	✓		✓
Euphyes pilatka	Palatka Skipper	-0.076	0.020	↓ -78.04%	✓		✓
Staphylus hayhurstii	Hayhurst's Scallopwing	-0.068	0.020	↓ -74.39%	✓	✓	✓
Speyeria cybele	Great Spangled Fritillary	-0.065	0.012	↓ -72.59%	✓	✓	
Colias eurytheme	Orange Sulphur	-0.064	0.008	↓ -72.21%	✓	✓	✓
Colias philodice	Clouded Sulphur	-0.064	0.012	↓ -71.97%	✓	✓	
Satyrium calanus	Banded Hairstreak	-0.062	0.021	↓ -71.09%	✓	✓	✓
Thorybes confusis	Confused Cloudywing	-0.061	0.015	↓ -70.63%	✓	✓	✓
Satyrium titus	Coral Hairstreak	-0.058	0.027	↓ -68.61%	✓	✓	
Atlides halesus	Great Purple Hairstreak	-0.058	0.017	↓ -68.50%	✓	✓	✓
Euphyes arpa	Palmetto Skipper	-0.057	0.018	↓ -67.95%	✓		✓
Electrostrymon angelia	Fulvous Hairstreak	-0.055	0.021	↓ -66.40%			✓
Vanessa virginiensis	American Lady	-0.051	0.008	↓ -64.07%	✓	✓	✓
Vanessa atalanta	Red Admiral	-0.050	0.009	↓ -63.27%	✓	✓	✓
Polites origenes	Crossline Skipper	-0.049	0.014	↓ -62.63%	✓	✓	✓
Parrhasius m-album	White M Hairstreak	-0.049	0.015	↓ -62.62%	✓	✓	✓
Megisto cymela	Little Wood-Satyr	-0.048	0.014	↓ -61.79%	✓	✓	✓
Thorybes bathyllus	Southern Cloudywing	-0.043	0.009	↓ -57.90%	✓	✓	✓
Pieris rapae	Cabbage White	-0.041	0.008	↓ -56.34%	✓	✓	✓
Calephelis virginiensis	Little Metalmark	-0.038	0.014	↓ -53.32%	✓		✓
Calycopis cecrops	Red-Banded Hairstreak	-0.036	0.008	↓ -51.05%	✓	✓	✓
Polygonia comma	Eastern Comma	-0.034	0.012	↓ -49.83%	✓	✓	✓
Erynnis zarucco	Zarucco Duskywing	-0.034	0.008	↓ -49.65%	✓		✓
Euptoieta claudia	Variegated Fritillary	-0.033	0.008	↓ -48.73%	✓	✓	✓
Erynnis baptisiae	Wild Indigo Duskywing	-0.032	0.015	↓ -47.71%	✓	✓	✓
Pontia protodice	Checkered White	-0.031	0.012	↓ -46.69%	✓	✓	✓
Battus polydamas	Polydamas Swallowtail	-0.031	0.011	↓ -46.13%			✓
Cercyonis pegala	Common Wood-Nymph	-0.029	0.011	↓ -44.26%	✓	✓	✓
Atalopedes campestris	Sachem	-0.029	0.008	↓ -44.17%	✓	✓	✓
Marpesia petreus	Ruddy Daggerwing	-0.029	0.013	↓ -44.05%			✓
Vanessa cardui	Painted Lady	-0.029	0.014	↓ -43.96%	✓	✓	✓

KEY —GROWTH RATE SE—STANDARD ERROR 20-YR Δ—TWENTY YEAR CHANGE —REGIONAL LISTS: **1B.** Under Review; **2.** WAFWA; **3.** MW Watchlist Species; **4.** NE Watchlist Species; **5.** USFWS SE I+M Focal butterflies

GA	KY	LA	MS	NC	SC	TN	
✓	✓	✓	✓	✓	✓	✓	
✓		✓	✓		✓		
✓	✓		✓	✓	✓	✓	
✓	✓	✓	✓	✓	✓	✓	4
✓	✓	✓	✓	✓	✓	✓	
✓	✓	✓	✓	✓	✓	✓	2
✓			✓	✓	✓		5
✓		✓	✓	✓	✓		1B; 4
✓	✓	✓	✓	✓	✓	✓	
✓	✓		✓	✓	✓	✓	
✓	✓	✓	✓	✓	✓	✓	
✓	✓	✓	✓	✓	✓	✓	
✓	✓	✓	✓	✓	✓	✓	
✓	✓	✓	✓	✓	✓	✓	
✓	✓	✓	✓	✓	✓	✓	2
✓	✓	✓	✓	✓	✓	✓	
✓			✓				
✓	✓	✓	✓	✓	✓	✓	
✓	✓	✓	✓	✓	✓	✓	
✓	✓	✓	✓	✓	✓	✓	2
✓	✓	✓	✓	✓	✓	✓	
✓	✓	✓	✓	✓	✓	✓	2
✓	✓	✓	✓	✓	✓	✓	3
✓	✓	✓	✓	✓	✓	✓	
✓		✓	✓	✓	✓		
✓	✓	✓	✓	✓	✓	✓	
✓	✓	✓	✓	✓	✓	✓	
✓		✓	✓	✓	✓	✓	
✓	✓	✓	✓	✓	✓	✓	
✓	✓	✓	✓	✓	✓	✓	
✓	✓	✓	✓	✓	✓	✓	2; 4
✓	✓	✓	✓	✓	✓	✓	
✓	✓	✓	✓	✓	✓	✓	2
✓	✓	✓	✓	✓	✓	✓	

Federal ESA Listing Status—1A. Threatened

(Continued on next page...)

SUCCESS STORIES AND SOLUTIONS

The Gulf Fritillary (*Agraulis vanillae*) is considered by some to be a "climate change winner." This large bright-orange butterfly has been expanding its range over the last two decades (Halsch et al. 2020). In addition to being able to take advantage of warmer temperatures, especially in urban areas, the butterfly uses a caterpillar food plant, passionflower (*Passiflora* spp.), that gardeners enjoy planting in their home gardens. This ornamental plant grows easily in gardens in the south, and increasingly in other areas, such as coastal cities in California. Though the plant was relatively sparse in gardens in the 1990s, today it is abundant in gardens throughout the Southeast. Those increases are now being followed by increases in butterfly abundance in the Southwest and Pacific Southwest regions. In the last two decades, the Gulf Fritillary increased by 30% in the Southeast, 50% in the Southwest, and by over 5,000% in the Pacific Southwest.

As passionflowers have become more common in gardens across North America, Gulf Fritillaries have icreased in abundance. Here, a female is laying an egg on a passionflower vine. (Photo: Dan Mooney / Flickr CC BY-NC 2.0.)

SCIENTIFIC NAME	COMMON NAME	Growth rate	SE	20-YR Δ	AL	AR	FL
Polygonia interrogationis	Question Mark	-0.028	0.008	↓ -42.95%	✓	✓	✓
Cyllopsis gemma	Gemmed Satyr	-0.027	0.010	↓ -41.99%	✓	✓	✓
Amblyscirtes aesculapius	Lace-Winged Roadside-Skipper	-0.027	0.013	↓ -41.56%	✓	✓	✓
Limenitis archippus	Viceroy	-0.026	0.006	↓ -40.14%	✓	✓	✓
Asterocampa clyton	Tawny Emperor	-0.025	0.010	↓ -38.83%	✓	✓	✓
Pyrgus communis	Common Checkered-Skipper	-0.023	0.009	↓ -36.99%	✓	✓	✓
Papilio palamedes	Palamedes Swallowtail	-0.023	0.007	↓ -36.99%	✓		✓
Polites vibex	Whirlabout	-0.020	0.006	↓ -32.70%	✓	✓	✓
Epargyreus clarus	Silver-Spotted Skipper	-0.019	0.007	↓ -31.22%	✓	✓	✓
Strymon melinus	Gray Hairstreak	-0.018	0.006	↓ -30.06%	✓	✓	✓
Hermeuptychia sosybius	Carolina Satyr	-0.017	0.006	↓ -29.46%	✓	✓	✓
Papilio polyxenes	Black Swallowtail	-0.015	0.006	↓ -26.34%	✓	✓	✓
Papilio cresphontes	Giant Swallowtail	-0.015	0.006	↓ -25.33%	✓	✓	✓
Papilio troilus	Spicebush Swallowtail	-0.011	0.005	↓ -19.95%	✓	✓	✓
Agraulis vanillae	Gulf Fritillary	0.014	0.005	↑ 32.50%	✓	✓	✓
Danaus plexippus	Monarch	0.019	0.006	↑ 47.18%	✓	✓	✓
Phoebis sennae	Cloudless Sulphur	0.020	0.006	↑ 49.89%	✓	✓	✓
Poanes zabulon	Zabulon Skipper	0.021	0.010	↑ 53.21%	✓	✓	✓
Phyciodes phaon	Phaon Crescent	0.025	0.009	↑ 64.61%	✓	✓	✓
Thorybes pylades	Northern Cloudywing	0.025	0.010	↑ 65.21%	✓	✓	✓
Eurytides marcellus	Zebra Swallowtail	0.026	0.007	↑ 67.16%	✓	✓	✓
Panoquina ocola	Ocola Skipper	0.026	0.008	↑ 67.62%	✓	✓	✓
Eurema (=Pyrisitia) lisa	Little Yellow	0.029	0.009	↑ 77.07%	✓	✓	✓
Heliconius charithonia	Zebra Heliconian	0.032	0.008	↑ 91.33%			✓
Nathalis iole	Dainty Sulphur	0.033	0.011	↑ 92.65%	✓	✓	✓
Anaea andria	Goatweed Leafwing	0.035	0.014	↑ 99.38%	✓	✓	✓
Dryas iulia	Julia Heliconian	0.037	0.014	↑ 111.23%			✓
Chlosyne nycteis	Silvery Checkerspot	0.042	0.015	↑ 132.68%	✓	✓	✓
Junonia evarete	Mangrove Buckeye	0.045	0.021	↑ 145.27%			✓
Eurema daira	Barred Yellow	0.050	0.009	↑ 171.08%	✓		✓
Ascia monuste	Great Southern White	0.056	0.011	↑ 208.73%			✓
Anartia jatrophae	White Peacock	0.062	0.009	↑ 248.96%			✓
Strymon istapa	Mallow Scrub-Hairstreak	0.069	0.018	↑ 301.31%			✓
Hemiargus ceraunus	Ceraunus Blue	0.071	0.010	↑ 314.60%	✓		✓
Erynnis funeralis	Funereal Duskywing	0.074	0.024	↑ 343.31%	✓	✓	✓

KEY **—GROWTH RATE** **SE—STANDARD ERROR** **20-YR Δ—TWENTY YEAR CHANGE** **—REGIONAL LISTS:** **1B.** Under Review; **2.** WAFWA; **3.** MW Watchlist Species; **4.** NE Watchlist Species; **5.** USFWS SE I+M Focal butterflies

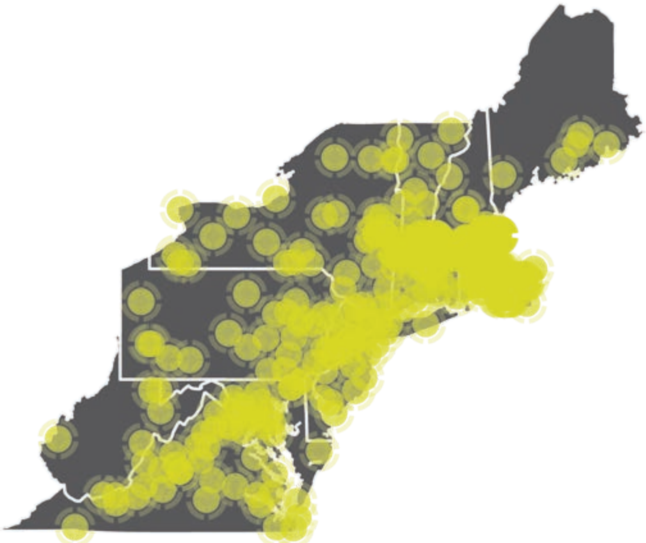
GA	KY	LA	MS	NC	SC	TN	
✓	✓	✓	✓	✓	✓	✓	
✓	✓	✓	✓	✓	✓	✓	
✓	✓	✓	✓	✓	✓	✓	5
✓	✓	✓	✓	✓	✓	✓	
✓	✓	✓	✓	✓	✓	✓	
✓	✓	✓	✓	✓	✓	✓	
✓		✓	✓	✓	✓		
✓		✓	✓	✓	✓		
✓	✓	✓	✓	✓	✓	✓	
✓	✓	✓	✓	✓	✓	✓	
✓	✓	✓	✓	✓	✓	✓	
✓	✓	✓	✓	✓	✓	✓	
✓	✓	✓	✓	✓	✓	✓	
✓	✓	✓	✓	✓	✓	✓	
✓	✓	✓	✓	✓	✓	✓	
✓	✓	✓	✓	✓	✓	✓	1A; 2; 3; 4
✓	✓	✓	✓	✓	✓	✓	
✓	✓	✓	✓	✓	✓	✓	
✓		✓	✓	✓	✓	✓	2
✓	✓	✓	✓	✓	✓	✓	3
✓	✓	✓	✓	✓	✓	✓	
✓		✓	✓	✓	✓	✓	
✓	✓	✓	✓	✓	✓	✓	
✓					✓		
✓	✓	✓	✓			✓	2
✓	✓	✓	✓	✓	✓	✓	
✓	✓	✓	✓	✓	✓	✓	2; 4
✓		✓	✓		✓		
✓		✓			✓		
							2
✓		✓			✓		
✓	✓	✓	✓			✓	

Federal ESA Listing Status—1A. Threatened

Northeast

TAKEAWAYS

- 33% decline in abundance in the region
- 47 species declining
- 19 species increasing
- Pollard walk-style programs needed in CT, DE, MD, ME, NH, NJ, PA, RI, VA, VT, WV, and DC



Monitoring sites across the Northeast region. [Credit: Edwards et al. (2025)]

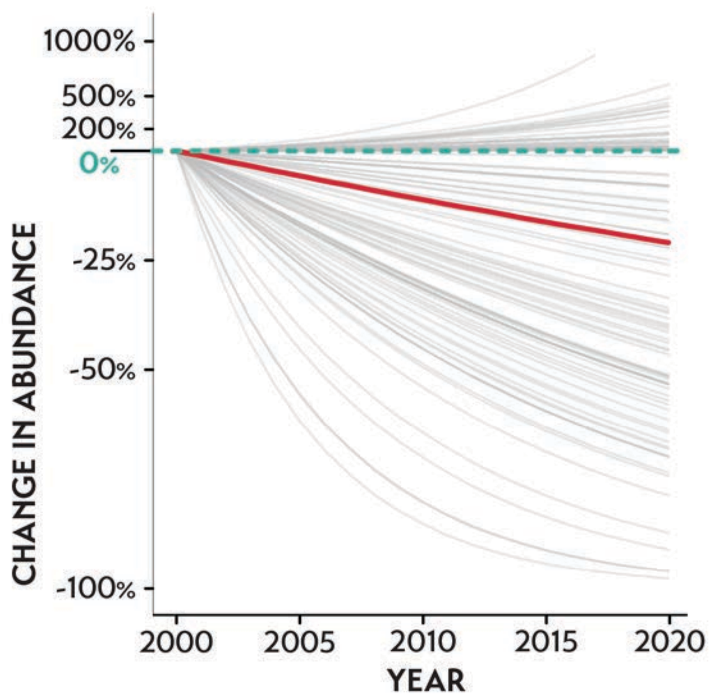
The Northeast (USFWS Region 5) is the smallest region in this study. It includes Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, Vermont, Virginia, West Virginia, and the District of Columbia. Major ecoregions are almost entirely mixed deciduous and pine forest types; approximately two thirds of the region is either deciduous or evergreen woodland, based on satellite images of land cover. It is estimated that the 108 species of butterfly in this region with enough data to analyze are declining in abundance by 2.0% per year, or a roughly 33% decline between 2000 and 2020. Forty-seven (44%) of these species are declining at long-term monitoring sites, while 19 species (18%) are increasing at these sites.

STATE OF THE DATA

Abundance counts were estimated for 108 of the approximately 183 species that are expected in the region (see chart right, median in red [credit: Edwards et al. 2025]).

Monitoring programs for this region include the nationwide NABA Butterfly Counts, as well as repeat transect surveys by Stephen Campbell and the Albany Pine Bush Preserve Commission; Arin Mills and the New Hampshire National Guard; the Massachusetts Butterfly Club (a chapter of NABA); and the Rice Creek Butterfly Monitoring Program.

The Northeast hosts more monitoring programs that most regions. It contains about 10% of the total land area of the contiguous U.S., and over 25% of the country's NABA and Pollard walk-style programs are found here.



INCREASING SPECIES HIGHLIGHT

Giant Swallowtail (*Heraclides cresphontes*)

MJ CC BY-NC 4.0

- **Host Plant[s]:** Various citrus family (Rutaceae) members, including cultivated and native species in the genus *Zanthoxylum*, common hoptree (*Ptelea trifoliata*), common rue (*Ruta graveolens*), white sapote (*Casimiroa edulis*), and sea torchwood (*Amyris elemifera*).
- **Habitat[s]:** In the northeast, habitats include open hillsides, creek sides, or woodland gullies.
- **Life History:** This species has two generations each season in more temperate climates and adults can be found all year in the southern portion of its range.

DECREASING SPECIES HIGHLIGHTS

Compton Tortoiseshell (*Nymphalis vaualbum*)

John V. Calhoun CC BY-NC 4.0

- **Host Plant[s]:** Aspens and cottonwoods (*Populus* spp.) and willows (*Salix* spp.) in the Salicaceae family, and birches (*Betula* spp.) in Betulaceae.
- **Habitat[s]:** Deciduous and coniferous forests.
- **Life History:** The species has a single long-lived adult generation (up to ten months) with butterflies emerging from their chrysalids in June and remaining active through November, after which they diapause for the winter, sometimes together in large numbers. These same adults emerge in spring to lay eggs and begin the cycle again. Adults feed on rotting fruit and tree sap.
- **Conservation Concerns:** Though the Compton Tortoiseshell appears more stable in the Midwest region, it appears to be in extremely steep decline at monitoring sites in the Northeast.

Milbert's Tortoiseshell (*Nymphalis milberti*)

alicecaste CC BY-NC 4.0

- **Host Plant[s]:** Stinging nettles (*Urtica dioica* and *U. procera*).
- **Habitat[s]:** Wet areas including riparian corridors, marshes, wet pastures, and wet woodlands.
- **Life History:** There are one or two generations per year, with adults diapausing through winter. Caterpillars feed in large groups when young.
- **Conservation Concerns:** Milbert's Tortoiseshell is in steep decline at monitoring sites in the Midwest, Mountain-Prairie, Northeast, and Pacific Northwest regions. Cross-region conservation efforts are needed.

Butterfly Population Trends Over Time in the Northeast

SCIENTIFIC NAME	COMMON NAME		SE	20-YR Δ	CT	DE	MD
Nymphalis vaualbum (=l-album)	Compton Tortoiseshell	-0.192	0.023	↓ -97.85%	✓	✓	✓
Nymphalis (=Aglais) milberti	Milbert's Tortoiseshell	-0.163	0.016	↓ -96.19%	✓		
Thymelicus lineola	European Skipper	-0.162	0.010	↓ -96.10%	✓	✓	✓
Erynnis icelus	Dreamy Duskywing	-0.121	0.017	↓ -91.13%	✓	✓	✓
Satyrium acadica	Acadian Hairstreak	-0.104	0.018	↓ -87.39%	✓		
Hesperia leonardus	Leonard's Skipper	-0.078	0.026	↓ -78.89%	✓	✓	✓
Satyrium caryaevorum (=caryaevorus)	Hickory Hairstreak	-0.068	0.016	↓ -74.41%	✓		✓
Achalarus lyciades	Hoary Edge	-0.067	0.010	↓ -73.67%	✓	✓	✓
Satyrium liparops	Striped Hairstreak	-0.060	0.008	↓ -70.07%	✓	✓	✓
Staphylus hayhurstii	Hayhurst's Scallopwing	-0.060	0.024	↓ -70.06%		✓	✓
Nymphalis antiopa	Mourning Cloak	-0.060	0.006	↓ -69.99%	✓	✓	✓
Pieris napi	Mustard White	-0.057	0.022	↓ -68.29%	✓		
Speyeria aphrodite	Aphrodite Fritillary	-0.057	0.009	↓ -67.93%	✓		✓
Lycaena epixanthe	Bog Copper	-0.055	0.017	↓ -66.71%	✓		✓
Erynnis juvenalis	Juvenal's Duskywing	-0.052	0.013	↓ -64.54%	✓	✓	✓
Asterocampa clyton	Tawny Emperor	-0.051	0.012	↓ -63.87%	✓	✓	✓
Colias eurytheme	Orange Sulphur	-0.048	0.005	↓ -61.50%	✓	✓	✓
Poanes hobomok	Hobomok Skipper	-0.045	0.009	↓ -59.17%	✓	✓	✓
Satyrodes (=Lethe) eurydice	Eyed Brown	-0.043	0.011	↓ -57.97%	✓		
Thorybes bathyllus	Southern Cloudywing	-0.042	0.009	↓ -57.17%	✓	✓	✓
Anatrytone logan	Delaware Skipper	-0.041	0.007	↓ -56.03%	✓	✓	✓
Boloria bellona	Meadow Fritillary	-0.039	0.011	↓ -54.37%	✓	✓	✓
Cercyonis pegala	Common Wood-Nymph	-0.038	0.005	↓ -53.46%	✓	✓	✓
Hesperia sassacus	Indian Skipper	-0.038	0.016	↓ -53.38%	✓	✓	✓
Nastra lherminier	Swarthy Skipper	-0.038	0.015	↓ -53.37%	✓	✓	✓
Satyrium calanus	Banded Hairstreak	-0.038	0.008	↓ -53.28%	✓	✓	✓
Lycaena phlaeas	American Copper	-0.038	0.006	↓ -53.18%	✓	✓	✓
Callophrys niphon	Eastern Pine Elfin	-0.037	0.017	↓ -52.25%	✓	✓	✓
Vanessa atalanta	Red Admiral	-0.036	0.005	↓ -51.72%	✓	✓	✓
Euphydryas phaeton	Baltimore Checkerspot	-0.036	0.010	↓ -51.54%	✓	✓	✓
Polites origenes	Crossline Skipper	-0.036	0.008	↓ -51.52%	✓	✓	✓
Vanessa virginiensis	American Lady	-0.036	0.005	↓ -51.22%	✓	✓	✓
Pieris rapae	Cabbage White	-0.031	0.003	↓ -46.66%	✓	✓	✓
Satyrium titus	Coral Hairstreak	-0.031	0.008	↓ -45.75%	✓	✓	✓
Colias philodice	Clouded Sulphur	-0.030	0.004	↓ -45.38%	✓	✓	✓
Polites mystic	Long Dash	-0.028	0.008	↓ -43.24%	✓	✓	✓

KEY —GROWTH RATE SE—STANDARD ERROR 20-YR Δ—TWENTY YEAR CHANGE —REGIONAL LISTS
RSGCN; **4.** MW Watchlist Species; **5.** NE Watchlist Species

	ME	MA	NH	NJ	NY	PA	RI	VT	VA	WV	
	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
	✓	✓	✓	✓	✓	✓	✓	✓		✓	
	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
	✓	✓	✓	✓	✓	✓	✓	✓			**2; 5**
	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	**3**
		✓		✓	✓	✓	✓	✓	✓	✓	
		✓		✓	✓	✓	✓		✓	✓	
	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
				✓		✓			✓	✓	
	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
	✓	✓	✓		✓	✓		✓			
	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
	✓	✓	✓	✓	✓	✓	✓	✓		✓	
	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	**2**
		✓	✓	✓	✓	✓	✓	✓	✓	✓	
	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	**2**
	✓	✓	✓	✓	✓	✓	✓	✓		✓	**2**
	✓	✓	✓	✓	✓	✓	✓		✓	✓	**4**
	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
	✓	✓	✓	✓	✓	✓		✓	✓	✓	
	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
				✓	✓	✓			✓	✓	
	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	**2**
	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	**2**
	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	**2**

1. Listed Threatened under Federal ESA; **2.** WAFWA; **3.** MW

(Continued on next page...)

SUCCESS STORIES AND SOLUTIONS

The Karner Blue butterfly (*Plebejus samuelis*) has been the subject of restoration efforts since 1992, though the species continued to experience declines and local extirpations for at least the next two decades.

A captive rearing program by the New Hampshire Fish and Game Department has added more than 35,000 butterflies to a state Army National Guard base since 2000 (Gifford et al. 2020). An additional captive rearing program with the Albany Pine Bush Preserve, NY, has included over 7,000 more butterflies released onto the preserve's restored lupine habitat, which now has eight subpopulations of the butterfly (Wheatly 2022).

Controlled fires and vegetation management at the preserve seek to mimic natural disturbance conditions needed for the caterpillar' food plants, and community education has played an important role in gathering public support for butterfly conservation in the local community (Naiman et al. 2018).

Karner Blue butterfly. (Photo: Jill Utrup, USFWS / Flickr CC0.)

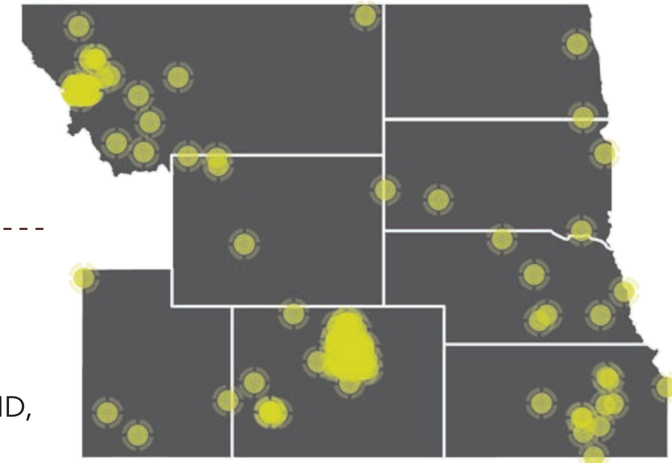
SCIENTIFIC NAME	COMMON NAME		SE	20-YR Δ	CT	DE	MD
Coenonympha tullia	Common Ringlet	-0.027	0.007	↓ -41.55%	✓		✓
Pyrgus communis	Common Checkered-Skipper	-0.026	0.010	↓ -40.83%	✓	✓	✓
Thorybes pylades	Northern Cloudywing	-0.025	0.008	↓ -39.83%	✓	✓	✓
Speyeria cybele	Great Spangled Fritillary	-0.022	0.004	↓ -36.04%	✓	✓	✓
Pholisora catullus	Common Sootywing	-0.021	0.008	↓ -33.80%	✓	✓	✓
Polites themistocles	Tawny-Edged Skipper	-0.017	0.006	↓ -28.65%	✓	✓	✓
Phyciodes tharos	Pearl Crescent	-0.015	0.004	↓ -26.15%	✓	✓	✓
Wallengrenia egeremet	Northern Broken-Dash	-0.013	0.006	↓ -22.33%	✓	✓	✓
Megisto cymela	Little Wood-Satyr	-0.012	0.006	↓ -21.65%	✓	✓	✓
Polygonia comma	Eastern Comma	-0.012	0.006	↓ -21.43%	✓	✓	✓
Ancyloxypha numitor	Least Skipper	-0.012	0.006	↓ -21.09%	✓	✓	✓
Satyrodes (=Lethe) appalachia	Appalachian Brown	0.014	0.006	↑ 32.22%	✓	✓	✓
Papilio glaucus	Eastern Tiger Swallowtail	0.015	0.004	↑ 34.37%	✓	✓	✓
Hylephila phyleus	Fiery Skipper	0.026	0.011	↑ 68.41%	✓	✓	✓
Danaus plexippus	Monarch	0.029	0.004	↑ 78.87%	✓	✓	✓
Calycopis cecrops	Red-Banded Hairstreak	0.033	0.012	↑ 92.45%	✓	✓	✓
Erynnis horatius	Horace's Duskywing	0.037	0.007	↑ 108.25%	✓	✓	✓
Euphyes dion	Dion Skipper	0.045	0.014	↑ 147.34%		✓	✓
Papilio canadensis	Canadian Tiger Swallowtail	0.045	0.012	↑ 147.93%	✓		
Strymon melinus	Gray Hairstreak	0.049	0.005	↑ 164.68%	✓	✓	✓
Libytheana carinenta	American Snout	0.059	0.011	↑ 222.98%	✓	✓	✓
Panoquina ocola	Ocola Skipper	0.070	0.025	↑ 307.73%		✓	✓
Chlosyne nycteis	Silvery Checkerspot	0.076	0.017	↑ 359.77%	✓	✓	✓
Hermeuptychia sosybius	Carolina Satyr	0.077	0.023	↑ 362.49%			✓
Poanes zabulon	Zabulon Skipper	0.080	0.009	↑ 400.17%	✓	✓	✓
Polygonia progne	Gray Comma	0.081	0.015	↑ 410.05%	✓		✓
Phoebis sennae	Cloudless Sulphur	0.084	0.011	↑ 438.06%	✓	✓	✓
Eurema (=Abaeis) nicippe	Sleepy Orange	0.087	0.015	↑ 475.15%		✓	✓
Junonia coenia	Common Buckeye	0.097	0.007	↑ 602.33%	✓	✓	✓
Papilio cresphontes	Giant Swallowtail	0.134	0.017	↑ 1351.02%		✓	✓

KEY **—GROWTH RATE** **SE—STANDARD ERROR** **20-YR Δ—TWENTY YEAR CHANGE** **—REGIONAL LISTS**
RSGCN; **4.** MW Watchlist Species; **5.** NE Watchlist Species

ME	MA	NH	NJ	NY	PA	RI	VT	VA	WV	
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
	✓		✓	✓	✓			✓	✓	
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	**4**
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
	✓	✓	✓	✓	✓	✓		✓	✓	**2**
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	**2**
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	**2**
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	**2**
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
			✓	✓	✓			✓	✓	
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	**1; 2; 4; 5**
	✓		✓	✓	✓	✓		✓	✓	
	✓		✓	✓	✓	✓		✓	✓	
			✓	✓	✓		✓	✓		
✓	✓	✓	✓	✓	✓		✓			
✓	✓	✓	✓	✓	✓	✓		✓	✓	
	✓		✓	✓	✓	✓		✓	✓	
			✓	✓	✓			✓		
✓	✓	✓	✓	✓	✓		✓	✓	✓	**2; 5**
					✓			✓	✓	
	✓		✓	✓	✓	✓		✓	✓	
✓	✓	✓	✓	✓	✓		✓	✓	✓	
	✓		✓	✓	✓	✓		✓	✓	
			✓		✓			✓	✓	
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
			✓	✓	✓			✓	✓	

1. Listed Threatened under Federal ESA; **2.** WAFWA; **3.** MW

Mountain-Prairie



Monitoring sites across the Mountain-Prairie region.
[Credit: Edwards et al. (2025)]

TAKEAWAYS

- 10% decline in abundance overall
- 26 species declining
- 5 species increasing
- Pollard walk-style programs needed in KS, MT, ND, NE, SD, UT, and WY

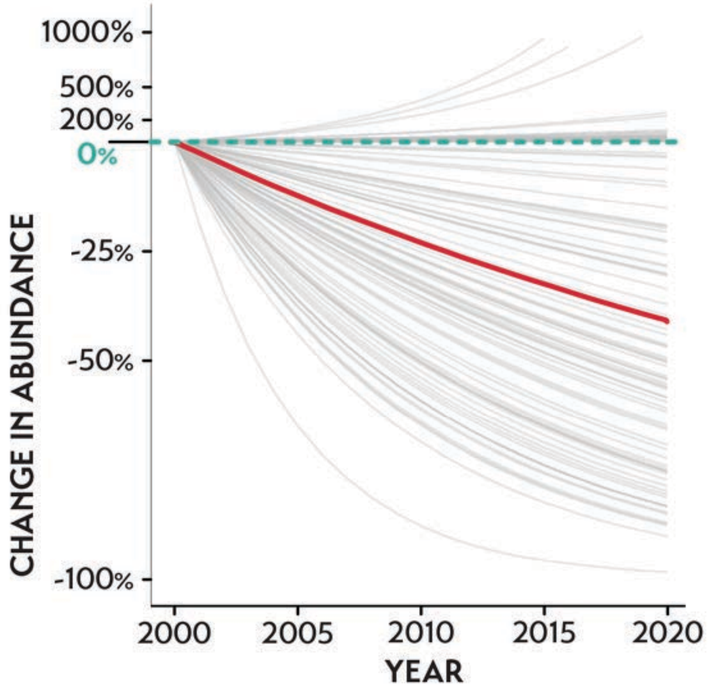
Encompassing over 740,000 square miles, the Mountain-Prairie region (USFWS Region 6) is the largest in this study. It covers Colorado, Kansas, Montana, Nebraska, North Dakota, South Dakota, Utah, and Wyoming. This area includes largely agricultural lands in the east, and mostly undeveloped rangeland to the west. Major ecoregions in remaining natural areas include the northern and western mixed and shortgrass prairies, Colorado Rockies forests, shrub steppe of the Wyoming Basin and Great Basin, and the northern Colorado Plateau shrublands. Models of butterfly abundance in this region suggest a decline of 0.5% per year, or roughly a 10% decrease in the number of butterflies observed between 2000 and 2020. Of the 101 species for which there are sufficient data for analysis, just over 25% are declining, while only 5% are increasing in abundance.

STATE OF THE DATA

Abundance counts were estimated for 101 of the approximately 312 species that are expected in the region (see chart right, median in red [credit: Edwards et al. 2025]).

Monitoring programs include the nationwide NABA Butterfly Counts, as well as the Colorado Butterfly Monitoring Network and the MPG Ranch Butterfly Monitoring Program.

While the region contains about 25% of the total land area of the contiguous U.S., only 10% of the country's NABA and Pollard walk-style programs are found here.



INCREASING SPECIES HIGHLIGHT

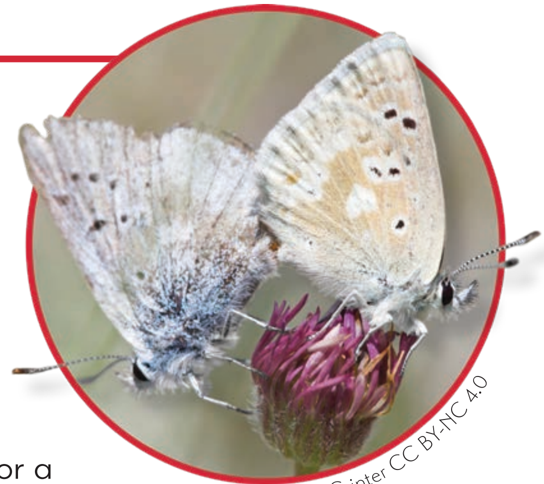
Northern Blue (*Lycaeides idas*)

Nitin Ravikanthachari CC BY-NC 4.0

- **Host Plant[s]:** In the West this species feeds on plants in the legume family (Fabaceae), including *Lotus* and *Lupinus* species.
- **Habitat[s]:** Woodland openings and wet meadows, but also drier habitats at higher elevations or in alpine regions.
- **Life History:** This species has one adult generation per year, and second instar caterpillars diapause through the winter.

DECREASING SPECIES HIGHLIGHTS

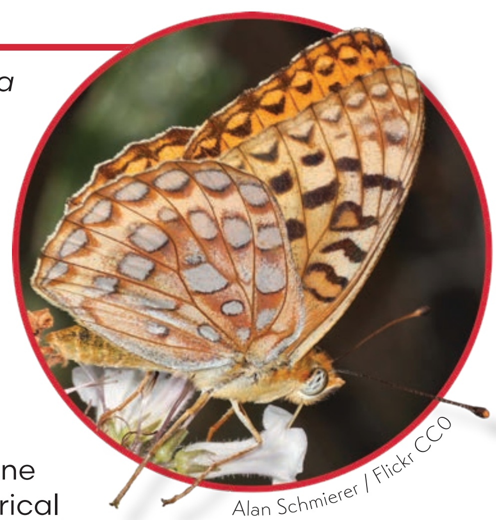
Arctic Blue (*Agriades glandon*)



Chris Grinter CC BY-NC 4.0

- **Host Plant[s]:** Plants in the primrose family (Primulaceae), including rock primrose (*Androsace septrentrionalis*) and sweet-flower rock-jasmine (*A. chamaejasme*). Feeds on plants in the saxifrage family (Saxifragaceae) elsewhere in the United States.
- **Habitat[s]:** Numerous alpine and arctic environments, including alpine meadows, ridges, slopes and summits, and rocky areas above timberline and in the tundra.
- **Life History:** This species has one adult generation in mid-summer, possibly two in Colorado. Diapause may occur as either partially grown caterpillars (second to fourth instars) or a pupa. Adults nectar on many species of flowers.
- **Conservation Concerns:** As an arctic and alpine species, the Arctic Blue is less likely to be exposed to pesticides or habitat destruction. Changes to the climate in these regions, including warming temperatures and decreasing precipitation, may be responsible for some population declines. Many populations may occur on public lands.

Zerene Fritillary (*Speyeria zerene*)



Alan Schmierer / Flickr CC0

- **Host Plant[s]:** Caterpillars feed on multiple violet species (*Viola* spp.), including *V. adunca* and others.
- **Habitat[s]:** Grasslands and openings in wooded areas; some subspecies known only from coastal dune regions.
- **Life History:** Adults fly throughout the summer in a single adult generation, mostly between July and early September. As with other species in the genus *Speyeria*, eggs are laid near the base of violet plants, and first instar caterpillars diapause through the winter. Larvae feed when host plants begin to grow in the spring.
- **Conservation Concerns:** Several subspecies of the Zerene Fritillary are threatened by habitat loss and changes to historical

disturbance regimes along the Pacific coast and are listed under the U.S. Endangered Species Act, including the Oregon, Behren's, Myrtle's, and Callippe Silverspot butterflies. Populations in other locations may also be impacted by urban development or the loss of their violet host plants.

Butterfly Population Trends Over Time in the Mountain-Prairie

SCIENTIFIC NAME	COMMON NAME		SE	20-YR Δ	CO	KS	MT	ND	
Phyciodes mylitta	Mylitta Crescent	-0.210	0.063	↓ -98.50%	✓		✓		
Agriades (=Plebejus) glandon	Arctic Blue	-0.116	0.025	↓ -90.17%	✓		✓	✓	
Hesperia comma	Common Branded Skipper	-0.104	0.029	↓ -87.63%	✓		✓	✓	
Speyeria zerene	Zerene Fritillary	-0.104	0.032	↓ -87.39%	✓		✓		
Phyciodes campestris (=pulchella)	Field Crescent	-0.102	0.020	↓ -87.02%	✓		✓		
Lycaeides (=Plebejus) melissa	Melissa Blue	-0.095	0.020	↓ -85.03%	✓	✓	✓	✓	
Parnassius phoebus	Phoebus Parnassian	-0.094	0.026	↓ -84.71%	✓		✓		
Polites mystic	Long Dash	-0.090	0.027	↓ -83.39%	✓	✓	✓	✓	
Anatrytone logan	Delaware Skipper	-0.090	0.030	↓ -83.37%	✓	✓	✓	✓	
Satyrium titus	Coral Hairstreak	-0.090	0.026	↓ -83.34%	✓	✓	✓	✓	
Oarisma garita	Garita Skipperling	-0.084	0.025	↓ -81.35%	✓		✓	✓	
Plebejus (=Icaricia) acmon	Acmon Blue	-0.080	0.024	↓ -79.90%	✓	✓	✓	✓	
Glaucopsyche lygdamus	Silvery Blue	-0.077	0.023	↓ -78.77%	✓	✓	✓	✓	
Polites themistocles	Tawny-Edged Skipper	-0.074	0.025	↓ -77.31%	✓	✓	✓	✓	
Phyciodes selenis (=cocyta)	Northern Crescent	-0.070	0.023	↓ -75.35%	✓		✓	✓	
Speyeria mormonia	Mormon Fritillary	-0.070	0.033	↓ -75.33%	✓		✓		
Speyeria cybele	Great Spangled Fritillary	-0.069	0.020	↓ -74.74%	✓	✓	✓	✓	
Polygonia satyrus	Satyr Comma	-0.068	0.027	↓ -74.11%	✓		✓	✓	
Erebia epipsodea	Common Alpine	-0.059	0.029	↓ -69.32%	✓		✓		
Pieris napi	Mustard White	-0.052	0.023	↓ -64.85%	✓		✓	✓	
Speyeria callippe	Callippe Fritillary	-0.044	0.022	↓ -58.30%	✓		✓	✓	
Plebejus (=Icarcicia) icarioides	Boisduval's Blue	-0.042	0.020	↓ -56.49%	✓		✓		
Papilio multicaudata	Two-Tailed Swallowtail	-0.041	0.015	↓ -55.87%	✓	✓	✓	✓	
Euphyes vestris	Dun Skipper	-0.040	0.020	↓ -55.24%	✓	✓	✓	✓	
Pieris rapae	Cabbage White	-0.038	0.011	↓ -53.59%	✓	✓	✓	✓	
Nymphalis antiopa	Mourning Cloak	-0.035	0.017	↓ -49.94%	✓	✓	✓	✓	
Erynnis pacuvius	Pacuvius Duskywing	0.060	0.027	↑ 234.96%	✓		✓		
Nathalis iole	Dainty Sulphur	0.065	0.028	↑ 264.12%	✓	✓			
Junonia coenia	Common Buckeye	0.124	0.035	↑ 1096.07%	✓	✓			
Thymelicus lineola	European Skipper	0.142	0.052	↑ 1607.63%	✓		✓	✓	
Lycaeides (=Plebejus) idas	Northern Blue	0.156	0.039	↑ 2168.81%	✓		✓		

KEY —GROWTH RATE SE—STANDARD ERROR 20-YR Δ—TWENTY YEAR CHANGE —REGIONAL LIST: WAFWA

	NE	SD	UT	WY	
			✓	✓	
	✓	✓	✓	✓	
	✓	✓	✓	✓	✓
	✓	✓	✓	✓	
	✓	✓	✓	✓	
	✓	✓	✓	✓	✓
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			✓	✓	
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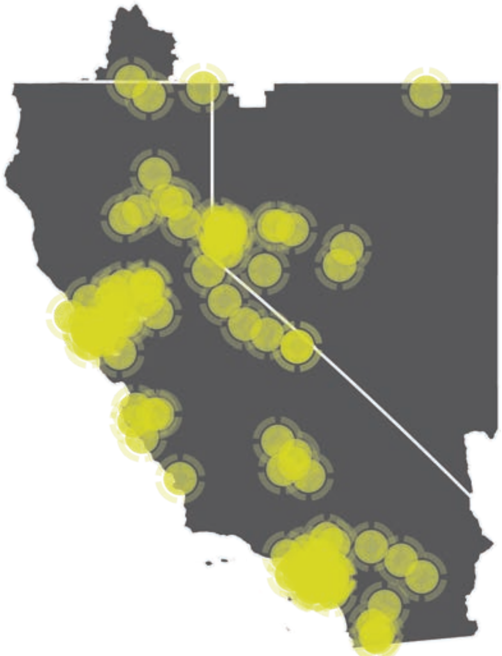
	✓	✓	✓		
			✓	✓	
			✓	✓	

SUCCESS STORIES AND SOLUTIONS

Several butterfly species that previously inhabited large areas of grasslands in this region were historically threatened by habitat loss from agricultural expansion, including the Dakota Skipper (*Hesperia dacotae*). Recovery efforts for these species include captive rearing and releases by the Minnesota Zoo's Pollinator Conservation Initiative (MDNR 2024) and working with ranchers to modify grazing practices to enhance conservation benefits for the Dakota Skipper and other prairie species (Stone 2022). New initiatives to broadly address needs of pollinators offer to augment habitat for butterflies in the context of increasing the health of all pollinator populations in the region. For example, the Colorado Native Pollinating Insects Health Study includes a scientific review of the state's native pollinating insects, comprehensive conservation practices, and priorities for the future of pollinating insect health and management (Armstead et al. 2024).

Clockwise from top left: Female Dakota Skipper on coneflower; Common Banded Skipper on blanketflower; bison grazing on TNC Ordway Prairie in North Dakota. (Photos, clockwise from top left: Erik Runquist, MN Zoo, via USFWS Midwest, Flickr CC0; Gary Eslinger, USFWS / Flickr CC0; Tom Koerner, USFWS / Flickr CC0.)

Pacific Southwest



Monitoring sites across the Pacific Southwest region. [Credit: Edwards et al. (2025)]

TAKEAWAYS

- 31% decline in abundance overall
- 41 species declining
- 14 species increasing
- Pollard walk-style programs needed in large portions of CA and NV

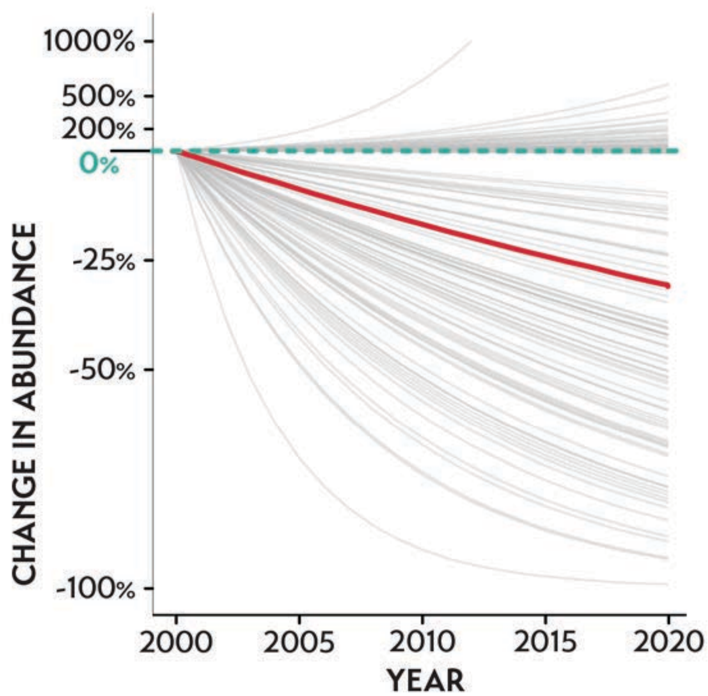
The Pacific Southwest (USFWS Region 8) includes California and Nevada. It contains some of the driest portions of the United States, with parts of the Mojave Desert and central Great Basin Desert receiving as little as 2–4″ of precipitation per year (PRISM Climate Group 2024). Ecoregions across these two states include the majority of the Great Basin and Mojave Deserts, as well as the Sierra Nevada Mountains; the central California grasslands, chaparral, and woodlands; and the California coastal forests. Models of butterfly abundance in this region suggest a decline of 1.8% per year, or roughly a 31% decrease in the number of butterflies observed between 2000 and 2020. Approximately 38% of the species included in the study appear to be declining at monitoring sites in this region, while only 13% show evidence of increasing abundances.

STATE OF THE DATA

Abundance counts were estimated for 108 of the approximately 226 species that are expected in the region (see chart right, median in red [credit: Edwards et al. 2025]).

Monitoring programs for this region include the nationwide NABA Butterfly Counts, as well as the Nevada Butterfly Monitoring Network; the Orange County Butterfly Monitoring Program (run by the Irvine Ranch Conservancy); programs by Dan Marschalek; Bill Merkle (Golden Gate National Recreation Area) and Christina Crooker (Golden Gate National Parks Conservancy); Arthur Shapiro and Matt Forister; Travis Longcore (UCLA), Robert A. Schallmann, and Robert E. Lovich (U.S. Department of Navy, Navy Facilities Engineering Systems Command Southwest); and PRISSM (Partnership of Regional Institutions for Sage Scrub Monitoring).

While the region contains about 9% of the total land area of the conterminous U.S., only 4% of the country's NABA and Pollard walk-style programs are found here.



INCREASING SPECIES HIGHLIGHTS

Mournful Duskywing (*Erynnis tristis*)

Alan Schmierer / Flickr CC0

Host Plant[s]: Multiple species of oak trees (*Quercus* spp.), including valley oak (*Q. lobata*) and coast live oak (*Q. agrifolia*). In addition to native oaks, the species also feeds on introduced landscape plants including cork oak (*Q. suber*).

Habitat[s]: Oak woodlands in the Sacramento Valley, San Joaquin Valley, and along the central and southern California Coast Range.

Life History: This species has three adult generations each year and can be seen from March to October. Eggs are laid on new leaves, and the caterpillars make nests of rolled leaves. Caterpillars from the final generation each year diapause through the winter. Adults visit many types of flowers. The fact that this species can feed on plants used in landscaping may help it thrive in urban areas.

DECREASING SPECIES HIGHLIGHTS

Large Marble (*Euchloe ausonides*)

© Cynthia Scholl

Host Plant[s]: Plants of the mustard (Brassicaceae) family including both native and non-native species, including *Arabis* spp., *Boechera* spp., *Descurainia* spp., *Erysimum* spp., *Lepidium* spp., and *Sisymbrium* spp.

Habitat[s]: Open sunny areas, including valleys, hillsides, fields, and meadows, and sometimes in weedy urban areas. Open habitats in road rights-of-way or utility corridors that contain native mustard plants may also provide habitat for this species.

Life History: Males patrol valleys and hillsides for females. Eggs are laid singly on unopened flower buds; caterpillars eat flowers and fruits. Chrysalids diapause. Some populations of the subspecies *Euchloe ausonides ausonides* may have two adult generations per year, though the majority of populations appear to have a single flight generation per year.

Conservation Concerns: This species is extirpated from many long-term monitoring locations in the Central Valley of California, and appears to be in decline at many other sites across its range.

Sandhill Skipper (*Polites sabuleti*)

© Matthew Forister

Host Plant[s]: Various grasses (Poaceae), including Bermuda grass (*Cynodon dactylon*), bluegrass (*Poa pratensis*), desert saltgrass (*Distichlis spicata* var. *stricta*), sand lovegrass (*Eragrostis trichodes*), rough bentgrass (*Agrostis scabra*), Idaho fescue (*Festuca idahoensis*), and alpine fescue (*F. brachyphylla*).

Habitat[s]: Alkali grasslands, moist meadows, marsh edges, seeps, and other areas with salt-tolerant grasses.

Life History: This species has one or two generations per year. Females deposit eggs singly on the host or nearby plants. As with other grass-feeding skippers, caterpillars feed on leaves and take shelter in nests of tied leaves.

Conservation Concerns: Several subspecies of the Sandhill Skipper are restricted to small habitats in isolated regions, including various alkaline regions of the Great Basin Desert, and may be threatened by overgrazing or various types of mineral and energy development. Other more common subspecies appear to be in decline based on data from long-term monitoring sites.

Butterfly Population Trends Over Time in the Pacific Southwest

SCIENTIFIC NAME	COMMON NAME		SE	20-YR Δ
Euchloe ausonides	Large Marble	-0.242	0.018	↓ -99.22%
Polites sabuleti	Sandhill Skipper	-0.135	0.008	↓ -93.28%
Satyrium tetra	Mountain Mahogany Hairstreak	-0.133	0.024	↓ -92.97%
Callophrys sheridanii	Sheridan's Hairstreak	-0.112	0.041	↓ -89.28%
Habrodais grunus	Golden Hairstreak	-0.107	0.026	↓ -88.16%
Danaus gilippus	Queen	-0.093	0.025	↓ -84.49%
Lycaena xanthoides	Great Copper	-0.085	0.011	↓ -81.69%
Vanessa annabella	West Coast Lady	-0.081	0.005	↓ -80.32%
Chlosyne gabbii	Gabb's Checkerspot	-0.079	0.034	↓ -79.55%
Parnassius clodius	Clodius Parnassian	-0.077	0.033	↓ -78.70%
Coenonympha tullia	Common Ringlet	-0.076	0.008	↓ -77.92%
Pyrgus scriptura	Small Checkered-Skipper	-0.073	0.009	↓ -76.99%
Thorybes mexicanus (=*mexicana*)	Mexican Cloudywing	-0.073	0.030	↓ -76.84%
Speyeria coronis	Coronis Fritillary	-0.068	0.016	↓ -74.50%
Satyrium saepium	Hedgerow Hairstreak	-0.060	0.015	↓ -69.83%
Cercyonis sthenele	Great Basin Wood-Nymph	-0.059	0.024	↓ -69.36%
Erynnis funeralis	Funereal Duskywing	-0.057	0.017	↓ -67.83%
Euphydryas chalcedona	Variable Checkerspot	-0.056	0.012	↓ -67.19%
Phyciodes campestris (=*pulchella*)	Field Crescent	-0.054	0.019	↓ -66.35%
Pholisora catullus	Common Sootywing	-0.050	0.011	↓ -63.58%
Glaucopsyche lygdamus	Silvery Blue	-0.050	0.009	↓ -63.04%
Lycaena helloides	Purplish Copper	-0.049	0.009	↓ -62.31%
Plebejus lupini	Lupine Blue	-0.048	0.020	↓ -61.55%
Papilio zelicaon	Anise Swallowtail	-0.045	0.006	↓ -59.14%
Brephidium exile (=*exilis*)	Western Pygmy-Blue	-0.043	0.008	↓ -57.37%

KEY —GROWTH RATE SE—STANDARD ERROR 20-YR Δ—TWENTY YEAR CHANGE —REGIONAL LISTS:
Federal ESA Listing Status: **1A.** Candidate, **1B.** Petitioned; **2.** WAFWA; **3.** MW RSGCN; **4.** NE RSGCN

	CA	NV	
	✓	✓	1B
	✓	✓	
	✓	✓	
	✓	✓	
	✓	✓	
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	✓	✓	2
	✓	✓	
	✓	✓	

(Continued on next page...)

SUCCESS STORIES AND SOLUTIONS

The El Segundo Blue (*Euphilotes allyni*, formerly *Euphilotes bernardino allyni*), had a very limited historical range of 4.5 miles along the coast from Los Angeles International Airport to the Palos Verdes Peninsula. It is one of several endangered butterflies inhabiting coastal dunes of California. Efforts to establish its only caterpillar food plant, seacliff buckwheat (*Eriogonum parviflorum*), in former habitat began in the 1980s and has continued with many private–public partnerships, the restoration of hundreds of acres of coastal dunes, and the sale of native plants used by this butterfly and others in coastal dune regions (ESB Coalition, n.d.[a], n.d.[b]).

El Segundo blue butterflies nectaring on seacliff buckwheat (top) in the Ballona Wetlands Ecological Reserve outside Los Angeles (bottom). (Photos: Jonathan Coffin CC BY-NA-SA 2.0.)

Butterfly Population Trends Over Time in the Pacific Southwest *continued*

SCIENTIFIC NAME	COMMON NAME		SE	20-YR Δ	
Erynnis propertius	Propertius Duskywing	-0.039	0.009	↓ -54.54%	
Danaus plexippus	Monarch	-0.038	0.005	↓ -53.22%	
Lycaena gorgon	Gorgon Copper	-0.037	0.016	↓ -52.69%	
Ochlodes agricola	Rural Skipper	-0.035	0.011	↓ -50.34%	
Chlosyne palla	Northern Checkerspot	-0.033	0.014	↓ -48.72%	
Plebejus (=Icaricia) acmon	Acmon Blue	-0.032	0.004	↓ -47.51%	
Atalopedes campestris	Sachem	-0.030	0.006	↓ -44.78%	
Phyciodes mylitta	Mylitta Crescent	-0.027	0.006	↓ -42.14%	
Vanessa virginiensis	American Lady	-0.026	0.010	↓ -40.86%	
Colias eurytheme	Orange Sulphur	-0.026	0.004	↓ -40.55%	
Callophrys augustinus	Brown Elfin	-0.026	0.011	↓ -40.36%	
Anthocharis sara	Sara Orangetip	-0.025	0.011	↓ -39.32%	
Pieris rapae	Cabbage White	-0.019	0.003	↓ -32.07%	
Junonia coenia	Common Buckeye	-0.018	0.005	↓ -30.72%	
Strymon melinus	Gray Hairstreak	-0.018	0.004	↓ -30.70%	
Vanessa atalanta	Red Admiral	-0.018	0.007	↓ -30.24%	
Battus philenor	Pipevine Swallowtail	0.019	0.006	↑ 45.20%	
Ochlodes sylvanoides	Woodland Skipper	0.027	0.008	↑ 72.80%	
Papilio rutulus	Western Tiger Swallowtail	0.035	0.004	↑ 101.75%	
Everes (=Cupido) comyntas	Eastern Tailed-Blue	0.043	0.005	↑ 134.14%	
Hylephila phyleus	Fiery Skipper	0.046	0.005	↑ 148.86%	
Cercyonis pegala	Common Wood-Nymph	0.051	0.016	↑ 177.57%	
Phoebis sennae	Cloudless Sulphur	0.056	0.025	↑ 204.67%	
Callophrys gryneus	Juniper Hairstreak	0.059	0.028	↑ 225.24%	
Limenitis lorquini	Lorquin's Admiral	0.066	0.005	↑ 271.44%	
Nathalis iole	Dainty Sulphur	0.067	0.032	↑ 284.15%	
Speyeria zerene	Zerene Fritillary	0.075	0.029	↑ 346.51%	
Poanes melane	Umber Skipper	0.088	0.007	↑ 482.65%	
Erynnis tristis	Mournful Duskywing	0.097	0.005	↑ 602.80%	
Agraulis vanillae	Gulf Fritillary	0.200	0.010	↑ 5325.17%	

KEY **—GROWTH RATE** **SE—STANDARD ERROR** **20-YR Δ—TWENTY YEAR CHANGE** **—REGIONAL LISTS:**
Federal ESA Listing Status: **1A.** Candidate, **1B.** Petitioned; **2.** WAFWA; **3.** MW RSGCN; **4.** NE RSGCN

	CA	NV	
	✓	✓	
	✓	✓	**1A**; 3; 4
	✓	✓	
	✓		
	✓	✓	
	✓	✓	
	✓	✓	2
	✓	✓	
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	✓		

Large areas of the United States have been transformed by development or agriculture over the past century or more, greatly reducing the available habitat for butterflies and other wildlife. (Photo: Ryan Harvey / Flickr CC BY-NC-SA 2.0.)

5. Drivers of Declines in Butterfly Populations

There is broad consensus that there are three main stressors driving butterfly declines: habitat loss, pesticide use, and climate change (Warren et al. 2021; Cardoso et al. 2024).

Butterflies in the United States once existed in large expanses of pesticide-free habitat under a relatively stable climate. Those conditions began to change in earnest in the early 1800s as European colonization accelerated and dramatically altered the landscape. In the last 200-plus years, habitat loss, pesticide use, and climate change have greatly reduced the amount and quality of available butterfly habitat and subsequently, butterfly populations. Early efforts to monitor butterflies were highly local or focused on single imperiled species. Butterfly monitoring did not start at a broad scale until the late 1990s (Taron & Ries 2015). Trend estimates from 2000–2020 in this study reflect the state of butterfly populations well after large-scale changes in habitats. This historical lens is key to contextualizing trends and developing conservation strategies for the 21st century and beyond.

Habitat Loss

Construction is a very obvious example of habitat loss. Much habitat loss is gradual and piecemeal: a hedgerow removed, a wetland filled, a meadow converted to lawn, a roadside lost to highway widening. (Photo: Matthew Shepherd.)

Habitat loss includes not just complete physical loss, but also degradation and fragmentation of what remains. Widespread habitat loss occurred over the last two centuries and continues today. It is estimated that half of the grasslands in the U.S. were converted to agricultural uses and development by the early 1900s (Li et al. 2023). Grasslands broadly include prairies, meadows, marshes, and other ecosystems which are the primary habitat for many butterfly species. At the same time, ecosystem structuring processes such as Indigenous burning practices and regular flooding events were stopped, leaving remaining grasslands largely degraded and often highly impacted by invasive species. Habitat loss is a leading driver of declines across all plant and animal species (Newbold et al. 2016; Hogue & Breon 2022; Janousek et al. 2023).

Pesticide Use

After their introduction beginning in the 1940s, synthetic pesticides were rapidly and widely adopted. Widespread use of pesticides in agricultural and urban areas further reduced and degraded the habitat available for butterflies. In the 1990s and early 2000s, the development of "Roundup Ready®" crops led to broad-scale herbicide application, eliminating from the landscape native plants essential for developing caterpillars and nectaring butterflies, including millions of stems of monarch-supporting milkweed. This loss of native plants was likely exacerbated by recent increases in use of the drift-prone herbicides 2-4,D and dicamba (Bohnenblust et al. 2016). In addition, the early 2000s marked the start of widespread neonicotinoid insecticide applications, both as foliar applications and as insecticide-coated seeds (Douglas & Tooker 2015).

The emergence of systemic pesticides—chemicals that are absorbed into the plant tissues and spread throughout a plant as it grows, and often applied as a seed coating—resulted in indiscriminate exposure and risk to insects that can persist for months or years. The shift away from organophosphate and carbamate insecticides to use of neonicotinoids and pyrethroids has meant that while the quantity of insecticides (measured as pounds of active ingredients) applied to agricultural land has decreased in the past three decades, the toxicity loading of the environment for insects has increased (DiBartolomeis et al. 2019). This is exacerbated by the widespread, preemptive use of insecticides on seeds even when pests are not detected in the field. While over half of insecticide use is in agriculture, insecticides are also commonly used in residential and municipal landscapes, where they can contaminate flowering plants visited by butterflies; about a quarter of insecticide use is around homes and gardens (Atwood & Paisley-Jones 2017).

Growing evidence implicates this history of pesticide use in insect declines in the United States (Forister et al. 2016; Thogmartin et al. 2017; Crone et al. 2019; Halsch et al. 2020; Guzman et al. 2024; Van Deynze et al. 2024).

Left: Close-up of a boom spraying a soybean field. Right: Corn seed covered in a neonicotinoid coating in hopper of a seed drill. (Photos: United Soybean Board / Flickr CC BY 2.0 [left], Lance Cheung, USDA / Flickr CC0 [right].)

Climate Change

Rates of climate change accelerated starting in 1980 (Lindsey & Dahlman 2024), raising temperatures, changing precipitation regimes, and increasing the frequency of extreme weather events. The last decade (2011–2020) was the hottest on record, with new records being set every year (WMO 2023). Climate-induced drought is particularly harmful to butterfly populations across the American West (Forister et al. 2021). With more habitat and larger populations, species might be able to adapt to some of these changes in climate, but the current fragmented landscape makes this adaptation very difficult. The most endangered species, such as the Hermes Copper (*Lycaena hermes*), are often experiencing pronounced effects of climate change with only a few small sites remaining, a far cry from their former ranges.


Mike Chapman / Flickr CC BY-NC 2.0

We cannot directly remove each of these threats from the landscape. We can, however, understand the context and devise conservation strategies to build habitats that support resilient butterfly populations, while simultaneously working towards methods and policies to reduce prevalence of pesticides and slow climate change. The next sections illustrate what is needed and provide guidance on how to achieve this.

Left: Thompson Ridge Fire in the Sante Fe National Forest. Right: Flooding due to climate change in North Dakota. (Photos: USFS / Flickr CC BY 2.0 [left]; Keith Weston, USDA / Flickr CC BY 2.0 [right].)

Butterfly Conservation

Butterfly habitat should be woven into all parts of our landscapes—farmland, utility corridors, solar arrays, bike paths, roadsides, natural areas, and backyard and community gardens—to provide homes for common and wide-ranging butterflies as well as rare and at-risk species. To recover butterflies, we must combine efforts across towns and cities, working lands, and natural areas as well as in the

Butterflies shown: 1) Milbert's Tortoiseshell; 2) Mourning Cloak [caterpillar]; 3) Zabulon Skipper; 4) Red Admiral; 5) Purplish Copper;

linkages and stepping stones which provide connecting pathways. Achieving a healthy landscape will involve collaborations that use land management knowledge coupled with applied science to identify the best ways to support butterfly recovery. This will take concerted effort but helping butterflies thrive in the places we live, breathe, and work will, in turn, have immense benefits for human health and well-being. (Artwork by Faith Williams.)

6) Clouded Sulfur; 7) Painted Lady [caterpillar]; 8) Black Swallowtail; 9) Regal Fritillary; 10) Karner Blue; 11) Gemmed Satyr.

Butterfly habitat rich in native plants can be created in any location, even densely developed city cores. And when the right conditions are there, butterflies will find it. (Photo: Matthew Shepherd.)

6. A Strategic Vision to Bring Butterflies Back

Reversing butterfly declines will need action across the country, leading to thriving butterfly populations and interconnected habitats. Projects of all sizes and scopes should include supporting butterflies as a conservation outcome. Those intended to support birds, mammals, or creek health, for example, can easily be adapted to also promote the specific needs of butterflies, delivering greater conservation benefit. Species-specific actions for at-risk butterflies, including both widespread and narrowly distributed species, should be woven into the fabric of such projects. We need action at all levels to protect, restore, and enhance habitat for these animals across all landscapes, from wildlands to farmlands to urban cores.

Kevin Metcalf CC BY-NC 4.0

Our vision of a butterfly-rich future centers around creating and restoring habitat to meet the needs of butterflies across species and life stages. Such habitat should include caterpillar host plants, nectar plants, resources to support all stages of their life cycle, and protection from pesticides. Strategically restoring and enhancing habitat can reverse population declines. Targeted scientific studies aimed at understanding how much habitat is required to bring back endangered butterfly species have been overwhelmingly successful (Schultz & Crone 2015; Edwards et al. 2024). As we move into the middle of the 21st century, butterfly conservation priorities must evolve from a focus on specialist and narrowly distributed butterflies to one that also includes wide-ranging species that inhabit broad swaths of the landscape. These wide-ranging butterfly species include established targets of conservation like the Monarch (*Danaus plexippus*) and Mottled Duskywing (*Erynnis martialis*), as well as "new" species in decline highlighted in this report, such as the Gorgone Checkerspot (*Chlosyne gorgone*), Sara Orangetip (*Anthocaris sara*), and Sandhill Skipper (*Polites sabuleti*). Efforts to strategically recover these and other species will use applied science to understand their needs and develop the resources to restore and manage their habitat; these resources can then be woven into broad-based approaches aimed at recovering our butterfly community.

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Critical to this vision is the knowledge that while the footprint of butterfly conservation activities may be small, the impact can be far-reaching. For example, Fender's Blue (*Icaricia* [=*Plebejus*] *icarioides fenderi*) almost disappeared from a landscape in western Oregon in which less than 1% of the natural grasslands remains. This sums to about 50 square miles of remaining grassland, less than the extent of land cover in most metropolitan cities. Research-based actions led to targeted habitat management implemented by partners across public and private lands, actions that resulted in Fender's blue becoming the first insect to be downlisted—from endangered to threatened—under the U.S. Endangered Species Act. Restoration for other declining butterflies can lead to similar successes.

Finally, the future of butterfly conservation must include an expansion of community science and applied research. Some parts of the country have very little or no regular monitoring of butterfly populations, while some existing monitoring sites avoid areas impacted by key threats to butterfly populations in the region, thus potentially skewing our understanding of population trends. A nationwide system of regular monitoring sites will help answer questions about the responses of butterfly populations to threats like pesticides and climate change, and will help scientists, public agencies, and others assess if butterfly populations are recovering in response to management actions.

In the calls to action outlined below, anyone—homeowners and home renters; city and county parks managers; farmers, ranchers, and foresters; utility companies; state and federal agency staff; policymakers at all levels; and conservation practitioners—can find something they can do. No matter the scale, there are actions that anyone can take to make any landscape better for butterfly populations by adding flowering plants (native plants are preferred), restoring host plants for butterfly caterpillars, minimizing or eliminating pesticides (especially insecticides), and leaving spaces for butterflies and their caterpillars to overwinter, pupate, and seek refuge during inclement weather. There are also policy changes, outreach, and surveys that can be done. These efforts have impacts far beyond butterflies. Well-planned conservation initiatives seek to incorporate environmental and economic justice principles, improve access to spaces and resources, reduce barriers to participation, and provide opportunities for all voices to be heard. These efforts, in turn, have immense benefits for human health and well-being.

7. Calls to Action: Steps to Achieving this Vision

Recovering butterfly populations across the United States requires concerted efforts in all landscapes and collaborations between organizations. This chapter is divided into broad and overlapping landscape-based categories—Natural Areas, Working Lands, Towns and Cities, and Linkages—and integrative elements, steps that need to be advanced by collaborative partnerships, policy-based changes, and applied science.

Recognizing that the real landscape is not so neatly divided and that these actions broadly overlap, the table presented in appendix A was developed to highlight the interweaving of these efforts and illustrate opportunities for collaborative projects.

Landscape Elements

Natural Areas

Natural areas are areas of land or water dominated by native plants and natural processes, and relatively undisturbed by human activity. They are set aside for protection due to unique natural communities or other ecological features, the presence of rare or threatened species, or recreational value. Natural areas can be privately or publicly held. Examples of publicly owned sites include national, state, county, and city parks; wildlife refuges and preserves; and national forests. Private landowners that opt to retain some of their property as natural areas often do so by participating in voluntary conservation programs such as easements with land trusts.

Left: Restored prairie, Texas. Right: Saddle Mountain state natural area, Oregon (Photos: Xerces Society / Anne Stein [left]; Matthew Shepherd [right].)

Steps for augmenting butterfly-friendly habitat in natural areas:

- → Prioritize habitat protection in areas which support butterflies, especially imperiled butterflies.
- → Manage and restore butterfly habitat including host plants, nectar sources, and structural elements of habitat (sites for overwintering, etc.) (e.g., Conservation Evidence, n.d; Schultz 2001; Pfitsch et al. 2009).
- → Consider butterflies' needs when grazing, using fire management, mowing, removing invasive species, and conducting recreational activities (e.g., Severns 2008; Cayton et al. 2015; Warchola et al. 2018; Schultz & Ferguson 2020; Bussan 2022)
- → Develop and implement management plans that include species-specific attributes such as host plants and nectar plants required to reduce population declines for at-risk butterflies (Swartz et al. 2015; Schultz et al. 2019).
- → Develop and implement management plans that increase habitat diversity and resilience of butterfly habitats to buffer impacts of climate extremes (Henry et al. 2020). This includes practices such as restoring degraded habitat, creating linkages between habitat patches (Schultz 1998; Haddad et al. 2005), and installing diverse plantings that include species adapted to changing local conditions.
- → Minimize exposure of butterflies and their habitat to pesticides. To control invasive and other pest species, use practices such as integrated pest management (IPM) to minimize impacts while maximizing effectiveness. If herbicides are necessary to reduce invasive weeds, care should be taken to minimize movement away from target areas and limit impacts to pollinators and non-target plants (Crone et al. 2009; LaBar & Schultz 2012; Wagner & Nelson 2014; Schultz & Ferguson 2020). Similarly, where invasive insect pests must be managed with insecticides, land managers can choose targeted products and apply them sparingly.

Steps for incorporating butterflies into planning processes

- → Integrate butterfly conservation planning into overall planning for management of natural areas (Doll et al. 2022).
- → Conduct targeted habitat restoration efforts to increase high-quality habitat for at-risk species and develop efforts in concert with potential reintroduction programs (Henry et al. 2024).
- → Incorporate butterfly host plants into plant lists for pollinator habitat and other restoration projects.
- → Maximize access to natural areas, so that people from all communities have the opportunity for increased awareness of nature and to benefit from positive effects on human health and well-being, and to build support for conservation.

Spot-spraying herbicides on invasive plants instead of broad applications prevents butterfly host plants from being exposed—like this milkweed near Canada thistle and bindweed. (Photo: NPS / Flickr CC0.)

Working Lands

Working lands can be privately or publicly owned and are managed to meet human needs. Examples include farms and nurseries, ranchlands, solar and wind farms, state forests, and many types of federal lands such as those managed by the Department of Defense, Bureau of Land Management, U.S. Forest Service, and Department of Energy.

Steps for expanding and enhancing butterfly-friendly habitat on working lands

- Consider transitioning under-yielding marginal lands from cropland to perennial habitat cover.
- Make use of areas in and around agricultural land where pesticide exposure can be minimized, as these can be valuable butterfly habitats. In these areas both native and non-native plants may be used by butterfly species at all life stages, so non-native plants should only be reduced after native plants are established or if they are problematic and invasive.
- Include native caterpillar food plants in perennial plantings such as prairie strips and hedgerows and protect them from pesticide contamination.
- Reduce pesticide applications and manage pesticide drift to protect non-target butterfly populations and their habitat.
- Adopt ecologically sound IPM strategies to manage pests and diseases while minimizing the use of pesticides (USFWS, n.d.).
- Avoid large-scale use of insecticides on rangelands. State and federal agencies periodically spray insecticides across vast areas to suppress native grasshoppers and Mormon crickets. These insecticide uses can have devastating impacts on butterflies.
- Use integrated pest management and a holistic ecosystem view when managing grasshoppers. This includes managing cattle for rangeland health, monitoring grasshopper abundance and assessing economic thresholds, understanding the

Natural Resources Conservation Service Supporting Pollinators on Working Lands

The Natural Resources Conservation Service (NRCS; part of the U.S. Department of Agriculture) offers a range of programs that provide financial support and technical assistance for landowners looking to improve habitat for butterflies and other wildlife (USDA 2023; USDA-NRCS, n.d.[a], n.d.[b], 2019, 2021). These include:

- **Conservation Reserve Program** to move marginal lands out of cropland and into perennial habitat.
- **Conservation Stewardship Program** and **Environmental Quality Incentives Program** to adopt integrated pest management (IPM), reduce the use of pesticide-treated seeds, and/or establish and manage pollinator habitat within and around cropland.

Habitat for butteflies and other wildlife can be created on land used for ranching, agriculture, and energy facilities. (Photograph by Jeremy Reinisch, USFWS.)

species that could be harmed, and only applying insecticides where and when needed.

Steps for incorporating butterflies into planning processes

- When evaluating the effects of activities such as grazing, insect pest management, or energy development, consider the needs of butterflies as part of the planning process (Johansson et al. 2017; Bussan 2022).
- Educate agriculture professionals about how butterflies and other pollinators can co-exist on agricultural lands and how protecting imperiled butterfly species can support other production goals such as conserving soil, improving biocontrol of pests, and improving climate resilience of crops, as well as preventing the need for federal intervention.
- Increase adoption of pest prevention and non-chemical management strategies.

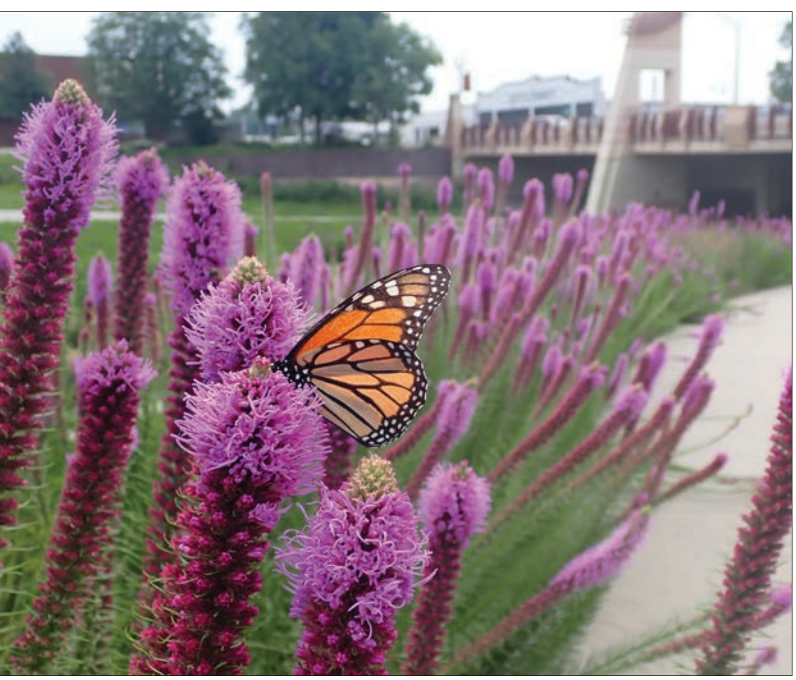
Towns and Cities

This category encompasses populated zones that typically have fixed boundaries, from the nation's biggest cities to small rural towns. Habitat opportunities in these places include private and community gardens, city parks, roadsides, and riparian zones. City-wide policy changes can also benefit butterflies.

Steps for incorporating butterfly-friendly planting practices into home and community gardens, curb strips, school yards, local parks, and other spaces

- Incorporate all aspects of butterfly habitat (host plants, nectar sources, and habitat structure) into plantings to support local butterfly species.
- To the extent possible, when adding new plant materials, prioritize the use of native, regionally appropriate plants.

Monarch butterfly nectaring on prairie blazingstar (*Liatris pycnostachya*) in a planting along an urban trail. (Photograph by Katie Lamke.)



- Recognize that some butterfly and other pollinator species may be using non-native or "weedy" plants for nectar sources, or in some cases as host plants, especially in places where native plants are lacking. In these situations, establish native plants before removing the non-natives, so that resources for butterfly species remain available throughout the restoration process.
- Prioritize the use of plants that host multiple species of butterflies (e.g., oak, willow, hackberry, nettle).
- To the extent possible, ensure that planting locations and nectar and host plants purchased from nurseries are free from harmful pesticides.
- Consider habitat needs beyond food, such as shelter from wind, diversity of plant heights and structures, exposure

to sun in cool times of year, adequate access to shade in hot and dry times of year, safe spaces for overwintering, and adequate protection from pesticides.

Steps for incorporating butterflies into planning processes

- Promote landscape design that incorporates butterfly nectar and host plants in landscaping near commercial areas and businesses and throughout public spaces in towns and cities.
- Develop and use research-based education, guidance, and resources on butterfly gardening and conservation needs.
- Incorporate butterfly host plants into plant lists for pollinator habitat and other restoration projects.
- Map community gardens and natural areas in towns and cities to identify where butterfly habitat links up, and where it does not. Prioritize outreach, work parties, and plant giveaways in neighborhoods where habitat is lacking or sparse.
- Encourage pesticide reduction on municipal lands by advocating for local governmental entities, like parks departments, school districts, and vector control agencies, to adopt IPM plans that emphasize the use of prevention-based practices over chemical controls and to consider eliminating the use of pest-control products for cosmetic purposes in public spaces.

Steps for engaging the broader community

- Engage all members of the community to build support for butterfly conservation and to expand accessible greenspaces and butterfly habitat in neighborhoods where it is lacking.
- Emphasize the need for pesticide-free, regionally appropriate butterfly host and nectar plants during outreach activities, workshops, and other activities.
- Incorporate information on butterflies and their habitat needs into educational outreach.
- Develop relevant signage for communal and public spaces, so areas where dead stems and leaf litter remain are not seen as neglected.
- Educate the public about the risks to butterflies and their host plants from pesticide treatments for residential nuisance pests.
- Advocate for the reduction of pesticide use for cosmetic reasons and provide information on alternative management for nuisance pests and disease vectors such as mosquitos.
- Increase availability of programs to broadly engage the public in community (or participatory) science such as weekly butterfly walks as part of Pollard walk-style monitoring

Office building pollinator planting. (Photograph by Xerces Society / Kathryn Prince.)

programs, annual field trips organized by the North American Butterfly Association, or season-long backyard monitoring as part of Monarch Larva Monitoring Program. Enhance accessibility of these programs to the broader community.

Linkages in the Landscape

Linkages are the connecting corridors that provide habitat and support dispersal of butterflies between other areas of habitat. They include natural areas, as well as roadsides, utility corridors such as in suburban power line right-of-way easements, and other rights-of-way. Hedgerows and riparian areas crossing farmland can also be corridors.

Steps for augmenting butterfly-friendly habitat in linkages

- → Include native caterpillar food plants in rights-of-way during habitat restoration and enhancement.
- → Prioritize management methods that use mechanical tools to reduce brushy vegetation (e.g., infrequent mowing) over pesticide-intensive approaches. Time mowing to avoid peak flowering and periods of use of the linkage by local butterflies and other pollinators.
- → Adapt practices, including the frequency, timing, and selectivity of vegetation management, to accommodate imperiled butterfly populations.
- → Minimize exposure to pollutants in roadside margins by reducing pesticide usage.
- → Manage and reduce pesticide applications to protect butterfly populations.
- → Survey roadsides to identify remnant native habitat, and once identified, manage these areas for this native habitat. Such habitat patches support butterflies and other pollinators and are often found along existing rights-of-ways.
- → Monitor rights-of-way to assess the impacts of habitat restoration practices on butterfly populations, and educate agency staff regarding imperiled butterflies found in these areas.

This Portland ecoroof is a pollinator bonanza with native wildflowers. (Photograph by Multnomah County Green Team / Flickr CC BY 2.0.)

Steps for incorporating butterflies into planning processes

- → Include butterfly conservation during the environmental review and planning stages for transportation projects including regional and statewide Transportation Improvement Plans.
- → Agencies and companies managing rights-of-way can communicate to staff, customers, and the wider public about the value of conservation measures for butterflies.
- → Train rights-of-way staff to identify both native plants and invasive plants to ensure management of invasive plants does not harm butterfly habitat.

Pollinator meadow created in a suburban power line right-of-way in Oregon. (Photograph by Matthew Shepherd.)

Bee City USA and Bee Campus USA

Towns and cities have an important role to play in conservation. Everywhere we look, people are working to transition their community greenspaces into thriving pollinator habitat. The Bee City USA and Bee Campus USA program provides an avenue for communities to unite around a shared desire to protect pollinators.

Each Bee City and Campus affiliate commits to creating habitat, developing and implementing strategies to reduce pesticide use, and engaging their community in conservation. The program is run by the Xerces Society, which establishes the minimum expectations. Xerces staff also provide guidance and advice to support the work of affiliates. However, the details of what communities do is up to them: the program is flexible and can be adapted to local needs and desires.

There are more than 400 affiliates in 47 states, plus the District of Columbia and Puerto Rico. They bring a high level of passion, energy, and dedication to pollinator conservation and together are creating real and meaningful change (Bee City USA 2025).

Thousands of acres of habitat have been established and improved, from main street plantings to pollinator gardens and meadows to restored prairies.

Pesticide reduction takes many forms: volunteers hand-pulling weeds, goats eating invasive plants, the adoption of a community-wide IPM plan, a ban on use of particular insecticides.

Outreach activities are similarly varied: floats in town parades, puppet shows, art exhibits, window displays, tabling, talks, training courses, photography competitions, trivia nights. The list could go on and on, but collectively, such events have reached more than 1.75 million people.

For more information about Bee City USA and Bee Campus USA, visit beecityusa.org.

- → Incorporate butterfly host plants into plant lists for pollinator habitat and other restoration projects.
- → Provide education on non-native plants that are common in rights-of-way that provide nectar or caterpillar food plants for butterflies and are not noxious weeds, since some butterfly species may be using non-native or "weedy" plants for nectar, or in some cases as host plants. In places where native plants are lacking, train local staff to leave the non-native plants being used by butterflies until the non-native plants are replaced with native plants.

Pollinator-Safe Nursery Plants

Some plant nurseries, even those carrying "pollinator-friendly plants," may treat their plants with pesticides like neonicotinoids that can persist for a long time in plant tissues and be harmful to butterflies and other pollinators. When buying plants for pollinators, talk to your local nursery, garden center, or plant vendor to ensure pesticides have not been used. You can find more resources about how to have these conversations, as well as information about plant vendors, at https://xerces.org/pesticides/bee-safe-nursery-plants.

Integrative Elements

Collaboration

Butterfly populations cannot be recovered without the involvement of people from diverse communities. Building relationships between partners, landowners, and other relevant parties is an essential step.

- → Form joint ventures of federal and state agencies, nonprofit conservation organizations, and university partners to address declines in butterfly populations using the model of the Migratory Bird Joint Ventures (MBJV 2023), a cooperative network of twenty-four regional partnerships that formed to collectively conserve and manage migratory birds. These can be used to initiate landscape-level collaborations across partners, identify local-level research and science needs, and pursue planning and processes to take actions.

Surveys gather essential information on butterfly populations. (Photos: Xerces Society / Molly Martin [left, center]; Xerces Society / Matthew Shepherd [right].)



- → Form a new "Butterfly Conservation Science Partnership" following the model of the Monarch Conservation Science Partnership.
- → Where there is interest, work with Indigenous communities to partner on butterfly conservation.
- → Form multi-region collaborations to focus on recovery of declining species that occur across multiple regions (e.g., Regional Species of Greatest Conservation Need).
- → Identify approaches to engage and include underserved and under-represented members of the community.

Applied Science

Species distributions, population status, and the impacts of management actions are just a few topics that are important to understand to help chart the best path forward with conserving butterflies. Addressing important questions at the same time as undertaking effective conservation actions provides a pathway for engaged research to be done in cooperation with community-based research and action.

Steps for developing informed and efficient conservation actions

- → Contribute to the development of novel landscape-scale approaches which incorporate common and wide-ranging butterfly species and, at the same time, needs of rare and at-risk butterflies.
- → Develop:
    - ↳ Species-specific assessments that pinpoint causes and extent of declines and identify aspects of species life history that are most likely to respond to management actions.
    - ↳ Research that integrates climate effects and potential of high-quality habitat to buffer climate impacts, including dispersal within potential travel routes and stepping-stone habitats as butterflies move across the landscape to settle in new climate niches and habitats.
    - ↳ Management interventions to maximize likelihood of butterfly populations to persist in areas impacted by climate

Community-Based Programs Collecting Butterfly Monitoring Data

Two types of community-based programs were essential to a large portion of our effort to understand the status of butterfly populations in the United States.

- ⓘ The Fourth of July Count, run by the North American Butterfly Association, began in the 1970s (Taron & Ries 2015) as a project of the Xerces Society. The program adapts the count circle approach used for the Audubon Christmas Bird Count, in which survey parties count all observed butterflies in a 15-mile diameter circle over a single 24-hour period. Over 400 count circles are surveyed every year by thousands of volunteers (NABMM, n.d.).
- ⓘ Pollard walks are another common approach to community-science monitoring. This approach is used by the monitoring networks in Ohio, Illinois, Colorado, and many other states and regions (see regional profiles). A Pollard walk involves walking a known route several times in a season (often weekly) while identifying and counting all butterflies seen within a few feet of the surveyor.

change using strategies such as increasing habitat heterogeneity and restoring underutilized land.

- Advance knowledge of:
  - Demography and dispersal behavior throughout the life cycle and in response to potential management interventions. A poor understanding of the response of butterflies to active interventions limits conservation effectiveness.
  - Effects and extent of environmental contamination with pesticides and pollutants, in concert with approaches to minimize impacts of these chemicals on butterfly diversity and abundance.
  - Factors that allow some species to thrive and increase in the presence of roadside and garden plants while others are declining even when they rely on a similar suite of host plants and nectar sources.
- Monitor butterflies along agricultural edges to identify use of existing habitat and to assess how agricultural practices influence butterfly abundance and diversity.

Steps to predict status and trends of butterfly populations

- Identify risk thresholds in population size or distribution, below which more aggressive conservation actions will be initiated.
- Create Pollard walk-style monitoring programs in geographic regions where none exist, targeting a baseline goal of a network of Pollard walks in every U.S. state. This will include building the capacity to collect and curate data from community members.
- Increase capacity of organizations to fill data gaps and to conduct comprehensive butterfly monitoring programs across the country that include estimates of abundance (such as Pollard walks) in addition to species occupancy.
- Create programs to monitor butterfly populations in underrepresented land use types,

Workshop on Indigenous Co-Stewardship of Pollinators in the Western United States

Engagement by Indigenous communities will foster effective pollinator conservation. There are increasing opportunities for partnerships and collaboration. In May 2024, two dozen Indigenous leaders came together with 15 federal and non-federal partners for the "Workshop on Indigenous Co-Stewardship of Pollinators in the Western United States." Hosted by the Institute for the American Indian Arts in Santa Fe, NM, this 4-day workshop was an opportunity to network and share knowledge about pollinators and pollination, as well as to share observations and perspectives on threats to pollinators and how to address them.

This community includes the Tribal Alliance for Pollinators which supports hands-on restoration work and community-based education and outreach such as field days at the Euchee Butterfly Farm in Oklahoma. (For more information, visit tribalallianceforpollinators.com and nativebutterflies.org.)

Other partners supporting the workshop were: Native American Fish and Wildlife Society, Bureau of Land Management, U.S. Fish and Wildlife Service, U.S. Geological Survey, U.S. Department of Agriculture, the Wildlife Conservation Society, and the National Native Bee Monitoring Network.

including agricultural areas and regions with low levels of human development.

- → Identify regions where better representation in monitoring is needed, including but not limited to the Pacific Northwest and Mountain-Prairie regions.
- → Develop programs to store and maintain databases for monitoring data that can be used by researchers and stakeholders following FAIR (Findable, Accessible, Interoperable, Reusable) data principles.
- → Create and augment monitoring programs for imperiled and at-risk species at the state and federal levels.
- → Establish regular regional reports for butterfly monitoring programs.
- → Integrate butterflies into existing monitoring protocols for plants and animals.
- → Create regional and local lists of at-risk butterfly species and their host plants for use by agencies lacking this information.
- → Contribute to state and regional status assessments (NatureServe).
  - ↳ Work with researchers to reassess outdated rankings to reflect new trend data on species-level declines.
- → Contribute to international status assessments done by the International Union for Conservation of Nature (IUCN).
  - ↳ Determine how best to use species-level trend analyses in the IUCN Red List's Categories and Criteria.
  - ↳ Reassess (if needed) the 52 U.S. species that have previously been evaluated for the IUCN Red List.
  - ↳ Where possible, crosswalk Nature-Serve assessments with the IUCN Red List categories and criteria to produce Red List assessments for species that have not yet been evaluated; assess all remaining U.S. species for which trend data are available.

Monarch Conservation Science Partnerships

The Monarch Conservation Science Partnership (MCSP) drew together leading scientists from federal and state agencies, nonprofit organizations, and academic institutions (Diffendorfer et al. 2020, 2023). These collaborative efforts have spawned and supported dozens of local, regional, national, and international efforts to bolster science to support monarch conservation across the continent. The aim was to bring together the best available science, identify science needs to address immediate questions related to monarch population status, and set the stage to initiate new research critical to laying the groundwork for science-based recovery actions. In the U.S., three national meetings were held between 2014 and 2016 with primary funding from the U.S. Geological Survey. These spawned regional meetings, including one focused on the western monarch population. These meetings were conducted in parallel with four meetings by the Trinational MCSP—an effort spanning the U.S., Canada, and Mexico to develop science-based actions to underpin conservation efforts across the three countries—funded by the Council for Environmental Cooperation.

Volunteers working together to respond to weed issues so that pesticides are not needed. (Photograph by Nancy Lee Adamson.)

Native thistles are an important nectar source for many butterflies, including the giant swallowtail (***Papilio cresphontes***), shown here. Many thistles have been removed, mistaken for problematic non-native species. (Photo: © Bryan E. Reynolds.)

8. Conclusion

The dataset compiled by the Status of Butterflies in the U.S. Working Group is the most comprehensive ever assembled for the country's butterflies. The trends revealed from analysis of the dataset are alarming—the majority of butterfly species assessed are declining, often by 50% or more over a 20-year period—and make a compelling case for insect conservation across the country. Working together we can stabilize or even reverse these losses, as well as have positive impacts on pollinator communities and the ecosystems on which they depend. This work will not only benefit butterflies, it will also bring broader benefits to our communities.

Achieving this, however, will take a concerted effort among many different parties working towards a shared vision: a landscape that provides adequate high-quality habitat to meet the needs of all butterfly species. This will necessitate creating and restoring habitat that offers host plants and nectar plants, can support all stages of the butterflies' life cycles, and is protected from pesticides.

As this report documents, butterfly declines are not limited to specialist and narrowly distributed butterflies, but include those species considered common and widespread. Accordingly, butterfly conservation priorities must evolve to include wide-ranging species that inhabit broad swaths of the landscape. Active management has reversed declines in targeted populations of rare butterflies; actively working on the protection of widespread species has the potential for much larger scale results. Effectiveness monitoring and adopting adaptive management practices is important to keeping track of what is working, what needs to change, and how populations are responding over time. Revisiting the data and updating the status and trends of butterflies every ten years will help to ensure we are on the right path.

We do not underestimate the work needed to achieve all that is laid out in this report. The task ahead won't be easy nor quick, but it is necessary. Without making these changes, butterflies will continue to decline and gradually disappear from our fields, parks, and neighborhoods, impoverishing our lives and our environment. Recovering our butterflies will take a joint effort from us all. The sooner we start, the sooner the benefits can be realized.

Helping America's butterflies recover is something that we can all contribute to. Habitat can be created in any space—large or small, urban or rural—and we can avoid using pesticides.(Photo: Matthew Shepherd)

Appendix A: Actions to Help Recover Butterflies

SECTION #	SubSection #	Natural Areas	Working Lands	Towns and Cities	Linkages	Collaboration	Applied Scienc	ACTIONS
1	**ACTING TO ENHANCE HABITAT: PLANTING, PLANNING, AND HABITAT MANAGEMENT**							
	1	N	W	T	L	C	S	Manage and restore habitat to support butterflies wherever possible, including hostplants, nectar, and structural elements of habitat (for roosting, overwintering, etc.).
	2	N	W	T	L	C	S	Prioritize habitat protection in places that support butterflies, especially at-risk butterflies.
	3	N	W	T	L	C	S	Design habitat management to consider direct effects of actions on habitat at the same time as indirect effects on butterflies within the habitat. This includes activities such grazing, using fire management, mowing, and removing invasive species.
	4	N	W	T	L	C	S	Develop management and restoration plans that include species-specific attributes required to reduce population declines for at-risk butterflies.
	5	N	W	T	L	C	S	Develop management and restoration plans that increase heterogeneity and resilience of butterfly habitats to buffer impacts of climate extremes.
	6	N	W	T	L	C	S	Incorporate butterfly host plants into plant lists for pollinator habitat and other restoration projects.
	7	N	W	T	L	C	S	To the extent possible, when adding new plant materials, prioritize the use of native, regionally appropriate plants.
	8	N	W	T	L	C	S	Recognize that some non-native or "weedy" plants may be important host plants, nectar sources, or provide habitat structure for local butterfly species where native plants are limiting. In these cases, establish native plants before removing the non-natives such that resources for butterfly species remain available throughout the restoration process.
	9	N			L	C	S	Integrate butterfly conservation planning into overall planning for management of natural areas.
	10			T	L	C		Promote landscape design that incorporates butterfly nectar and host plants in landscaping near commercial areas and businesses, and throughout public spaces in towns and cities.

KEY: Natural Areas (N), Working Lands (W), Towns and Cities (T), Linkages (L), Collaboration (C), Applied Science (S)

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SECTION #	SubSection #	Natural Areas	Working Lands	Towns and Cities	Linkages	Collaboration	Applied Scienc	ACTIONS
	11				L	C	S	Include butterfly conservation during the environmental review and planning stages for transportation projects, including Regional and Statewide Transportation Improvement Plans.
	11	N	W	T	L	C	S	Adapt practices, including the frequency, timing, and selectivity of vegetation management, to accommodate butterfly populations. This could be on roadsides, utility right-of-way, field margins, parks, stormwater catchments, and other vegetated areas.
	12		W		L	C	S	On farms, consider transitioning under-yielding marginal lands from cropland to perennial habitat cover.
	13		W		L	C	S	Include native host plants in farm habitat plantings.
	14		W		L	C	S	Make use of areas in and around agricultural land, as these can be valuable butterfly habitats as long as they have sufficiently low toxicity from pesticide drift and run-off.
	15		W		L	C	S	When evaluating the effects of activities such as grazing, insect pest management, recreation, energy development, or other actions, consider the needs of butterfly species as part of the planning process.
2	**REDUCE PESTICIDE EXPOSURE**							
	1	N	W	T	L	C	S	Adopt integrated pest management (IPM).
	2	N	W	T	L	C	S	Minimize exposure to pesticides except where targeted and limited use is critical to reducing invasive species in habitats for at-risk butterflies.
	3	N	W	T	L	C	S	During trainings and workshops, emphasize the need for pesticide-free, regionally appropriate butterfly host and nectar plants.
	4					C	S	Develop land management and maintenance plans to minimize impacts of pesticides and pollutants on butterflies and butterfly habitats.
	5	N	W					Avoid large-scale use of insecticides on rangelands for grasshopper suppression.
3	**INCREASE ACCESS AND AWARENESS**							
	1	N				C	S	Maximize access to natural areas across all parts of the community to increase awareness and to gain positive effects on human health and well-being.
	2		W		L	C	S	Raise awareness across all parts of the community in efforts to advance butterfly conservation in the working landscape; seek to gain appreciation for and connection to butterflies within the working landscape.
	3			T	L	C	S	Increase connection to all members of the community in efforts to advance butterfly conservation in towns and cities to gain appreciation for butterflies across the landscape.
	4					C		Identify approaches to increase engagement across members of the community.

KEY: Natural Areas (N), Working Lands (W), Towns and Cities (T), Linkages (L), Collaboration (C), Applied Science (S)

SECTION #	SubSection #	Natural Areas	Working Lands	Towns and Cities	Linkages	Collaboration	Applied Scienc	ACTIONS
4	**PROVIDE TECHNICAL ASSISTANCE**							
	1		W		L	C	S	Assist organizations with developing approaches to consider butterfly species needs when evaluating the effects of activities including grazing, insect pest management, or energy development.
	2		W		L	C	S	Assist organizations with recognizing that crop edges and other areas surrounding agricultural operations are valuable butterfly habitats, and that both native and non-native plants may be used by butterfly species at all life stages.
	3					C	S	Assist organizations with the creation of programs that address pollinator habitat and pesticide use.
	4	N	W	T		C	S	Educate staff across organizations regarding imperiled butterflies found in areas they manage or oversee.
	5					C	S	Provide information to organizations on species trends, especially at-risk species.
5	**EDUCATE**							
	1		W			C		Educate agriculture professionals about how butterflies can co-exist on agricultural lands and how protecting at-risk butterfly species can prevent the need for federal intervention.
	2			T	L	C		Develop educational and outreach materials, workshops, and trainings about the harms caused by pesticides, aimed at a range of audiences (K-12, community groups, land management and maintenance organizations, etc.).
	3	N	W	T	L	C		Use workshops, trainings, and outreach materials to educate a variety of audiences about how to integrate butterflies and their habitat needs into restoration, management, and gardening efforts.
	4			T	L	C		Develop relevant signage for community and public spaces that promote increased habitat for butterflies and reduced exposure to pesticides.
	5			T	L	C		Provide research-based education, guidance, and resources on butterfly gardening and conservation needs.
	6			T	L	C		Map community gardens and natural areas near towns and cities—identify where butterfly habitat links up, and where it does not. Prioritize outreach, work parties, and plant giveaways in places where habitat is lacking or sparse.
6	**SURVEY AND MONITOR**							
	1				L	C	S	Monitor rights-of-way to assess the impacts of habitat restoration practices on butterfly populations.
	2	N	W	T	L	C	S	Identify states and regions where better representation in monitoring is needed.
	3	N	W	T	L	C		Increase monitoring of butterfly populations in underrepresented land use types, including agricultural areas and regions with low levels of human development.
	4					C	S	Prioritize the storage and maintenance of, and access to, databases for monitoring data that can be used by researchers and collaborators in a sustainable manner.

KEY: Natural Areas (N), Working Lands (W), Towns and Cities (T), Linkages (L), Collaboration (C), Applied Science (S)

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SECTION #	SubSection #	Natural Areas	Working Lands	Towns and Cities	Linkages	Collaboration	Applied Scienc	ACTIONS
	5	N	W	T	L	C	S	Create and augment monitoring programs for at-risk species. Integrate butterflies into existing monitoring protocols for plants and animals. Establish regular regional reports for butterfly monitoring programs to contribute to long-term datasets.
	6					C	S	Assist local and regional land management organizations with filling data gaps and conducting comprehensive butterfly monitoring programs such as Pollard walks which include estimates of abundance as well as butterfly species occupancy.
7	ASSESS STATUS AND AUGMENT RESEARCH TO SUPPORT CONSERVATION							
	1					C	S	Form a joint venture of federal, state, nonprofit conservation organizations, and university partners to address declines in butterfly populations. For example, form a Butterfly Conservation Science Partnership following the model of the Monarch Conservation Science Partnership.
	2					C	S	Identify declining species that occur across multiple regions and form multi-regional collaborations for recovery (e.g., AFWA groups).
	3					C	S	Work with partners across a landscape to identify local-level research and science needs, and develop necessary planning and processed to take actions.
	4					C	S	Develop ways to engage all members of the community.
	5	N	W	T	L	C	S	Develop species-specific assessments to understand causes and extent of declines and to identify aspects of species life history that are mostly likely to respond to management actions.
	6	N				C	S	Advance knowledge of demography and dispersal behavior throughout the life cycle and in response to potential management interventions. Absence of understanding response of butterflies to active interventions limits conservation effectiveness.
	7	N	W	T	L	C	S	Develop research that integrates climate effects and potential of high-quality habitat to buffer climate impacts, including dispersal within potential travel routes and stepping stone habitats as butterflies move across the landscape settle in new climate niches and habitats.
	8	N	W	T	L	C	S	Advance knowledge on the effects of pesticides and pollutants in concert with approaches to minimize impacts of these chemicals on butterfly diversity and abundance.
	9	N	W	T	L	C	S	Contribute to the design of exemplar landscapes to test the ability of these landscapes to simultaneously rebuild at-risk populations and augment the broader community of butterflies and other pollinators.

KEY: Natural Areas (N), Working Lands (W), Towns and Cities (T), Linkages (L), Collaboration (C), Applied Science (S)

Appendix B: Data Sources, Strengths, and Limitations

Of all insects, butterflies are among the most comprehensively monitored. Butterfly datasets in the United States are largely collected by community scientists in programs at both the national and state levels. Additionally, agency scientists and professional biologists conduct targeted, annual monitoring of species of conservation concern. Examples of butterfly monitoring programs include:

- Nationwide butterfly counts organized by the North American Butterfly Association (NABA). These consist of a single, mid-summer count event in which observers make one or more trips to one or more locations within a 15-mile diameter circle identifying and counting all the butterflies they see.
- Statewide survey programs using Pollard walk-style monitoring methods that involve weekly butterfly counts along set routes each season; each time a route is walked, all butterflies observed within 5 meters of the observer are identified and counted.
- Dr. Art Shapiro's butterfly survey across northern California. Since 1972, Dr. Shapiro and (more recently) colleagues have monitored butterflies every two weeks on fixed routes at 10 sites from the Central Valley to the east side of the Sierra Nevada mountains.
- Single-species surveys, typically established to monitor populations of at-risk species, often occur weekly for the length of the focal species' flight season each year. These usually are led by agency or academic biologists.

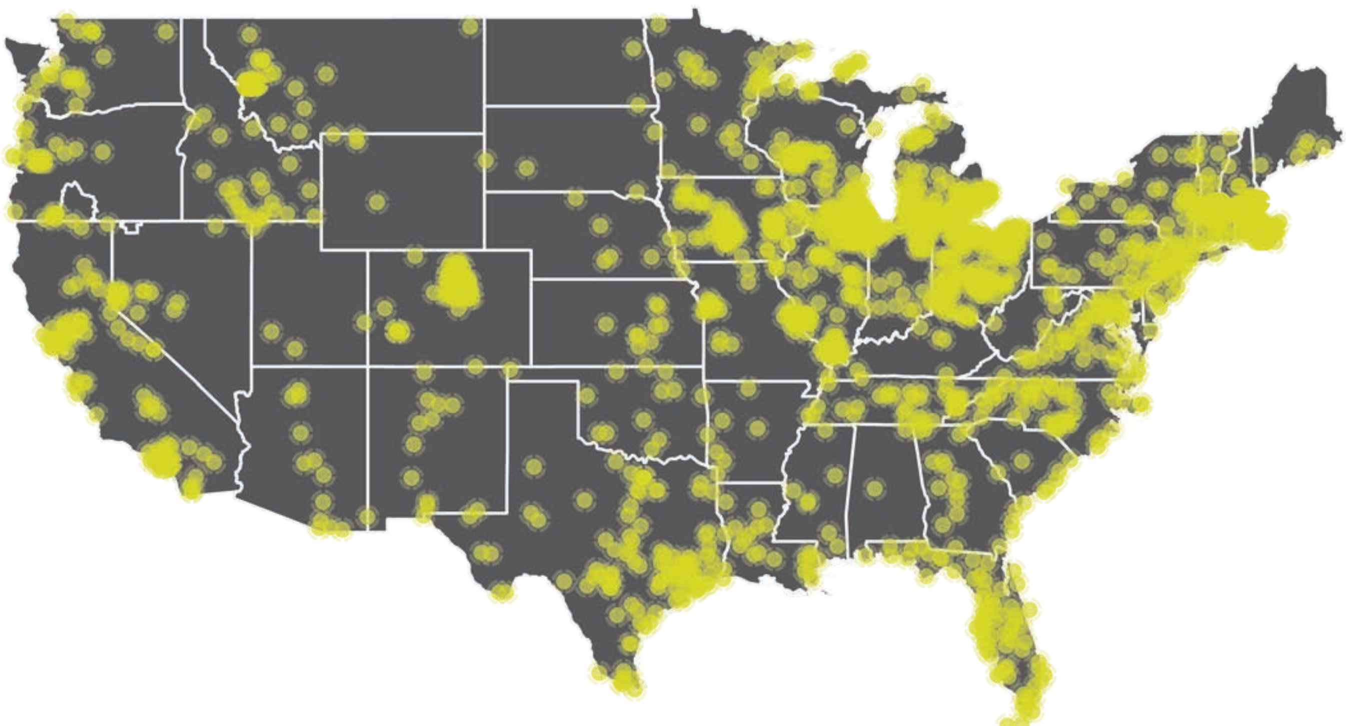
Between 2022 and 2024, researchers with the Status of Butterflies in the U.S. Working Group worked to integrate these datasets, accounting for variation in methodology across programs and species-specific butterfly ranges (Grames et al., in review), into the most comprehensive butterfly dataset assembled to date (for more information on data integration refer to Edwards et al. [2025] and Henry et al. [in review]). Because it spans geography from coast to coast and compiles data from 35 different monitoring programs, this dataset provides the best picture of butterfly trends in the U.S. over the prior two decades.

Like many datasets integrated across multiple programs and sampling schemes, the Status of Butterflies dataset has limitations, the first being that butterfly sampling is not equally representative across the country. Some regions, like the Midwest, are well sampled, while the largest region, Mountain-Prairie, contains the fewest monitoring sites. This uneven distribution of data is accounted for in the analysis, but leads to higher statistical power (and more ability to detect significant trends) in some regions than in others. The second limitation is that even within regions, sampling locations do not represent the distribution of different land cover types and variation in climate (Grames et al., in review; NABMM, n.d.). These limitations mean that the estimated declines may be over or under estimated depending on where sampling has occurred relative to threats to butterfly populations (Grames et al., in review). Additionally, many monitoring programs only gathered steam from 2000 onward, long after habitat loss and pesticide use had large impacts on butterfly populations (see above in section 5, Drivers of Decline). These limitations provide guidance for where data gaps exist and how butterfly monitoring across the country could be designed to better represent butterfly habitat across the landscape. Finally, butterfly taxonomy is an ongoing field of study, and combining the various datasets required a taxonomy "harmonizing" procedure that has inherent constraints; more details on this procedure can be found in Edwards et al. (2025).

Despite these limitations, the dataset is still the most comprehensive ever assembled for the U.S. The trends are alarming and make a compelling case for insect conservation across the country.

Figure B1. Locations of Available Data

Even with nearly 77,000 separate surveys that gathered over 12.6 million individual observations of butterflies, many areas of the U.S. lack comprehensive monitoring efforts.



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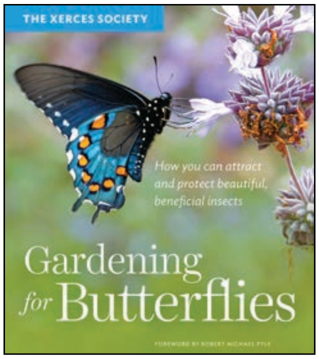
It's vitally important to continue conserving pristine habitat in national parks and remote natural areas, like this subalpine meadow in Montana. (Photo: Matt Lavin / Flickr CC BY-NC 2.0.)

For More Information

Books

Gardening for Butterflies

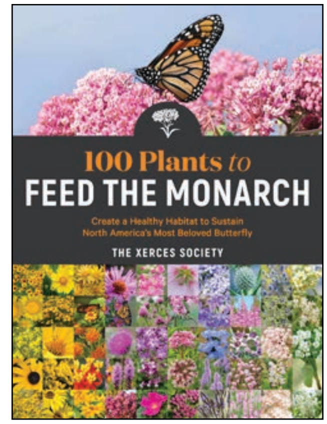


With creating gardens for butterflies at its core, this book includes guidance on supporting butterflies in all landscapes.

Learn how to design and install butterfly habitats, and appropriate maintenance practices to accommodate all their stages of life.

Contains an extensive guide to butterfly plants of North America. Learn more at xerces.org/books/

100 Plants to Feed the Monarch



This in-depth portrait of the monarch butterfly offers detailed information on how to design and create monarch-friendly landscapes, and at-a-glance profiles of the plant species that provide monarchs with nourishment. Learn more at xerces.org/books/

Further Resources

Pollinator & Beneficial Insects Plant Lists
xerces.org/publications/plant-lists

Monarch Nectar Plant Guides
xerces.org/monarchs/monarch-nectar-plant-guides

Bring Back The Pollinators
xerces.org/bring-back-the-pollinators

Pollinator Conservation Resource Center
xerces.org/pollinator-resource-center

X Kids Activity Book
xerces.org/xkids

Western Monarch Milkweed Mapper
monarchmilkweedmapper.org

www.inaturalist.org/projects/western-monarch-milkweed-mapper

WESTERN MONARCH MILKWEED MAPPER

Monarch Nectar Plant Survey
Have you seen monarchs on native nectar plants? Share your monarch nectar plant observations with Xerces at xerces.org/monarch-nectar-plants

Monarch Nectar Plant Survey • xerces.org/monarch-nectar-plants •

For more information about how to help butterflies, please reach out to Xerces staff at butterflies@xerces.org.

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Glossary and List of Acronyms

AFWA: Association of Fish and Wildlife Agencies.

Chrysalid: Synonym for pupa.

Diapause: A period of dormancy similar to hibernation.

Host plant: A plant that provides food for caterpillars.

Instar: A stage of caterpillar development between molts; there may be 4–6 instars, depending on species.

IPM: Integrated pest management.

IUCN: International Union for Conservation of Nature.

MCSP: Monarch Conservation Science Partnership.

Multivoltine: Completes multiple generations in a year.

NABA: North American Butterfly Association.

NRCS: Natural Resources Conservation Service.

Pollard walk: A type of butterfly monitoring that involves repeated transect counts of adult butterflies within specific parameters.

RSGCN: Regional Species of Greatest Conservation Need

SGCN: Species of Greatest Conservation Need.

SWAP: State Wildlife Action Plan.

Univoltine: Completes a single generation in a year.

USFWS: United States Fish and Wildlife Service.

USFWS SE I+M: U.S. Fish and Wildlife Service Inventory and Monitoring program

USGS: United States Geological Survey.

WAFWA: Western Association of Fish and Wildlife Agencies

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