

# WINGS

ESSAYS ON INVERTEBRATE CONSERVATION



THE XERCES SOCIETY

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# The Xerces Society's Roots In Butterfly Conservation

*Scott Hoffman Black*

Butterfly conservation has always been at the core of what we do at the Xerces Society. Robert Michael Pyle, the Society's founder, envisioned an organization that would bring butterfly conservation into the mainstream, and after forty-five years we have made tremendous strides. Agencies and conservation organizations no longer take these im-

portant animals for granted, and many people work for their benefit.

A major focus of our endeavors is the conservation of the rarest species and the ones that we know are in decline. We hope never to see another butterfly go extinct as did our namesake, the Xerces blue (*Glauropsyche xerces*). Such species as the Karner blue (*Lycæides samuelis*), Taylor's checkerspot (*Euphydryas editha taylori*), and even the broadly distributed monarch butterfly (*Danaus plexippus*) receive our attention because they need robust conservation efforts to ensure that their populations are protected and restored.

Our approach varies depending on the needs of any particular species and the threats to its survival, and over the last few years that approach has had some considerable successes:

- ◆ More than two thousand acres of prairie habitat was restored for the Karner blue butterfly in Wisconsin, thanks to collaboration with academic partners, farmers, and agency staff.

- ◆ More than six hundred acres of essential mountain meadow habitat is being managed for the mardon skipper (*Polites mardon*). Xerces scientists completed surveys, developed monitoring protocols, undertook research into the ways that fire impacts these butterflies, and ultimately developed the management plans that are now being



The Xerces Society began with a focus on butterflies and continues to work for their protection, irrespective of size. With a half-inch wingspan, the western pygmy-blue (*Brephidium exilis*) is the smallest butterfly in North America. Photograph by Bryan E. Reynolds.

implemented by the U.S. Forest Service and the Bureau of Land Management.

◆ We have restored and protected tens of thousands of acres for the monarch butterfly. With the precipitous decline in its populations, we have ramped up our efforts to protect, manage, and restore monarch habitat in all landscapes from farmland to wildlife refuges, and now have staff working on monarch conservation across the United States.

◆ Taylor's checkerspot butterfly was listed as "endangered" after a decade of advocacy, and now, surviving on the last of its prairie habitat, it is getting the conservation attention it deserves.

◆ Working to protect not just butterflies but all Lepidoptera, we recently provided feedback on the conservation of the federally endangered Kern primrose sphinx moth (*Euproserpinus euterpe*).

Although many of the species we work on have very specific habitat needs—wet mountain meadows, for instance, or intact prairies—all butterflies need four things: 1) nectar sources to fuel adult flight and mating; 2) host plants on which they can lay eggs and on which their caterpillars can feed and grow; 3) places to pupate and overwinter; and 4) a refuge from insecticides. One neat thing about working to conserve butterflies is that we can all help butterflies by planting and managing habitat where we live: anyone, from urbanite to farmer, can be engaged.

Xerces has actively supported gardening that nurtures butterflies and other insects since the release of our first book, *Butterfly Gardening: Creating Summer Magic in Your Garden*, which we produced in partnership with the

Smithsonian Institution and which was published by Sierra Club Books in 1990. This book helped push butterfly gardening to a different level and promoted gardening as a means of conservation.

I am delighted to announce that we have a new book: *Gardening for Butterflies: How You can Attract and Protect Beautiful, Beneficial Insects*, published in March by Timber Press. *Gardening for Butterflies* was written in equal measure for butterfly lovers and gardeners, and provides all you need to know to create a safe harbor for butterflies in a sea of artificial landscapes and paved surfaces.

The book introduces readers to butterfly conservation and provides suggestions for native plants to attract butterflies, garden designs to help them thrive, and best practices to accommodate all of their life stages. In addition, we include a chapter on ways that gardeners can provide for moths and enjoy their nighttime antics. The book also provides information on how all of these practices can be adapted for a wide range of larger landscapes. Wherever you live, *Gardening for Butterflies* will enable you to create great places for these beautiful animals.

At Xerces we believe that addressing the challenges faced by butterflies and other invertebrates requires broad grassroots participation. Over the past four and a half decades the Society has grown from a small group to become an international conservation organization. Our constituency has expanded in parallel, and now includes people from all walks of life. By joining us in taking action to help butterflies and sharing your passion for this important effort, you can help exponentially increase the amount of habitat so that all butterflies will not just survive, but thrive.

# North American Butterflies: Are Once-Common Species in Trouble?

*Scott Hoffman Black*

I grew up during the heyday of the American muscle car and have teenage memories of rocketing down Nebraska country roads in my 1971 Ford Mustang Mach 1. Back then even a short drive resulted in hundreds of dead bugs splattered across the grille, so I was always washing my car to keep it clean and shiny. When I returned to the Midwest last year with my wife and two kids—now driving a much more sensible and fuel-efficient rental car—I was struck by the paucity of bugs. These days you can drive the entire four hundred miles across the broad state of Nebraska and

your car will be practically spotless when you get to the other side.

The situation was even more noticeable when I stepped out of the car. In many areas, there were shockingly few insects. Where I might once have seen thousands of monarchs in the fields, yards, and roadsides, I now saw perhaps a dozen. Butterflies are disappearing, along with countless other creatures.

With more than eighteen thousand species of butterflies and ten times as many species of moths gracing our planet, we know relatively little about the status of each one, but the information



The regal fritillary (*Speyeria idalia*) was at one time found in thirty-two U.S. states, and now appears to be secure in only one. Photograph by Bryan E. Reynolds.

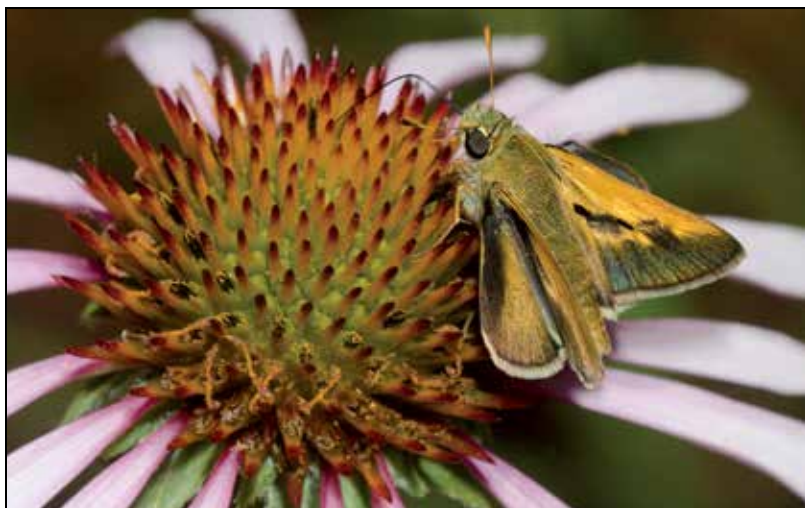
we do have is not encouraging. Recent reports from practically every continent document unprecedented declines in a broad array of butterflies.

Studies in Europe reveal that on average the continent's grassland butterfly species have had population losses of almost 50 percent since the early 1990s. Similarly, three-quarters of Britain's butterfly species are in decline. The situation is just as disturbing in the United States, where at least five butterflies have gone extinct since 1950, another twenty-five are presently listed as endangered nationwide, and four more are listed as threatened. NatureServe, one of the leading sources of information about rare and endangered species, assessed all of the roughly eight hundred butterfly species in the United States and found that 17 percent are at risk of extinction.

Much of my career has been spent focusing on conservation of the rarest of the rare—those butterflies and other animals that are on the brink of extinc-

tion. Such butterflies are often called “rare endemics”—that is, species that are found only in particular places, either in a limited geographic area or occupying a very specific type of habitat. For a population living within such tight constraints, the advent of a housing development in or adjacent to its habitat, or the invasion of that habitat by weedy plants, can lead to decline and endangerment. Indeed, most of the butterflies listed by NatureServe as being at risk of extinction are rare endemics.

It is, however, becoming apparent that many of the common species are disappearing as well, though such declines were hard to notice at first. These common species were historically the most populous, butterflies that you would find in your yard or notice along the side of the road. They are the ones we expect to see regularly—and, although we now see them less frequently or in scores rather than hundreds, the fact that we continue to see them at all fur-



Tawny-edged skipper (*Polites themistocles*) nectaring on purple coneflower (*Echinacea angustifolia*). Photograph by Bryan E. Reynolds.

ther masks their decline. It is often hard to spot this type of slow, incremental erosion of butterfly populations, especially when our focus is on rare species or on those that are already known to be threatened. Who was even counting the common or garden butterflies?

The realization that broadly distributed species are declining was brought home to me a few years ago when I was invited to give a keynote talk, at the Butterfly Conservation Symposium in England, on the status of butterflies in North America. It was a big topic and one where I felt I needed some feedback from colleagues to make sure that I covered it adequately. In preparing for the presentation, I asked a number of entomologists a series of questions, the last one being, "What is your take-home message about the status of butterflies in North America?" What amazed me was the similarity among the responses. The answer from Dr. Jaret Daniels of the University of Florida sums up the thinking of most of the scientists I queried: "There is no doubt that the rate of decline for at-risk butterfly populations continues to accelerate. . . . What should be most alarming to all of us is that this downward trend has now spilled over to include many previously more wide-ranging and common butterflies."

This precipitous decline is epitomized by the monarch butterfly (*Danaus plexippus*), whose population has fallen by over 70 percent across North America since monitoring efforts began in the mid-1990s. Another victim of this trend is the regal fritillary (*Speyeria idalia*), a striking butterfly that lives in the tallgrass and mixed-grass prairies of eastern and central North America. Historically it was found in thirty-two

U. S. states and the Canadian province of Manitoba, but now Kansas is the only place where it is apparently secure. NatureServe lists the regal fritillary as extirpated from Manitoba and fourteen states, and as critically imperiled, imperiled, or vulnerable in fifteen; the other two states in its historic range have not tracked it. And the regal fritillary is not the only prairie species that is in decline; whole groups of butterflies that rely on open grasslands, such as grass skippers, appear to be in trouble throughout the Midwest and Pacific Northwest.

One problem with determining the status of many species is that there are few long-term data sets that record butterfly numbers in the United States, but there are a couple that are worth noting. The first of these is an analysis by Greg Breed, Sharon Stichter, and Elizabeth Crone of two decades of observational data gathered by the Massachusetts Butterfly Club, compiled over the course of nearly twenty thousand one-day surveys covering a hundred butterfly species common in the state. The analysis revealed that the abundance of southerly distributed species increased while at the same time those species with a more northern distribution decreased. This finding corresponds with other climate studies demonstrating that butterfly populations may be moving northward and to higher elevations, but the study also showed something new: species that overwinter as eggs or as newly hatched larvae experienced greater declines than did those that overwinter at later stages.

The second investigation is ongoing and is now North America's longest-running butterfly study. Dr. Arthur Shapiro, a professor at the University of Califor-

nia at Davis, has been monitoring butterflies across northern California for nearly forty-five years. He began in 1972 with a single site near San Francisco, and over the next two decades added more sites; his regular transect now stretches from sea level on the San Francisco Bay to the crest of the Sierra Nevada near Lake Tahoe.

Dr. Shapiro and his colleagues, including Dr. Matthew Forister at the University of Nevada at Reno, monitor these sites every year, and though each of the locations is a natural or semi-natural area that has not been directly impacted by urban or agricultural development, they have found that butterflies are declining at every one of the sites. Their study shows that these changes are occurring across all butterflies: every family has species that are in decline. The data also revealed that population losses are more severe at lower elevations; consistent with the results of other studies, some butterfly species seem to be moving to higher elevations. One of the most interesting findings is that endemic butterfly species appear to be in only slightly more severe decline than more-wide-ranging butterflies. At one site, for example, the western pygmy-blue (*Brephidium exilis*), a small, relatively localized species, is showing a similar decline to the cabbage white (*Pieris rapae*), one of the most common butterflies in North America.

Across the board, the information we have leads to the conclusion that a huge number of butterfly species, including many that we would consider common, are indeed in decline. What is happening in our landscapes to cause such alarming change? Loss of habitat and habitat degradation are important

drivers. Urban landscapes increasingly displace natural ones, and those formerly green spaces that are not completely paved over are fragmented. For its part, agriculture favors fewer types of crops, leaves fewer edges unplowed or untrampled, and tolerates ever fewer “pests.” Insecticides and herbicides used on all of these landscapes directly kill both the butterflies and the plants that they rely on. The wild places that do remain suffer the effects of invasive species and climate uncertainty, as well as the destructive impacts of mining, logging, and other forms of resource extraction.

The fact is that we have created a fully human-dominated world, with devastating results for the other inhabitants of this planet, including butterflies and moths. But our lives would be greatly impoverished without these winged creatures. They are of vital importance to ecosystems, inspire poetry and art, provide livelihoods, offer a window into the natural world, and bring beauty into our cities and neighborhoods. We must do whatever we can to restore their populations to health.

The situation poses an enormous challenge, yet despite the biodiversity crisis unfolding all around us, we at the Xerces Society believe that butterflies and other animals can have a secure future. Continuing research is, of course, imperative, since the more we know the more effective we can be in our conservation efforts. There are a lot of data sets that can help answer these larger questions, but a coordinated effort must be made to compile and assess all of the data available.

Even so, we cannot wait until we have assembled “perfect” information to move forward, because by then it will





**Moths make up the larger portion of Lepidoptera. We know even less about how well they are faring in North America than we do about the state of butterflies. Photograph by Bryan E. Reynolds.**

be too late. We already know that the future health of the planet requires a thoughtful and sensitive reconciliation between the human environment and the more natural one. Policies that could accelerate that reconciliation are desperately needed; at the same time there is much that we can do, as individuals, while we as a society work for those policies to be enacted.

We must actively protect, enhance, and restore resilient habitats, in which both plants and butterflies can flourish. Many butterfly species require quality habitat connected by corridors to allow populations to move across the landscape; larger natural areas can serve as the anchors, but interstitial areas of habitat are vital if we hope to protect butterflies as well as other pollinators. We also need to reduce stressors, and in particular we must minimize the use of pesticides.

Farms, roadsides, and your own garden all have a critical role to play. Whether you live in California's Central Valley, upstate New York, or the panhandle of Texas, you can act right now to help save the earth's butterflies. Your efforts will support countless other creatures as well, from lady beetles to songbirds—and, in the end, humanity itself will be a major beneficiary of a more conservation-minded approach.

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*Scott Hoffman Black, executive director of the Xerces Society, has been involved with butterfly conservation for more than two decades. He serves as chair of the International Union for Conservation of Nature (IUCN) Butterfly Specialist Group and as co-chair of the Monarch Joint Venture, and his several awards include the U.S. Forest Service Wings Across the Americas 2012 Butterfly Conservation Award.*

# Gardening with Butterflies

*Matthew Shepherd*

I learned gardening at my mother's side, and I'll admit that at first I didn't really enjoy it. As she worked, my mum would leave piles of weeds and clippings; it was my job to clear them up and add them to the compost heap. Gradually, though, this became more than just a source of pocket money. I began to notice what was happening around me—how the plants grew, the changing blooms of different months, the birds, and, in particular, the butterflies. On my parents' bookshelves, I found a copy of Josef Moucha's *A Concise Guide in Colour: Butterflies*, and began to put names to what I was seeing: brimstone, peacock, small tortoiseshell, red admiral, painted lady. I was hooked.

Over time, I took a more active role in the garden, and when we moved to southern England and had a new garden I helped my mum select plants and extend the flower borders. In time, the garden was transformed. Imagine an English country garden—complete with a thatched cottage—and you have a pretty good picture of what this looked like. And it was not just beautiful: it was full of life.

In the years since then, I have planted and tended butterfly gardens around a succession of my own homes and have had the pleasure of working with schools and parks to design and create gardens, and I've discovered that the skills learned in one place can be adapted to new locations. I moved several more times in Britain and also lived in

East Africa and now in western Oregon, and have created butterfly-friendly gardens in each place.

At the core of any garden, of course, are plants. Butterfly gardens are no exception, although, rather than choosing plants based on their individual color or shape or whether they combine in a pleasing way, the choices are guided by additional considerations such as their nectar content, the degree to which they are regionally appropriate, or whether caterpillars will eat them. This is not to say that a butterfly garden will be unattractive to people—far from it. A garden full of nectar plants provides a beautiful backdrop for family barbecues and play dates, for graduation photographs and lazy summer afternoons.

When you start thinking about your own garden, one of the first pieces of information you'll need is an idea of which species of butterflies occur in your local area. You can then identify the host plants necessary for their caterpillars, which may be flowers, grasses, shrubs, or even trees; many of them will also be nectar plants. In addition, you will want to discover how your local butterflies survive winter—as eggs, caterpillars, pupae, or adults—which will guide you in deciding how you can provide for their entire life cycles. There are numerous good field guides and websites that can help with this, but also don't forget to spend time observing butterflies to see which plants they are using in your neighborhood.

Plan your flower plantings so as to create large blocks of color, because these tend to attract more butterflies. Their compound eyes are good at discerning color—although they don't see colors as we do—but not at picking out small details; a massed planting (such as a cluster of five or more of the same plants) creates a splash of color that butterflies will notice. They will potentially visit flowers of any hue, but generally prefer those that to us look white, yellow, pink, orange, red, or purple. Once butterflies find their way to your garden, additional flowers will give them reason to stay.

Incorporating a wide variety of flowers with different colors, shapes, and fragrances increases your chances of attracting the greatest number of species of butterflies and other flower visitors. Moreover, a successful butterfly garden will have nectar plants that bloom all across the growing season (which, in some warm climates, includes winter). The early spring or fall butterflies may not be so obvious, but providing for them can significantly boost the diversity of your garden. Potential components include spring-flowering shrubs such as wild lilac (*Ceanothus*), cherry (*Prunus*), hawthorn (*Crataegus*), and serviceberry



Ideally, the plants in a butterfly garden will be in a sunny location, and will offer a diversity of species for nectar as well as host plants to support caterpillars. Small gardens may not be able to offer everything, but every garden can contribute to making a neighborhood more welcoming for butterflies. Photograph by Penny Stowe.

(*Amelanchier*), and such fall-blooming nectar plants as asters (*Symphotrichum*), goldenrods (*Solidago*), and sunflowers (*Helianthus*).

Native plants support a wider range of butterflies and moths than do non-native species, particularly as caterpillar host plants, as clearly demonstrated by research done by Dr. Douglas Tallamy and his colleagues at the University of Delaware. Comparing the number of species of butterflies and moths that were supported by native plants vs. nonnative ones, Tallamy found an average of seventy-four species on native plants and only five on nonnatives. The abundance of butterflies and moths also differed, with an average 75 percent

reduction in numbers on nonnative plants compared to native plants. We shouldn't be too surprised; nonnative garden plants are often selected to be "pest-free," which means fewer biting and chewing insects, and those biters and chewers include butterfly caterpillars. (To get a deeper understanding of the importance of this consideration, read Dr. Tallamy's book, *Bringing Nature Home: How You Can Sustain Wildlife with Native Plants*.)

There is a place for nonnative plants in a garden, though, so if you are a lover of catmint or majoram or English lavender, don't despair. They can serve as good nectar sources, but, if you do plant nonnative species, please be care-



When planted to create a mass of color, flowers are more likely to attract butterflies—though maybe not as many swallowtails (*Papilio*) as shown in this garden on sweet Joe Pye weed (*Eutrochium purpureum*)! Photograph by Debbie Roos.



The right plants can support butterflies in shaded areas. Polydamas swallowtail (*Battus polydamas*) laying eggs on pipevine (*Aristolochia*). Photograph by Bob Wager.

ful never to use invasive species even if they attract butterflies. Lantana (*Lantana*) and purple butterfly bush (*Buddleja davidii*), for example, are two butterfly-attracting shrubs that are identified as noxious weeds in some states.

Butterflies are sun-loving insects. Good habitat tends to consist of open, sunny landscapes protected from strong winds, since butterflies need warm temperatures and sunshine in order to fly and forage. With this in mind, it is ideal to situate your butterfly garden in an area that receives six to eight hours of direct sunlight each day. If you have the option, establishing your garden on a southern exposure will maximize the amount of sun received. Still, although most butterflies (and their food plants) prefer sun, several butterfly plants tolerate full or partial shade, so you can take heart if your garden space does not get full sun. Larval host plants that

can grow satisfactorily in at least partial shade include broadleaf lupine (*Lupinus latifolius*), common blue violet (*Viola sororia*), Joe Pye weed (*Eutrochium*), and pipevine (*Aristolochia*).

One issue that wasn't a concern back when I was learning about gardening is the presence of pesticides in plants sold at garden centers. Driven by the demand for blemish-free stock, nurseries have increasingly employed a group of insecticides that act systemically. Systemic insecticides are absorbed by plants upon application and then distributed throughout plant tissues, sometimes making their way into pollen and nectar. While this provides long-lasting protection against such insect pests as aphids, it also makes the plants potentially toxic to bees, butterflies, and other beneficial insects that eat pollen, sip nectar, or feed on plant tissues. An additional step in the process of selecting



**Chrysalises of the monarch (*Danaus plexippus*). Photograph by Kenneth Setzer.**

plants, then, is to ask garden-center staff what their plants have been treated with, since you will not want to purchase plants that have been treated with systemics. Nurseries that grow their own stock, and native-plant nurseries in particular, will be in a better position to provide such details, while retail outlets may not have this information available. You should avoid buying plants from any source that cannot verify that they are free from systemic pesticides.

Butterflies need more than nectar sources and caterpillar food plants to survive an entire year. They also need areas in which to bask, secure places to pupate, and refuges in which to spend the winter or to seek cover during bad weather. As a result, my own garden does not look much like the ones in advertisements for hardware stores seen on

television: no uniform lawn or neat rows of brightly colored bedding plants, but instead much more diversity of structure and species. Shrubs provide shelter on rainy or breezy days and the chance of a hidden spot to pupate. They also offer different orientations with changing sun angles, and thus a variety of basking opportunities where insects can warm themselves. The corners and margins of my garden are places for brush piles or logs, serving as somewhere to heap raked-up leaves or store trimmed stems and creating just the kind of untidiness that supports the greatest garden biodiversity. It is also in these places that the newts and salamanders shelter, as well as native snails.

Some neighborhood associations and cities have regulations against weeds or poorly maintained yards, and the variety and profusion of a butterfly garden may seem inappropriate to those who prefer their landscapes to be more manicured. Surrounding your garden with tidy, distinct borders can help overcome such objections, as can visible statements such as the Xerces Society's "pollinator habitat" sign or the "butterfly garden" or "certified wildlife habitat" signs from the National Wildlife Federation. These help inform neighbors and others that the diverse native plant landscape you have created is thoughtfully maintained and cared for.

Butterflies are collectively in decline because of habitat loss, insecticide use, and climate change. Some of these issues might seem too great for a gardener to address, but every yard can contribute something toward building a more sustainable landscape while creating resilience in butterfly populations and strengthening their ability to overcome

threats. And indeed, butterflies are just a starting point. Once your garden is established, you'll notice that there are many other insects attracted to the flowers, as well as a host of other wildlife thriving in the healthy landscape.

The afternoons I spent helping my mother in the garden were the catalyst for what has become an abiding passion. Four decades later I still have that copy of *A Concise Guide in Colour*—with “Shepherd” in my mother’s neat handwriting inside the front cover—a direct connection to the roots of my personal gardening history. Butterfly gardening may once have been the preserve of a few enthusiasts, but it is now becoming more widespread, a movement

for change within our domestic landscapes. And it is immensely satisfying to see the results when, with a cup of tea in one hand and a book in the other, I find escape from the outside world amid the constant movement of flowers and brightly colored wings.

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*Matthew Shepherd is the Xerces Society’s communications director. He previously worked with the pollinator program and is a co-author of several Xerces books, including the newly released Gardening for Butterflies. Before joining Xerces, Matthew led community-based conservation programs in Britain and Kenya; he has gardened everywhere he has lived.*



The author’s garden includes an abundance of flowers that bloom sequentially from spring to fall. Its diverse structure provides shelter in different seasons, nurturing butterflies through their entire life cycle. Photograph by Matthew Shepherd.

# Conserving the Crystal Skipper, North Carolina's Newest Butterfly

*Allison Leidner*

Hugging North Carolina's Crystal Coast is a line of narrow barrier islands. The sheltered waters behind them are popular with boaters, and the beautiful beaches facing the Atlantic are well known to beachgoers, birdwatchers, and shell hunters, but what has gone unnoticed to most visitors is a small brown butterfly, a skipper, living among the sand dunes. Indeed, this butterfly was unknown until the late 1970s, when it was discovered by Dr. Eric Quinter.

How does someone find a new butterfly? One answer, which may amuse avid butterfly watchers, is this: when looking for something else. In 1978, Dr. Quinter was searching for a rare moth, when instead, at Fort Macon State Park, he came across a skipper with which he was unfamiliar. He collected specimens and brought them to the attention of Dr. John Burns, a colleague at the Smithsonian Institution's National Museum of Natural History. Although the skipper was placed in the genus *Atrytonopsis*, for a variety of reasons the naming process took quite some time, and it was only last November that it was officially described and named in the scientific literature. Publishing his findings in the *Journal of the Lepidopterists' Society*, Dr. Burns gave the skipper the species name of *quinteri*, in honor of its discoverer.

Notwithstanding this lack of an official identity, the butterfly did not go ignored in the four decades between

discovery and description. In the early 2000s, following a preliminary assessment of the skipper's status, the U.S. Fish and Wildlife Service asked North Carolina State University's Dr. Nick Haddad, an expert on rare butterflies, to conduct research on the skipper to better understand its natural history and habitat requirements. In 2004 I joined Dr. Haddad's laboratory as a doctoral candidate. He suggested that the then-still-unnamed skipper would be a good study species for testing questions about conservation strategies to ameliorate the effects of habitat fragmentation. After an initial field season, I was hooked on this butterfly, which I dubbed the "crystal skipper" because it is native to the Crystal Coast and has crystal-like white spots on its wings.

The crystal skipper has a tiny range, living only on a thirty-mile stretch of barrier islands along the southern side of Cape Lookout. The island vegetation is greatly influenced by the prevailing winds from the Atlantic, and because the islands in this section of the North Carolina coast face south, they support flora notably different from that of the state's other barrier islands, which face east. In particular, on these islands the dominant plant in the zone behind the primary dunes (the first dunes beyond the beach) is seaside little bluestem (*Schizachyrium littorale*), the host plant for the skipper's caterpillars.



At the east and west ends of this stretch of islands are state parks that are home to thousands of crystal skippers, which fly in two generations during distinct periods of spring (April–May) and summer (July–August). Standing in these parks, you might not guess that the skipper is rare, but these are the butterfly’s strongholds. In the land between the parks, the skipper persists only in little pockets: a handful of small nature reserves, “empty” lots, the unlandscaped yards of the islands’ older homes, and those places where houses are set back from the ocean far enough to allow healthy sand-dune vegetation. The total number of adults flying in a given generation is likely fewer than ten thousand—a tiny number for any animal, especially an insect.

Over the course of four years, I used a combination of field and genetic techniques to look at the effects on the

crystal skipper of habitat fragmentation caused by beachside development, with an eye toward identifying conservation strategies. Two hundred years ago, skipper populations were separated from each other only by such natural barriers as ocean inlets and maritime forests. If a hurricane or other event wiped out any given population, the area could be naturally repopulated by butterflies flying in from elsewhere along the coast. But what now? Those butterflies wandering down the dune line might turn around upon encountering parking lots or manicured lawns devoid of dune grasses, or could get killed by passing cars, or might just run out of energy when looking for the next patch of dune grass.

My research focused on three questions: Would crystal skippers leave sand dunes and fly through unfamiliar areas? If they did leave their habitat, how far would they fly? And, finally, if they did



Given the common name “crystal skipper” by the author in the mid-2000s, this butterfly did not gain an official name—*Atrytonopsis quinteri*—until last year, nearly four decades after it was discovered. Photograph by Allison Leidner.



**A thirty-mile stretch of barrier islands fringing North Carolina’s coast is the only known home of the crystal skipper. Increasing development is fragmenting the butterfly’s habitat. Photograph by Allison Leidner.**

make it to a new area, would they be able to reproduce successfully? Perhaps all of this questioning is a fancy way of asking: “Would the butterfly cross the road? And if it did, would it survive on the other side?”

Whereas a researcher in a laboratory based study has the ability to manage the various aspects of an artificial environment, working in the field under the constraints imposed by the arrangement of natural vegetation and housing developments meant that it was impossible to systematically control all variables. Therefore, I employed three research techniques: observations of the behavior of skippers at the edges of their natural habitats and other landscape types, mark-and-recapture study, and population genetics analysis. Combin-

ing methods made it possible to piece together the effects on the skipper of fragmentation in the landscape where it lives, with the added benefit of accommodating a realistic time frame and the limited budget of a PhD student. This work was partially supported by a DeWind Award from the Xerces Society.

What did the research reveal with regard to the crystal skipper? For the edge-behavior observations, crystal skippers were captured and then released at the margins of their sand dune habitat, where they encountered areas such as parking lots, the beach, housing developments, and maritime forest. In this way, I could determine whether skippers would even leave their sand dune habitat. As it turned out, they would—flying into developed areas

and maritime forest, though only infrequently out over beach and ocean.

The mark-recapture study was done using the tried-and-true method of writing numbers on the wings of butterflies with a Sharpie marker and then seeing where they go. (Contrary to how it might seem, when done carefully this marking procedure does not harm the butterfly). I set up pairs of marking locations, each separated by a quarter of a mile (0.4 kilometer) of continuous sand dune habitat, lower-intensity urban development, or higher-intensity urban development. From the edge-behavior studies, I knew that skippers would fly into developed areas, and this study confirmed that they would travel at least a quarter of a mile. We even found skippers that moved more than a mile (1.6 kilometers) in just a few days.

Finally, studying the population genetics of the skippers made it possible

to infer whether they move over many miles of urban development, maritime forest, or ocean, and then whether they reproduce within the populations to which they moved. During the study, allele frequencies were estimated from samples collected along the barrier islands, which showed similarities among sample locations. Skipper populations with greater dispersal—that is, those that exchange more individuals—will have greater genetic similarity. We found that maritime forest and ocean inlets were barriers to dispersal (preventing individuals from being exchanged among populations), whereas the current distribution and intensity of development was not.

Each of these studies individually points in a similar direction, but taken together they provide clear evidence of the importance of stepping stones of habitat—disconnected patches scat-



The author marked and released butterflies to see whether they would fly across developed areas. They would, for at least a quarter of a mile. Photograph by Allison Leidner.

tered across the islands—in areas where continuous corridors of habitat no longer exist. The edge-behavior study showed that butterflies flew into both urban areas and maritime forest, but the genetic studies indicated that forest, although not urban areas, was a barrier. Why this difference? Unlike the long continuous stretches of maritime forest, urban development does include small patches of habitat with host plants and nectar sources. However, if development intensifies to the point where there are no empty housing lots or natural landscaping in residential yards and the gaps between suitable habitat therefore grow too great, movement of skippers among populations could decline to low levels.

This information readily translates to a conservation strategy for the skip-

per. Existing protected areas provide relatively large areas of habitat and support robust skipper populations. To increase resilience in the face of storms or other disturbances, there need to be sufficiently large patches of healthy habitat scattered throughout the islands. To this end, home and business owners can retain native vegetation as landscaping and plant native nectar sources. Additionally, it will be important to manage or eradicate invasive species, such as beach vitex (*Vitex rotundifolia*), which can take over sand dunes and overwhelm the seaside little bluestem.

Habitat restoration and creation are also critical. The Army Corps of Engineers dredges shipping channels and maintains access to ports in the region, with the result that a number of islands that were once wetlands are now filled with dredge spoil. Since these areas will not be restored back to marshes, planting seaside little bluestem to make them favorable for the crystal skipper offers some benefit. Staff at the Rachel Carson Reserve (which is within the North Carolina Coastal Reserve and the National Estuarine Research Reserve) planted seaside little bluestem on an infilled wetland in 2008 and expanded the planted area in 2011. Crystal skippers are now found at this location as well as in an area on the western edge of the reserve where seaside little bluestem naturally colonized dredge spoil. Similar grass-planting efforts could be promoted on barrier islands. Additionally, there is an increasing interest in using natural methods to protect coastal development from storms, particularly in the face of climate change and the associated rise in sea level, and towns along the North Carolina coast are planting dune grass-



The crystal skipper completes two generations in a year. Adults may be seen during spring and again in summer. Photograph by Allison Leidner.



**The skipper's host plant grows in a narrow strip behind the main line of dunes. Although this is prime real estate, adequate habitat may remain when houses are set back from the beach. Photograph by Allison Leidner.**

es to facilitate the formation of dunes at the back of the beach. Behind those dunes, seaside little bluestem could be planted to support skippers.

It may have taken scientists forty years to name *Atrytonopsis quinteri*, but local residents quickly connected with this unassuming butterfly. They take pride in the fact that they share their islands with a unique species and many of them support conservation efforts on its behalf. One of the most rewarding aspects of my involvement in those efforts has been a children's science camp that I helped initiate in collaboration with the Rachel Carson Reserve and the North Carolina Maritime Museum. For three summers now, we have run a three-day class for middle-school students on coastal conservation that in-

cludes modules on the crystal skipper. Taking kids out to see "their" species really brings home how and why conservation is important and illustrates the ways in which local actions can make a difference. And when I watch these kids talk to their parents after class, I know we have gained new ambassadors for the crystal skipper and the conservation of its coastal habitat.

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*Dr. Allison Leidner is a conservation biologist in NASA's Earth Science Division through a cooperative agreement with the Universities Space Research Association, where she works on issues of climate change and biodiversity. She received a DeWind Award from the Xerces Society to support her PhD studies on the crystal skipper.*

## Butterfly Conservation

It could be said that Britain is the home of butterfly conservation. The country boasts a long history of naturalists, including John Ray, who in the late seventeenth century was the first person to describe the complete life cycle of butterflies and moths. It may also lay claim to the first nature reserves established to protect butterflies—Wickham Fen and Woodwalton Fen—and almost certainly to the first organization dedicated to them, the Committee for the Protection of British Lepidoptera, established in 1925 (and chaired by Lord Walter Rothschild, whose niece, Miriam Rothschild, would become a pioneer in butterfly gardening and the use of native plants).

Britain is also the home of Butterfly Conservation, a nonprofit organization that, for nearly half a century, has been the most influential voice protecting British butterflies and moths. Formed in 1968 by a group of naturalists alarmed by the noticeable decline in butterfly populations, Butterfly Conservation now has a staff of more than seventy people across England, Wales, Scotland, and Northern Ireland. Its work spans direct conservation, advocacy, education, and research.

In a country that has such a long interest in nature, it should be no surprise that Butterfly Conservation enjoys broad public support, with a membership of more than twenty-eight thousand. It has also attracted the endorsement of such well-known individuals as Sir David Attenborough, who serves

as the organization's president and who has brought much well-deserved attention to the group's endeavors.

Butterfly Conservation members can participate through a network of thirty-two volunteer-run local branches, which organize a broad range of public events, such as butterfly walks, moth nights, and habitat-conservation days. Members of the local branches include expert and enthusiastic naturalists who join in monitoring programs for butterflies and moths, thus strengthening the organization's scientific base.

Among Butterfly Conservation's array of programs are four that are particularly noteworthy. The United Kingdom Butterfly Monitoring Scheme has been running since 1976, and now has more than a thousand regularly monitored sites. The distribution survey of Butterflies for the New Millennium contains more than ten million records, while that of the National Moth Recording Scheme has more than twenty million. And then there's the Big Butterfly Count, which truly is *big*: more than forty-five thousand people participated last summer, counting nearly six hundred thousand butterflies.

Butterfly Conservation manages thirty-five nature reserves in which it protects nearly two thousand acres (eight hundred hectares) of prime butterfly and moth habitat. With the participation of its local branch members and through collaboration with landowners and a variety of organizations,

the group is engaged in hundreds of projects to conserve particular species of at-risk butterflies and moths. Working with Natural England and other partners, for example, Butterfly Conservation has restored habitat and reintroduced the marsh fritillary (*Euphydryas aurinia*) on eight sites in the county of Cumbria in northwest England, reviving the butterfly from a single record in 2007 to more than two thousand today.

Butterfly Conservation also seeks to change habits and policies through education and advocacy. It works with schools to present classroom activities and plant butterfly gardens, and engages the public through various channels online, in the media, and in print materials. At the national level, Butterfly Conservation is working to ensure that agricultural-support programs and national strategies around wildlife and

pollinators pay proper attention to the needs of butterflies and moths.

And Butterfly Conservation reaches across borders, joining with partners in European countries to build a greater conservation effort throughout the continent. In particular, it is sharing its hard-won expertise in monitoring; there are now similar programs established in twenty-two countries, building a stronger case for conservation and informing policies continent-wide. Further extending the organization's impact, its Butterfly Symposium attracts hundreds of participants and a slate of speakers from across the world (including Xerces' executive director Scott Hoffman Black in 2011 and 2014).

There is no doubt that Britain's butterflies and moths face great challenges, but Butterfly Conservation is standing strong and working hard on their behalf.



Schoolchildren from Chard in southern England discover the wonders of the moth trap as part of one of Butterfly Conservation's education projects, Munching Caterpillars. Photograph by Richard Lucas.

# INVERTEBRATE NOTES

## Recent Research

Every month, it seems, new research is published that adds to our understanding of insects and how we can help them—or just makes us stop in our tracks and say, “Wow, invertebrates are amazing!”

Work done in Switzerland by Dr. Matthias Tschumi and colleagues demonstrates the value of planting wildflowers on farmland to support beneficial insects. The researchers studied the presence and impact of cereal leaf beetle in a number of wheat fields, half of which were bordered by planted wildflower strips, the other half by another crop. Scientists found 66 percent fewer beetle

larvae and a 40 percent reduction in crop damage near the flower strips compared with the fields bordered by another crop. This difference was attributed to the presence of beneficial predators attracted to the flowers. The study was published in *Agriculture, Ecosystems and Environment*. (See <http://bit.ly/24N6eVj>.)

The importance of keeping insecticides out of wildflower strips and other habitat was underscored by research done in Colorado by a team of U.S. Geological Survey scientists led by Dr. Michelle Hladik. Bees collected from farm fields and grasslands were tested



New research shows the value of flowering habitat near crop fields to support beneficial insects that help with pest control and pollination, and also demonstrates the importance of protecting such areas from pesticides. Photograph by Don Keirstead, New Hampshire NRCS.



for 122 different pesticides, as well as for more than a dozen additional chemicals produced when pesticides break down. Nineteen pesticides or break-down products were found in the samples, with as many as nine chemicals in a single sample. The most commonly found pesticide was thiamethoxam, a neonicotinoid, which was detected in 46 percent of samples. From their findings, the researchers suggest that bees living in areas with more agricultural fields suffer greater exposure to pesticides than do bees in a landscape with more habitat. The research was published in *Science of the Total Environment*. (See <http://on.doi.gov/1RPnNNf>.)

## New Books

There are some stellar academic tomes on bees (such as Charles D. Michener's *The Bees of the World*) that detail their biology, and some excellent and accessible field guides (*Kaufman Field Guide to Insects of North America*, for example) that will help you identify many of the bees you encounter, but there has been nothing that combines the best of both. *The Bees in Your Backyard: A Guide to North America's Bees*, by Joseph S. Wilson and Olivia Messinger Carril (Princeton, 2015), fills that gap. This excellent book provides a full description of bees' biology and comprehensive accounts of the different genera, presented in an engaging style and illustrated with great photographs—a thoroughly good read that is worth every penny!

Once you get to know the bees in your backyard, you'll no doubt want to know more about gardening for them. Our towns and cities are disturbed environments in which nature has largely

And in the “wow” category: Tardigrades (also called water bears) were revived after being frozen for thirty years! In 1983, scientists from Japan's National Institute of Polar Research collected moss samples in Antarctica; the samples included two tardigrades and an egg. The samples were already frozen and remained so during the rest of the field expedition and in a freezer in the lab.

When, in 2014, the samples were defrosted, both of the tardigrades revived and one subsequently laid eggs, which hatched. The single frozen egg also hatched—and that tardigrade in turn laid eggs that successfully hatched. (See <http://bit.ly/1W4EZ2B>.)

been pushed to the margins. In these man-made landscapes, garden designers are likely to treat plants as objects to be placed according to the color and shape of the blooms or the form and texture of foliage. In *Planting in a Post-Wild World: Designing Plant Communities for Resilient Landscapes* (Timber Press, 2015), Thomas Rainer and Claudia West present an alternative perspective, designing planting plans to provide ecological function and thereby create low-maintenance landscapes. There is no doubt that native plants are better for native insects, but Rainer and West make good arguments for mixing in appropriate non-native species as part of a coherent plant community that will be better suited to the location, requiring less maintenance or irrigation and suffering fewer pest or disease problems. Following their suggestions, we can create gardens that help bridge the gap between natural and artificial and support more wildlife.

## STAFF PROFILE

### Sarina Jepsen, Endangered Species and Aquatic Programs Director

*What got you interested in invertebrates?* I grew up in rural western Oregon, spending a lot of time outside. I used to collect various things that I found, including insects. I've always been interested in both art and science, and find inspiration in wild, outdoor spaces. In high school, I spent a couple of summers working for the Northwest Youth Corps, living outside, taking environmental education courses, and building trails. I became really interested in ecology and conservation during that time.

*How did you hear of the Xerces Society?* While studying entomology as a graduate student at the University of California at Davis, I heard Claire Kremen give a talk about her research on the economic value of pollination from native bees that thrived in wild habitat adjacent to farms in Central California. I found the research—and the economic arguments for conservation—compelling, and met with her afterward. When I expressed an interest in working to communicate research like hers to growers and others who could benefit from it, she told me about the Xerces Society. Within a few months, I had joined Xerces, read the entire *Pollinator Conservation Handbook*, and began doing volunteer work for the pollinator program.

*What made you want to work here?* I was excited to find a conservation organization that focuses on insects, and that takes an evidence-based approach to conservation. I appreciated that Xerces



was—and is—an organization of scientists who engage in advocacy.

*What's the best thing about your job?* I work with incredible people, and I love being able to work on a variety of conservation issues in many different areas of the country.

*What book are you currently reading?* I just started *The Book of Unknown Americans* by Cristina Henríquez, which is the Multnomah County Library's current "Everybody Reads" selection.

*What do you do to relax?* I like to paint, go for walks, run, and soak in hot pools.

*What music do you have on your iPod?* A random assortment that I'm not sure how to characterize simply. A few of my favorite genres include country prior to about 1980, classical (especially stringed instruments: I'm a huge fan of cello music), and American folk music.

## Xerces' New Book: *Gardening for Butterflies*

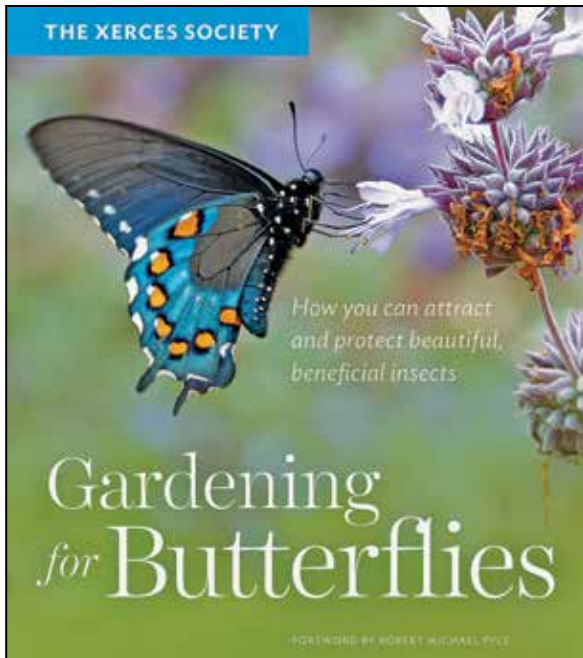
The Xerces Society is proud to announce our latest book, *Gardening for Butterflies: How You Can Attract and Protect Beautiful, Beneficial Insects*. It was released this spring by Timber Press, a publisher of books on gardening and natural history.

*Gardening for Butterflies* starts from the premise that every gardener can help create an ideal landscape for butterflies, and from there leads the reader through understanding what butterflies need and how to provide for them. The book is divided into sections that describe the natural history of butterflies and moths, detail their habitat requirements, and explain the practical steps to

design, install, and maintain a butterfly garden. The book also goes beyond the garden fence, with notes on ways to nurture butterflies in a range of environments such as parks, farms, corporate campuses, roadsides, and green roofs.

The design chapters contain lists of plant recommendations for different regions, and the chapter "Butterfly Plants of North America" offers illustrated profiles of more than a hundred plants that will provide nectar for adult butterflies and the nourishment that is essential for caterpillars.

Robert Michael Pyle, in his foreword, has this to say: "No matter your



starting point, this essential and welcome book will help you bring about the garden you desire—for the butterflies, for yourself, and for the earth.”

The pages of *Gardening for Butterflies* are enriched by more than 270 lovely photographs and several illustrations

of gardens. We are grateful to the many photographers who graciously allowed us to use their images.

You can buy *Gardening for Butterflies* from us via our website or over the telephone, but you’ll also find the book at bookstores and online retailers.

## The DeWind Award: Investing in the Future of Conservation

Our conservation and advocacy efforts have always been rooted in science, drawing from the work of university researchers to inform projects and guide our actions. As part of our commitment to supporting the work of scientists, the Xerces Society each year grants two Joan Mosenthal DeWind Awards to students engaged in research that will advance butterfly and moth conservation in the course of leading to a degree. It gives us great pleasure to announce the recipients for the 2016 awards.

Paola Olaya-Arenas, a PhD student at Purdue University, received her award to support her project investigating the

exposure of milkweed plants to neonicotinoid insecticides when growing in close proximity to agricultural fields, and evaluating the effect of this exposure on monarch butterflies.

The second recipient is Cameron Thomas, an MS student at Washington State University’s Vancouver campus. He is studying ant tending of Fender’s blue caterpillars and will measure the associated biotic and abiotic factors. Cameron intends for his work to inform habitat restoration efforts and vegetation management to benefit this federally protected butterfly.

Congratulations to them both!

## Signs of Hope for the Monarch Butterfly?

With the California population of overwintering monarch butterflies having declined 74 percent since the late 1990s, each winter finds us eagerly awaiting reports of how they are faring. During a three-week period centered on Thanksgiving, volunteers with the Xerces Society’s Western Monarch Thanksgiving Count fan out to the overwintering sites along the California coast to count how many monarchs have migrated there.

Smaller and less well known than the overwintering sites in Mexico, California’s sites play host to monarchs from across the western United States and

southern Canada. This year, more than a hundred Thanksgiving Count participants visited 188 sites, at which they tallied more than 292,000 monarchs. The fact that this is more butterflies than were counted last year gives us cautious optimism about the future, although the average number of monarchs per site has not grown significantly.

There are other positive signs. Notably, the fifteen sites that have been continuously monitored every year since 1997 had the highest numbers of butterflies in a decade; there were several sites, such as Berkeley’s Aquatic Park, that



The Xerces Society's most recent count of monarchs overwintering in California tallied some 292,000 butterflies. Photograph by Carly Voight.

hosted overwintering monarchs for the first time; and still other sites were occupied that had not seen monarchs for years. In Marin County, in the northern extent of the overwintering range, two new sites each supported more than eight thousand butterflies.

Mexico has also seen an increase in the number of overwintering monarchs, according to the World Wildlife Fund Mexico. The estimate of 150 million butterflies is an increase from the last two years (the two lowest years on record) but still far below a number that most scientists consider sustainable. Unlike the California count, the data in Mexico are based on a measurement of the area of forest occupied by butterflies in the sanctuaries. Four hectares (ten acres) were occupied this year; researchers estimate that there are approximately 37.5 million monarchs per hectare.

The population in Mexico was expected to be up this winter due to good

spring and summer weather conditions in the monarch's U.S. and Canadian breeding areas. Although the higher population figure is very good news, the number of butterflies is still well below the target of 225 million monarchs overwintering in Mexico set by the U.S. Fish and Wildlife Service. The fragility of the monarch population was underscored when a winter storm hit the overwintering sites in mid-March of this year. The impact of this is not yet clear because the butterflies had begun leaving the sanctuaries, but it is estimated that millions of monarchs still at the sites died.

Despite the better population numbers for this winter, the monarch continues to face threats and is far from secure. One good year does not equal recovery, and there is much work that needs to be done to protect overwintering sites, improve milkweed availability, and expand habitat in the butterfly's breeding areas.

## The Island Marble Butterfly: Slipping Towards Extinction

The U. S. Fish and Wildlife Service announced in early April that the island marble butterfly (*Euchloe ausonides insulanus*) is in danger of extinction, but protection under the Endangered Species Act is “precluded by higher priority listing actions.” We are very disappointed by this decision. After a decade of falling numbers, this butterfly survives at only one site and has a population of just a few hundred individuals. It is not clear what would be a higher priority.

The Xerces Society has been working to save the island marble for fifteen years. In December 2002, the Society was joined by the Center for Biological Diversity, Friends of the San Juans, and

the Northwest Ecosystem Alliance in submitting a petition requesting protection. That petition was denied four years later, although the threats facing the island marble remained.

The butterfly’s population continued to decline as it disappeared from site after site in Washington state’s San Juan Islands, leading Xerces to submit a second ESA petition in August 2012. In its response to that petition, the USFWS stated that the butterfly is “in danger of extinction or likely to become so in the foreseeable future.” Despite these dire circumstances, the agency declined to provide the island marble with the protection that it deserves.

## Sharing Knowledge Through Public Events

Late winter, when many farming conferences are held, is a busy time for our pollinator conservation program. A highlight this year was program co-director

Eric Lee-Mäder presenting a keynote address at the 2016 MOSES (Midwest Organic and Sustainable Education Service) conference, the largest organic farming event in the United States. More than three thousand people were at the La Crosse Center in Wisconsin to hear Eric talk about the intersection of farming and wildlife conservation. His keynote can be seen on YouTube, at <http://bit.ly/23FRvdi>.

During the coming months, Xerces staff will lead many different events. Our day-long pollinator conservation short course continues to be highly popular; dates have already been set in Colorado, Pennsylvania, and Vermont this summer, and more will be added. In recent years, funding for our short courses has come from SARE, the Sustainable Agriculture Research and Education program of the U. S. Department



The Xerces Society is launching a series of short courses on creating habitat to attract beneficial insects such as lady beetles. Photograph by Sarah Foltz Jordan.

of Agriculture. The pollinator courses have been so well received that the Xerces Society was honored to be the only organization ever to get grants from all four SARE regions. Remarkably, this has now occurred twice, and each of the four SARE regions are funding a new series of short courses on conservation biocontrol. These will cover the natural history of beneficial insects, along with ways to employ them effectively as part

of a strategy for managing crop pests. Conservation biocontrol short courses are planned in Illinois and Vermont, with more to be added.

Information about these and other events can be found on the events page of our website ([www.xerces.org/event](http://www.xerces.org/event)); we also post details on our Facebook page. Alternatively, you can get registration information by telephoning our office at 855-232-6639.

## Planned Giving, Your Legacy for Invertebrates

A charitable bequest is one of the simplest ways to provide continuing support to the Xerces Society beyond your lifetime. Your gift will have a lasting impact on the conservation of essential invertebrates and help preserve these creatures for future generations.

We highly recommend that you discuss your planned giving options

with your financial or legal advisor in order to choose a gift that works best for you and your family. If you have questions or would like to inform us of your plans, please complete our online planned giving form at [www.xerces.org/donate/planned-giving](http://www.xerces.org/donate/planned-giving), send an email to [suzanne@xerces.org](mailto:suzanne@xerces.org), or call us at 855-232-6639.

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For information about membership and to learn about our conservation programs for native pollinators, endangered species, and aquatic invertebrates, as well as our efforts to reduce the impacts of pesticides, contact us:

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The vibrant colors and spectacular markings of the peacock (*Aglais io*) suggest a creature from a tropical forest—but no, this butterfly can be found in temperate regions of Europe and Asia. A common and much-loved visitor to gardens, it lays its eggs on its caterpillar host plant, the common nettle (*Urtica dioica*). Photograph by Tony Hisgett, Flickr/CC2-BY.

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On the cover: Although a great deal of effort is put into protecting rare species of butterflies, it is becoming increasingly obvious that even common and widespread species are in decline and need conservation efforts. The regal fritillary (*Speyeria idalia*), shown here drinking nectar from common milkweed (*Asclepias syriaca*), is a broadly distributed species whose numbers have fallen dramatically. Photograph by Bryan E. Reynolds.