WINGS

ESSAYS ON INVERTEBRATE CONSERVATION

THE XERCES SOCIETY SPRING 2024

CONTENTS

There seems to be a constant flow of bad news about environmental losses and declining wildlife populations. But there are also individuals and organizations working to create positive change, helping to turn the tide and bringing hope for the future.

Planting Habitat as an Act of Hope

Scott Black

Working as a conservationist can be depressing. Following the latest research on species declines or climate change is vital for understanding the threats we have to overcome, so that we and our collaborators can find ways to advance conservation—but it can sometimes make me feel pretty gloomy. If I am not careful, I can get burned out and demoralized by what I read and see.

One way I lift myself in the face of such information is to focus on possible solutions. I have been working in conservation since I was seventeen. My first involvement was knocking on doors to help an effort to stop construction of a dam in Nebraska near where I grew up. Ultimately, that campaign was successful and the Niobrara is still a free-flowing and much-loved Wild and Scenic River. Although I played a very small part, it still makes me feel good that I contributed—if only a little bit—to that success.

Since then I have worked with several nonprofits and have played a bigger part in some substantial successes, but action can be at any scale: a new garden planted for pollinators is as important as creating acres of habitat on a farm. It is the act of caring for nature that is essential, and no matter what you do, you should celebrate what you have done.

A few years ago, I co-authored an article published in *Conservation Science and Practice* titled "Declines in insect abundance and diversity: We know enough to act now." My co-authors and

Natural landscapes can be created in places with enough space, but nowhere, even a tiny city garden or deck, is too small to offer some opportunities for habitat.Photograph by Bryan E. Reynolds.

Soldier fly foraging on fleabane. Photograph by Bryan E. Reynolds.

I made the case that while further research is helpful, we don't need to wait for more studies to be done: we already have enough information to address the crisis of insect declines. We also noted that action is required in all landscapes from natural areas to farms, and from inner cities to roadsides; and by all sectors of society—researchers and community scientists, land managers and farmers, gardeners and park managers, policy makers and agencies, and more. There is something that all of us can do.

I recognize that these issues can seem overwhelming, which is why the article highlighted efforts that we know have worked or are working. Protecting and managing high-quality habitat, for example, helps increase the diversity and abundance of insects, as does minimizing pesticide impacts. This certainly works for large-scale restoration of natural areas, as well as on farms and roadsides, and I know from personal experience that it also works in gardens.

When my family moved into our house nine years ago, the garden was largely lawn and non-native plants that provided little for wildlife. We reduced the area of grass and replaced plants with others that we knew would provide pollen and nectar or serve as host plants for caterpillars. We created areas in our garden where insects can nest, overwinter, and live out all of their life stages. We also leave the seeds heads on the flowers for a variety of birds to feast upon to fatten up for the winter. And, of course, we do not use any pesticides.

Thanks to these changes, our yard has become a magnet for wildlife. Our little space is providing for scores of species of insects and birds throughout their life cycle. And it's not only helping them: we also grow food for ourselves. Raspberries, blueberries, and apples provide for pollinators when blooming, and give us a reliable harvest—some of which we share with the birds whether we want to or not!

I often sit among the plants to enjoy their beauty and the many insects that are buzzing around. Research shows that time spent in nature, even in small, seemingly mundane spaces like your garden or a park, can help lower blood pressure, aid relaxation, and improve our mental health. I believe this is doubly so for me in places that I have helped to protect and restore.

There *is* hope, despite what we see in the news. Insects are resilient, and we know that protecting and managing high-quality habitat can quickly produce positive outcomes for insect populations, sometimes within a few years, on a time scale that means we will see the difference. Whether you are caring for a natural area, running a farm, or tending a backyard, your work will show almost immediate returns. Plant the plants and the insects will come, which helps us all.

Fender's Blue on a Flight to Recovery

Cheryl Schultz and Michele Collins

With a wingspan of less than an inch and a half (four centimeters) and looking like a flake of sapphire-hued summer sky that has fallen to earth, Fender's blue butterfly (*Icarica* [=*Plebejus*] *icarioides fenderi*) is endemic to prairies in Oregon's Willamette Valley. It was first recorded in the 1920s but then apparently disappeared. The butterfly wasn't seen for decades and was thought to have gone extinct—until being rediscovered in 1989. Despite its prairie habitat having been lost to agriculture and development, the small butterfly had somehow held on for half a century in the fringes around farmland and vineyards.

In the years after its rediscovery, both the Fender's blue and its prairie habitat were scarce. The butterfly's population was estimated to be as low as eleven hundred in the 1990s, and just a fraction of 1 percent of the prairies' previous extent remained. Compounding this, Fender's blue females lay eggs on only a couple of types of perennial lupine—primarily Kincaid's lupine (*Lupinus oreganus*), which itself was uncommon, and, occasionally, spur lupine (*L. arbustus*). The perilous status of the butterfly's population led, in 2000, to Fender's blue being listed as "endangered" under the Endangered Species Act; Kincaid's lupine was listed as "threatened" at the same time. What has happened in the years since then is quite remarkable: a butterfly once

Both Fender's blue butterfly and the lupines on which it lays its eggs are rare, and both have benefited from a quarter century of conservation. Photograph by Cheryl Schultz.

considered extinct rebounded. It now has thriving populations amounting to nearly thirty thousand individuals, and, in early 2023, it was downlisted (a rather neutral word for such a major triumph) to "threatened."

This reversal of its fortunes has been thanks to the hard work and partnership of many people. The steps to recover Fender's blue required patience and a commitment to understanding the biology of the butterfly in the context of potential conservation actions; it also needed community engagement to build support for the butterfly and create strong partnerships among agencies, nonprofit organizations, and private individuals. Almost thirty years of teamwork resulted in a victory for the Fender's blue, demonstrating that translating science into application, policy, and action is effective.

The authors are proud to have played a central role in this success. Cheryl Schultz is now a professor at Washington State University, and Michele "Mikki" Collins is a biologist at the U.S. Fish and Wildlife Service. For more than two decades we have worked with landowners, organizations, and agencies to recover Fender's blue. This is the story of how our collaboration and the greater partnership resulted in the first successful butterfly recovery under the Endangered Species Act.

Cheryl started working with Fender's blue in 1993, as a graduate student at the University of Washington. The ecological question that motivated her research was, "Will corridors work?" At that time the idea of corridors connecting together small fragments of habitat was a hot topic in academic conservation biology, but the concept had rarely

Cheryl Schultz surveying for butterflies on Kincaid's lupine. The work of Schultz and coauthor Mikki Collins has been key to the ongoing recovery of Fender's blue. Photograph courtesy Cheryl Schultz.

been investigated in terms of how animals might actually perceive and make use of such pathways. Cheryl learned that corridors had already been mapped across the southern Willamette Valley, which would create connections between the Nature Conservancy's Willow Creek Preserve and prairie remnants a mile or two away that were variously owned and managed by the City of Eugene, the Bureau of Land Management, and the Army Corps of Engineers. Each of these areas supported small, fragmented populations of the newly rediscovered Fender's blue.

Although she'd never before held a butterfly net, Cheryl focused on understanding the Fender's blue's dispersal behavior across the array of potential habitat. She concluded that a "stepping stone" mosaic of habitat would promote its movement throughout the landscape. This idea was set against the backdrop of the West Eugene Wetlands Plan, a landmark partnership of public agencies and private landowners to advance wetland conservation in the local area. As Cheryl progressed with graduate work, one of her key aims was to develop a set of projects to address questions about the butterfly that could be put into action in the context of the West Eugene Wetlands Plan. These questions were also the backbone of what would later become the recovery plan for Fender's blue, and would be used to set recovery criteria to guide conservation actions over the following decades.

Mikki became the USFWS lead biologist for the butterfly in 2003, just as the agency needed to respond to a court-ordered deadline to delineate critical habitat for the species. Steve Smith, at that time a private-lands biologist with

Research into its ecology, bolstered by local knowledge, provided the foundation for the recovery of Fender's blue. Photograph by Cheryl Schultz.

the USFWS and the coordinator for the Willamette Valley Partners for Fish and Wildlife Program (aka the "Partners Program"), took Mikki under his wing. He started by bringing her to see habitat-restoration projects undertaken by the Benton County parks department, teaching her about working with private landowners, and driving home the fact of how central such collaboration is to recovering endangered species in the Willamette Valley. This local knowledge was essential when Mikki worked with Partners Program biologists Jarod Jebousek and Chris Seal to collect accurate information on where Fender's blue occurred. That project established the foundation of a partnership among this group of biologists that persists today.

Cheryl and Mikki began working together when Mikki set out to tackle the problem of designating critical habitat. Cheryl's decade of research, combined with the information about

Ants gather honeydew secreted by a Fender's blue caterpillar, and in return they protect it from predators. Photograph by Cheryl Schultz.

butterfly occurrence, enabled Mikki to identify critical habitat quite quickly. This first collaboration led into a decade of developing new approaches to recovery planning that were grounded in science and that would succeed in the real-world mosaic of public and private lands in the Willamette Valley. Much of this was presented in an article, "Using ecological theory to develop recovery criteria for an endangered butterfly," published by Cheryl and her long-time research collaborator Elizabeth Crone in the *Journal of Applied Ecology* in 2015. In the article, they showed how scientific and experimental questions can be constructed in a manner that enables agencies to develop recovery criteria that are supported by research and theory and at the same time are achievable within the local and regional context.

For example, Fender's blue recovery calls for three regional networks of butterflies, spanning its historical distribution. An assessment known as population viability analysis provides theoretical justification for having multiple independent populations, but the decision for three—as opposed to, say, two or five or six—was largely based on the locations of known populations, existing local planning units, landowner knowledge, and expert opinion that at least this number is necessary to spread the risk across the range. This target, although based on the theoretical estimate of average population size needed to effect recovery, seemed like an unachievable hurdle to land managers. Together, Cheryl and Elizabeth reframed the conversation to focus on the number of butterflies needed for each network (a minimum of a thousand butterflies counted each year) and a time span (ten consecutive years), with the understanding that insect populations are highly dynamic ("bouncy") from year to year.

There was also concern about how much land would be needed for this many butterflies—a worry that was likely colored by land managers' experience of working with larger animals. Instead of a vast requirement that would make it challenging to motivate participation by private landowners, Cheryl and Elizabeth could say with confidence that individual sites within the regional networks needed to be about fifteen acres (six hectares) of high-quality prairie. The Partners Program biologists reacted with, "Is that all?"—and set to work.

Three regional zones are now the fundamental framework for restoration and recovery actions for Fender's blue. Within each zone, we have led focused research to spur conservation actions.

Recognizing and planning around the inherent year-to-year "bounciness" of butterfly populations has been an essential aspect of understanding the butterfly's biology and its responses to actions.

In the Eugene zone (southern Willamette Valley), Cheryl's research included questions about how to convert old farmland back into upland prairie. As part of the West Eugene Wetlands program, the Nature Conservancy, the BLM, the Army Corps of Engineers, and others were purchasing both upland and wetland prairie. But no one really knew how to turn old fields back into native prairies. In 1995, at the request of Jock Beall from the BLM, Cheryl began to test several different restoration strategies. The first study led to a series of repeated experiments over the next decade, starting with small garden-size plots in an initial footprint about the size of a football field. Eventually, at an old hayfield at the Nature Conservancy's Willow Creek Preserve, the experimental plots encompassed an area of more than ten acres, now turned into habitat. Fender's blue dispersed into the area by the early 2000s, and this site has supported four hundred to eight hundred butterflies each year for the last decade.

Partners, including the Institute for Applied Ecology, the Army Corps of Engineers, and others, also conducted research in other parts of the Eugene zone, with multiple experiments taking place at the BLM's Fir Butte site. In the 1990s, Fir Butte was an abandoned field overrun with blackberries, supporting barely a few dozen Fender's blues; today the population fluctuates between three thousand and nine thousand. At Fern

Prairies in the Willamette Valley have been lost to agriculture and development. Fender's blue butterfly can live in the shadow of people, though, and partnership with farmers and land managers has been essential for its recovery—and for its future. Photograph by Cheryl Schultz.

Ridge, the Army Corps of Engineers piloted numerous methods to renovate old fields, with good results. A small weedy field along Green Oaks Lane supported fewer than a dozen Fender's blue butterflies in the 1990s, but more than five thousand twenty years later. An old grassy field near Spires Lane had fewer than ten Fender's blues in 2016 and now supports five hundred to a thousand. The site of an old cherry orchard that had fewer than ten butterflies in 2019 is now climbing in numbers.

In the Corvallis (central) and Salem (northern) zones, engagement with private landowners has been the cornerstone of Fender's blue recovery. Mikki led efforts to have them apply methods developed by the USFWS to their lands, innovations that were grounded in the research by Cheryl and others, including developing a safe harbor agreement and habitat conservation plans, documents that lay out strategies for conserving declining species.

In the Corvallis zone, work with private landowners—including organic vineyards, ranchers, and Benton County's parks department—moved the needle from fewer than a hundred butterflies in 2003 to more than three thousand over the last few years.

In the Salem zone, the Baskett Slough National Wildlife Refuge has served as the core of experimental conservation and restoration activities since the 1990s, when pivotal research on the potential of fire to promote Fender's blue was first conducted. Here the Partners Program works with adjacent vineyards and other private landowners within the framework of the safe harbor program to greatly expand the extent of native Willamette Valley prairie. Salem zone sites had fewer than a thousand butterflies before listing in 2000; in recent years, that number has grown to four thousand to five thousand.

Collectively, what started out as a few hundred butterflies across a few dozen highly degraded sites is now a vibrant network of wildflower prairies that supports twelve thousand to thirty thousand Fender's blue butterflies each year. In addition, efforts are underway to start new populations in places where Fender's blue winked out long ago. The first translocation work was done in 2015 at the William L. Finley National Wildlife Refuge, which now supports five hundred to eight hundred butterflies each year. The augmentation team that made this possible is presently working towards reintroduction in other parts of the butterfly's historic range, including areas at higher elevation along the eastern edges of the Willamette Valley that may be important in offering refuge for Fender's blue and other endemic prairie species, cushioning the impact of climate change.

Thanks to the contributions of partners across the butterfly's range, together with a commitment to take the time to ground restoration and management work in conservation science, Fender's blue is flying towards recovery.

Cheryl Schultz is a professor at Washington State University, Vancouver, and is principal investigator in WSU's Conservation Biology Research Group. Mikki Collins, after many years as the lead biologist of Fender's blue butterfly for the Oregon office of the U.S. Fish and Wildlife Service, is now the Willamette Valley Recovery Coordinator at the USFWS.

Supporting Nature and Urban Communities Through the People's Garden Initiative

Kass Urban-Mead and Kelly Gill

Until recently, high school students at Philadelphia's U School operated a small urban farm in raised beds and grow bags on an asphalt schoolyard. Despite the limited facilities, students were engaged in project-based studies in agriculture, food, and natural resources. But they had a larger vision, one that, under the leadership of teacher Anna Herman, was made possible when the school farm was designated as a flagship garden through the People's Garden Initiative of the U.S. Department of Agriculture, which gave them access to federal grants. Anna and her students knew that plants are more resilient to drought when their roots can go deep into the soil. And not so far away, the school parking lot was underused. They wanted to depave 2,250 square feet (209 square meters) of asphalt to expand the garden.

The students participated in a planning session known as a "design charrette," led by Think Green, which allowed them to work together to develop their goals, to design a preliminary

Creating spaces for nature in densely developed neighborhoods brings many benefits for both insects and people. Photograph by the Xerces Society / Kass Urban-Mead.

garden map with desired plants, and to determine the size and location of the depaving effort. Half of the newly depaved area would become a vegetable garden, while the other half would be habitat to support pollinators. The new garden would meet a combination of educational and community needs, while providing a much-needed expansion of greenspace.

Depaving day was an exciting event! Staff from the USDA Natural Resources Conservation Service, which had provided funding through the Peoples' Garden Initiative, offered oversight. Two long, parallel beds were created in a single day, thanks to access to a cold-planing and milling machine that ate down through the parking lot in a succession of passes to expose the long-hidden subsoil below. The removed asphalt was taken away to a recycling center, and a hundred and fifty cubic yards of organically rich topsoil were brought in. The garden beds were edged and raised above the level of the parking lot by "logs" of coconut coir, and mulched with hay to retain moisture and help suppress weeds.

One bed was planted with food crops. The second bed was planted with pollinator-friendly perennial meadow plants and bordered with annual flowers and herbs. Xerces Society staff members helped translate the class's vision into a plant list, sourced the plants from a local nursery, and assisted with layout and design during planting. Xerces also helped with pollinator lessons and worked with the woodshop class to build bee houses that were placed on the school building.

The garden may not seem big compared with some locations, but in this neighborhood it makes a world of difference. According to the City of Philadelphia's urban agriculture plan, the U School is in an area with a low proportion of grocery stores selling fresh produce, and one in which community gardens are being lost due to considerable

Construction machinery makes easy work of the first step in transforming this schoolyard. Photograph by the Xerces Society / Kass Urban-Mead.

pressure from development. Depaving impermeable surfaces and replacing them with perennial habitat and food crops also helps to meet goals for stormwater management and heat-island reduction. Students participate in seasonal tasks and grow a wide range of food in the new garden space (and in other raised beds on campus). The meadow habitat supports bees that pollinate the adjacent garden as well as parasitoid wasps and predators that help control crop pests. Together, they boost the harvest of delicious fruits and vegetables, which directly contributes to increased food security in the neighborhood.

With the new site established, said Herman, "We were able to double the size of our food-growing area, and add native plants and flowers. This more than doubled the hands-on service learning opportunities for our students, and improved the beauty of our grounds for our school neighbors." The garden was designed to be a welcoming space, and to enhance the sense of place and local identity in a neighborhood that has limited accessible greenspace. Students and community members often spend time in the parking lot after school hours—the basketball court is heavily used by local kids—with the garden now providing a connection with nature and the associated benefits for emotional health. Future plans include creating a gathering space between the meadow and garden by adding benches and a sun shade.

The U School garden is part of a network of greenspaces in densely developed Philadelphia neighborhoods. Students' opportunities to learn about the science and social history of food systems and climate change include field trips to local urban farms. Among them is the nearby Life Do Grow Farm, which also created pollinator habitat with native plants thanks to receiving one of Xerces' habitat kits. Together with the school garden, the farm boosts the area's available pollen, nectar, and nesting resources for pollinators and other beneficial insects, contributing to food sovereignty and resilience.

Kass Urban-Mead shares the excitement of the new garden with teacher Anna Herman and U School students. Photograph by the Xerces Society / Raven Larcom.

The garden at Philadelphia's U School is just one of many success stories aided by the Peoples' Garden Initiative as it works in communities around the country to foster collective action in bringing greenery into neighborhoods. Two other examples can be found in the Bronx. There, on a sunny day in spring 2023, residents and local organizations, including New York City Parks GreenThumb, the New York Botanical Garden, and the Mary Mitchell Family Foundation—as well as staff from the

NRCS and Xerces—gathered to celebrate two urban farms: Garden of Happiness, in East Tremont, and Taqwa Community Farm, in Highbridge.

Garden of Happiness was founded in 1988, after development plans fell through for three lots that were formerly owned by the City. The abandoned lots had become a dumping ground, but the neighbors stepped up and, with the help of GreenThumb, were able to clean up the area and transform it into a garden. Taqwa Community Farm was also an abandoned lot collecting trash. In 1992 the residents revived the lot and transformed it into a vibrant community farm, again with the help of NYC Parks.

Since their inception, both farms have worked to improve access to fresh food, teach people how to garden, advance equity, and build community resilience; the ongoing benefits these gardens provide and the scale of the positive impact they have is staggering. Both sites serve as models for urban agriculture that clearly demonstrate that small-scale farming has disproportionately large-scale benefits.

For local residents, these gardens are more than places that benefit the community by growing and providing fresh, local produce. Such urban farms are also a natural refuge, where people can connect with and enjoy nature. They are a focal point for community gathering, activity, and cultural exchange, and they are places of peace and neighborhood pride. Now, after residents and partners worked together on clean-up tasks at both farms and added hundreds of native flowering plants to celebrate their dedication as People's Gardens, Taqwa Community Farm and Garden of Happiness are also places for pollinators.

Garden of Happiness is well named. This green oasis in the Bronx provides space for growing food as well as for community gatherings. Photograph by USDA / FPAC.

One of Xerces' habitat kits being planted at Taqwa Community Farm. Although small, such gardens support many pollinators. Photograph by the Xerces Society / Kelly Gill.

These three urban greenspaces—one in Philadelphia, two in New York City—are part of a group of seventeen across the country that were selected as flagship locations for the inaugural relaunch of the USDA's People's Garden Initiative, and are just a few of the many PGI projects nationwide that Xerces staff contribute to, thanks to a collaboration with the USDA. Originally established in 2009 by Secretary of Agriculture Tom Vilsack—and named in honor of Abraham Lincoln, who created the USDA and called it the "People's Department"—the People's Garden Initiative is part of a broader USDA effort to advance equity, support and expand local food systems, improve access to food, teach people how to garden using conservation and climate-smart practices, provide habitat for pollinators and wildlife, maintain or create open greenspaces in cities, and build more resilient communities.

In addition to the support and advice that Xerces is providing to flagship PGI gardens all across the country, our conservation staff are working closely with the PGI leadership team at the USDA to develop educational materials and training opportunities for all PGI participants. Any community garden or farm in the United States that is actively working to promote the production of food for local consumption, to practice sustainability—including creating habitat for pollinators, birds, or other wildlife—and to bring people together in their community, can go to the People's Garden website (usda.gov/peoples-garden) to register their garden and join with others in the movement. All People's Garden participants have access to the information, training, and other resources that the USDA and Xerces are developing.

Xerces Society conservation staff

Urban community gardens may not traditionally be considered places for conservation, but they offer great opportunities for wildlife habitat as well as human enjoyment. Photograph by the Xerces Society / Kelly Gill.

members are also excited to be working closely with both the NRCS Plant Materials Program and PGI staff in Washington, D.C. Together, we are planning and planting unique food gardens and invertebrate habitat at the National People's Garden in front of the USDA's national headquarters. For the next three years, visitors to our nation's capital can visit the garden on the National Mall to see examples of special habitats designed for monarch butterflies, native bees, honey bees, and beneficial insects that are important for control of garden pests. Interpretive materials, public events, and local partnerships with other federal facilities and the Bee City USA affiliate in Washington, D.C., are all in the works over the next few years to celebrate pollinators and share the work of the USDA, the People's Garden Initiative, and Xerces—and, hopefully, to inspire visitors to create wonderful habitats and gardens when they return home.

Together with our city-focused habitat kit programs, the inspiring work of Bee City and Bee Campus affiliates, and collaborations with many parks and tree-planting groups, these projects contribute to a growing matrix of greenspace and community action across the country. We and our USDA partners hope that, in combination, these efforts bring increased ecosystem resilience and pollinator health in support of food projects for diverse communities, while also creating opportunities for individuals and neighborhood groups to build connections and friendships, and offering a dose of optimism for the future.

Kelly Gill and Kass Urban-Mead both work for the Xerces Society as pollinator conservation specialists and NRCS partner biologists in the Mid-Atlantic and Northeast region. They collaborate with agencies, farmers, and local communities to plan, install, and manage habitat for insects.

Collective Wingspan: Xerces Members Soar for Invertebrates

Melissa Manuel

Against the backdrop of declining invertebrate populations, stories of hope emerge from the efforts of Xerces members such as Noah Raven, Augustin Garnier, David Kollen, and Justine Burt. Their endeavors, from establishing pollinator gardens to founding youth-led nonprofits, are making significant impacts for invertebrates. Join us as we delve into the stories of some of our dedicated members who are determined to create positive change and safeguard the future of invertebrates and their habitats. Their stories illustrate that collectively, individual actions, large or small, can contribute to preserving the intricate ecosystems of our natural world for invertebrates and all life.

Noah Raven's empathy for monarch butterflies is contagious. Living in Philadelphia, Noah is a young Xerces member doing incredible work to engage other young people to help protect monarch butterflies. He was first inspired to action when his family went to see overwintering monarchs at the Piedra Herrada reserve in central Mexico. As he learned about the butterflies, Noah became amazed by them, and then very troubled to learn how much their popu-

Inspired by seeing monarchs in Mexico, Noah Raven launched Monarch Defenders, a youth-focused effort to create habitat gardens. Photograph courtesy the Raven family.

lations have crashed—by more than 80 percent in the eastern states and over 90 percent in the West.

After brainstorming with his family, Noah decided to launch Monarch Defenders, a youth-led nonprofit with the mission of saving the monarchs from extinction, one garden at a time. Noah explains that "we realized that creating habitat is something we could do. But to be impactful, lots of people, all across their migratory range, need to do the same thing. I decided I wanted to encourage youth and families to plant monarch habitats."

Young people anywhere in North America can participate in the work of Monarch Defenders by planting milkweed and nectar plants in their yards. The locations of these habitats can be added to the interactive map on the Monarch Defenders website (monarchdefenders.org). In addition to encouraging others, Noah's family planted habitat in their home garden. "Our garden is not huge, but we have seen female monarchs lay eggs on the milkweed and watched them hatch into caterpillars," says Noah.

On the other side of the country, Augustin Garnier of Redondo Beach, California, is another passionate advocate for the monarch butterfly. From being a musician and composer, to serving as a senior officer on two local nonprofit organizations, his many positive outputs have had a lovely ripple effect on folks near and far, including working to establish a pollinator garden at his local library. This cheerful, colorful garden now welcomes monarch butterflies and other pollinators as well as human visitors to the library, and is a living invitation to people to learn more and join in the cause.

Augustin's interest in invertebrates and conservation began in childhood. He remembers exploring his local fields and parks, observing lizards, snakes, foxes, and other wildlife; handling grasshoppers, crickets, and butterflies was simply a part of his childhood. A chance sequence of events drew Augustin back toward insects while a nursing

A monarch butterfly refueling with nectar in Noah Raven's garden, evidence of his efforts' success. Photograph courtesy the Raven family.

Demonstrating how one person can have an impact, Augustin Garnier sought permission to create a pollinator garden at his local city library—and then planted it. Photograph courtesy Augustin Garnier.

major at community college. One day he noticed a number of monarch caterpillars on a milkweed plant and paused to count them. A biology professor saw his curiosity and told him that where he was standing was a garden that had been planted for the purpose of supporting monarch butterflies. Augustin began to read research papers on monarchs, and subsequently created a monarch garden at his home. Posting his gardening successes and failures on social media led to friends and acquaintances asking how they could get started.

Seeing the impact Augustin was having, a friend told him, "You need to scale this up. Why not find a city plot that might work for a pollinator garden?" The entry landscaping outside the Redondo Beach Main Library turned out to be a perfect fit. Determined to manifest his vision of a pollinator garden at the library, Augustin made a presentation to the city council, which enthusiastically endorsed the idea. He then secured funding for the project and set about installing the garden. Much to his delight, the first monarch visited the library garden in spring 2023, bringing him full circle from that first moment of inspiration.

Continuing our tour of the United States: living in Brookings, on the south coast of Oregon, David Kollen is a retired tech executive with a dedication to digging deep into the world of invertebrates. Since 2019, Dave has been involved as a community scientist for the Xerces Society's Bumble Bee Atlas, where he and other volunteers contribute to research by conducting non-lethal surveys for bumble bees.

Dave remembers being fascinated, as a kid, by caring for his ant farm, the kind that displays the colony and its activity with see-through sides. Then,

Dave Kollen initially volunteered with the Bumble Bee Atlas, but then found his calling as a Xerces Ambassador, doing talks and working outreach events. Photograph courtesy David Kollen.

as a teen, he read Rémy Chauvin's *The World of Ants: A Science-Fiction Universe*, which was, he notes, "a real epiphany in terms of the absolutely fascinating lives of those insects. It gave me a deeper appreciation of nature in general."

Now that Dave is retired, participation in the Bumble Bee Atlas project keeps him busy. From his home near the Oregon–California border, he participates in the atlas projects that straddle the Pacific Northwest and California regions. The Bumble Bee Atlas is a collaborative community science project that tracks and conserves bumble bees in twenty states that encompass more than half of the land area of the Lower 48. Between April and September each year, Dave heads out to survey five different sites within the Klamath-Siskiyou region, a unique area with a large number of endemic plants that are found nowhere else. This is also where Franklin's bumble bee was last seen, so there is always hope of a sighting.

More recently, Dave also became a volunteer Xerces Ambassador. By tabling at community events and giving presentations, he helps introduce people to conservation and shares information that enables them to take their own steps to protect insects. Dave says, "If I can in any way inspire others to help out, that would be gratifying."

Justine Burt grew up in the countryside of northern Maryland, surrounded by dairies and horse farms. Monarch butterflies fluttering through the family property caught her attention, but it was the iridescent wings of dragonflies at a nearby creek that mesmerized her. Now living in Palo Alto, California, Justine works through the Richmond Green-Blue New Deal and the Palo Alto Transportation Management Association to help people shift their commute from

driving to taking mass transit or biking.

At the end of last summer, Justine became a climate champion for invertebrate conservation, embarking on the 399-mile Climate Ride from Burlington, Vermont, to Bar Harbor, Maine. Justine said that she had been "looking for a nonprofit to support that was doing great work to help bring back bee populations," and learned about Xerces through a Bee Better Certified label on a package of blueberries.

Participation in the ride was no easy endeavor: Justine and her husband, Chris Cocca, trained for six months to get into shape, and the six-day trek took them along arduous roads through the White Mountains of New Hampshire. The adventure allowed her to combine her passion for invertebrates with her love of physical activity, all while raising funds for her favorite cause.

(If this sounds like something that you'd enjoy, Xerces is proud to be a beneficiary partner of Climate Ride. If you would like to ride for Xerces, search for upcoming events at climateride.org.)

Whatever our interests and abilities, invertebrates are animals that all of us can take direct steps to help, sometimes quite literally in our own backyard. Climate riders like Justine, community scientists like Dave, monarch supporters like Augustin, and young advocates like Noah provide examples of creative solutions that protect invertebrates and their habitats and can lead to others taking positive action as well. We hope that they inspire you to find new ways to be involved in conservation.

Melissa Manuel works at the Xerces Society as the donor engagement specialist. Before joining Xerces, she worked as a horticulturist with more than a decade of expertise in urban farming, agroforestry, garden design, and education.

Justine Burt and Chris Cocca undertook a 399-mile bike ride to highlight climate change and raise donations for Xerces. Photograph courtesy Justine Burt.

Why Xerces Does Not Accept Money From Pesticide or Oil Companies

Scott Black

I was recently asked, "Why doesn't the Xerces Society partner with or take money from pesticide or oil companies?" The answer is simple: We feel that a conservation organization should not accept money from companies whose products are harming the very animals that we are charged with protecting.

We prioritize partners with shared goals. In its essence, Xerces is a partnership organization. We have thousands of partners, including federal, state, and local agencies, farmers, nonprofits, scientists, volunteers, and businesses—partnerships built on shared goals to ensure that they are working to advance invertebrate conservation. Pesticide and oil and gas companies are at odds with that. As a result, we do not accept money from or partner with either.

Pesticides and fossil fuels are causing the problem. The science is clear that pesticides and human-caused climate change are major drivers of insect decline and endangerment. Pesticides—more accurately "biocides"—are designed to kill, with insecticides specifically targeting insects. Unfortunately, most insecticides do not just harm their target species, they affect countless others. Many organizations that conserve pollinators and other insects sidestep the issue of pesticides, focusing instead on creating flowering landscapes.

While pollinators do need this habitat to survive, these areas must also be safe for them. To solve our insect-decline crisis, we must minimize the impact of pesticides in all landscapes, and maximize support for farmers and other land managers to adopt new strategies that still manage their pests and ensure their success.

Similarly, climate change, driven partly through the use of fossil fuels, is changing the face of our planet, negatively impacting biodiversity as well as human communities. It is estimated that nearly half of insects could lose half of their ranges under the most severe warming scenarios.

Unfortunately, the business models of pesticide, oil, and gas companies are built around selling these products: the more people buy, the better it is for their bottom line. There is no incentive to lower production or cut back on marketing—and the global market for pesticides is booming. The business model of both oil and pesticide companies hurts all of the inhabitants on our planet.

We don't want to provide a cover for greenwashing. Our view is that the Xerces Society should not provide a platform for greenwashing by these companies. They have been making record profits and talking up their green credentials while doing very little to fix the problems that they cause. Although

many companies highlight their contributions to habitat enhancement and preservation of biodiversity, the actual amount of money being donated is consistently less than one-tenth of 1 percent of the billions collected in sales.

Pesticide companies use philanthropy to make it appear that they are part of the solution, while at the same time they promote uncertainty about scientific studies; influence policies at the federal, state, and local levels to keep their harmful products on the market; and buy credibility through funding universities and nonprofits to delay actions that would actually mitigate some of the damage they have caused.

Fossil fuel companies similarly try to play both sides. According to a 2022 report by InfluenceMap, five oil companies spend $750 million each year on "green messaging." InfluenceMap notes that the companies continue to invest in unsustainable fossil fuel energy systems and lobby policymakers to lock the use of fossil fuels into climate policy, while simultaneously undertaking systematic PR campaigns to portray themselves as pro-climate.

Pollinators need habitat free from pesticides. Photograph by Matthew Shepherd.

Integrity is a core value of the Xerces Society. Beyond the questionable ethics of taking money earned from harming invertebrates, we at Xerces feel that our credibility as a conservation leader would be at risk if we took money from these sources. How could you trust Xerces to speak truth to power if we were also taking money from the very companies that are causing the issues we are trying to fix?

We understand that there are instances when pesticides can help—such as responding to harmful pests or protecting ourselves from disease—but even so, there are many ways to stop or lower our pesticide use. We work with farmers to incorporate practices that deter pests and encourage natural pest management, actions that are part of the verifiable integrated pest management approaches we promote.

We also understand that fossil fuels play a major role in how we go about our daily lives, but recognize that we should move away from them whenever possible to lessen or avoid their use. We are living in an age where we have the knowledge to develop and adopt alternatives to pesticides and fossil fuels, and this needs to be part of our message as a conservation organization.

Working with partners is key. It is imperative that we collaborate, as our task is too great for any one person or organization. But we believe that the partners we work with should be ones that are moving our conservation agenda forward, not those that hinder it.

STAFF PROFILE

Emilie Blevins, Senior Endangered Species Conservation Biologist

What got you interested in invertebrates? I have always known I wanted to work with animals. As a kid, I thought I'd be a veterinarian, then a zookeeper, and then, when I learned what it was, a field biologist. For my very first middle-school paper, I wrote about corals and coral reef ecosystems. Growing up in landlocked Tennessee, I had never seen such things except in magazines or TV documentaries. Years later, my first research project at college was to study parasites of freshwater snails and mussels. Although I've conducted research on a range of terrestrial and aquatic animals, invertebrates have always remained fascinating for their amazing adaptations in every corner of the world.

What college did you attend? I graduated with a bachelor's degree in biology from Berea College, a work-study college in Kentucky. I'm especially proud to be a Berean, hailing from the first coeducational and interracial school to be established in the southeastern United States, in 1855. I received a master's degree in biology from Kansas State University, where I conducted fieldwork at the Konza Prairie long-term ecological research site. As one of the few remaining areas of unplowed tallgrass prairie left in the country, it's a fantastic place to study and explore.

What's your favorite place to visit? I've traveled a lot in the United States, and spent a college semester in New Zealand, so I've had the good fortune to see some incredible places. When I moved to the Pacific Northwest in 2010, I thought I'd stay for a few years and then move somewhere else. I now live in the Columbia Gorge, a national scenic area in Oregon and Washington along the Columbia River. While I've enjoyed traveling to many places for fieldwork and vacation, I think the place I call home is truly my favorite. To anyone who has the opportunity to visit, I recommend it!

What do you do to relax? I love cross-country skiing. It's a fun way to get out in winter and spring, and a great way to see some wildlife. It's not uncommon for me to encounter spiders, caddisflies, and snow fleas (springtails), and in the spring months, you can often ski alongside butterflies like anglewings, which overwinter as adults. I also see the occasional snowshoe hare, bobcat, or weasel.

Colorado's Department of Natural Resources

The Colorado Department of Natural Resources (DNR) is tasked with the vital role of stewarding and conserving the natural resources across Colorado's varied environments. The state has an average elevation of over 6,600 feet (2,010 meters) with many snow-capped peaks, but it also boasts arid canyons and vast stretches of prairie that collectively support a great diversity of wildlife, including more than a thousand species of bees and nearly three hundred species of butterflies. Balancing recreation and development with conservation goals is no easy task.

Recently, the DNR has been raising awareness about the importance of the state's pollinators by supporting pollinator-related studies, management practices, and policy changes—including the establishment of a policy that instructs agencies within the DNR to undertake actions that support pollinators and minimize negative impacts on them. Two of the key agencies within the DNR that have responsibility for conserving nature are Colorado Parks and Wildlife, which manages forty-two state parks and hundreds of wildlife areas, and administers programs to study, conserve, and manage the state's wildlife; and the State Land Board, which has responsibility for three million acres of state trust lands.

The DNR's elevated focus on pollinators and invertebrates has coincided with Xerces expanding our work in Colorado, thus increasing opportunities for collaboration between Xerces and the department to integrate invertebrate conservation more effectively into state conservation goals and actions.

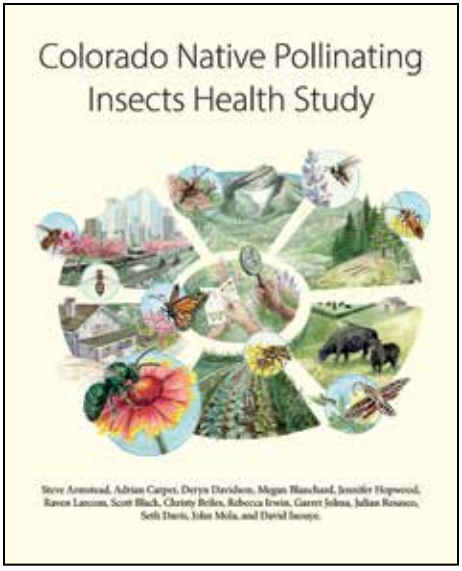
In 2023 the DNR partnered with Xerces, the University of Colorado Museum of Natural History, and Colorado State University Extension to complete an extensive study assessing the health of pollinating insects within the state, reviewing the great work already being done, and recommending practices and programs the state could undertake to enhance and improve pollinator conservation. Xerces currently supports the DNR in adopting one of the key recommendations from the study: to give Colorado Parks and Wildlife the statutory authority to manage and study rare plants and invertebrates, including pollinators.

The Colorado hairstreak is that state's official insect. Photograph by Christian Nunes.

Landmark Action on Behalf of Pollinators in Colorado

At the beginning of this year, Colorado's governor, Jared Polis, released the *Colorado Native Pollinating Insects Health Study*. This report is the most robust review of pollinator health ever undertaken in the state, providing a detailed account of the science demonstrating pollinator declines. The report also lays out conservation strategies and policy changes that state agencies can adopt to safeguard the insects that are so important for Colorado's environment and economy.

Commissioned by the Colorado Department of Natural Resources at the behest of the state legislature, the report's lead authors were Deryn Davidson of Colorado State University Extension, Adrian Carper at the University of Colorado Museum of Natural History, and Steve Armstead, Xerces' Colorado-based pollinator conservation specialist. Many other individuals and organizations contributed to the work.



The study identified the primary drivers of pollinator declines in Colorado as habitat loss (considered to be the biggest threat), land-management practices, the widespread use of pesticides, the presence of non-native species of plants and insects, and climate change.

In addition to providing guidelines on how to manage habitats for pollinators, the report's authors also reviewed the work currently being done by state agencies and made recommendations on how their efforts can create greater benefit to pollinators, as well as recommendations for new programs and policies to further advance pollinator health.

A critical policy gap identified by the study was that Colorado Parks and Wildlife (CPW) lacked formal authority for managing insects and plants: the agency responsible for caring for the state's wildlife was unable to focus effort on the majority of wildlife species. The Colorado legislature has already taken steps to remedy this. It recently passed bill HB24-1117, which adds rare plants and invertebrates to the species that may be studied and conserved under the current "Nongame, Endangered, or Threatened Species Conservation Act," thus enabling CPW to work to conserve pollinators.

Monarch Population Sinks to Historic Lows

Monarch butterfly numbers are down across North America, leading to additional concern for their future. Xerces' Western Monarch Count tallied just over 230,000 monarchs overwintering at 256 sites in California and Baja Mexico. The count is almost a third less than last year's total of more than 330,000 butterflies. Monarch populations were also lower at the overwintering grounds in central Mexico, where the annual survey by WWF–Mexico measures the area of forest in which they hibernate. This year's survey revealed that they occupied a mere 0.9 hectares (2.2 acres). Together these numbers make 2023–24 the second worst year for monarchs ever recorded.

Xerces is working to protect monarchs across the United States, and staff were recently in Mexico City for the Trilateral Scientific Group for Monarch Butterfly Conservation in the hopes of spurring even broader action. If more people will plant and protect habitat and minimize pesticide use, we can recover this iconic species.

Monarch butterflies overwintering in Mexico. Photograph by the Xerces Society / Candace Fallon.

New Initiative Encourages Enjoyment of Monarchs

The Xerces Society has just taken another initiative under our wing, the Western Monarch Trail. The trail consists of a series of locations along the California coast where monarch butterflies can be seen and enjoyed, from state parks that host overwintering groves to downtown parks that feature nectar-plant gardens along the migration path. The sites provide information, education, and inspiration for communities to work to restore a healthy population of western monarchs.

The trail was initially developed by the Central Coast State Parks Association, and, as with so many projects, is made possible by the involvement of numerous collaborators, in particular the private and public land managers who host monarchs and work to protect them. For more information and to find places to visit to learn about the monarch migration in California, go to westernmonarchtrail.org.

Your Legacy for Invertebrates

What could be more important than working to conserve the creatures that keep Earth's living systems functioning?

The Xerces Society is doing some of the most vital work on the planet today. That's why we have found it so fulfilling to include Xerces in our estate plans. As a board member, Jay sees up close how exceptionally managed this organization is, and how skilled and dedicated its staff are. This gives us confidence that our contributions will be in good hands. If you care about biodiversity and wish to leave a meaningful legacy for future generations, please join us in supporting Xerces.

—Jay Withgott, author and Xerces board member
Susan Masta, biology professor

xerces.org/donate/planned-giving

Changing Pesticide Use Across the Country

Our pesticide reduction team works cross-program on multiple Xerces projects, but is also engaged in advocacy to shift policy and collaborates directly with diverse partners to promote ecologically responsible pest management. Here are a few recent highlights.

Advocacy: Staff vigilance prevented aerial insecticide spraying over twenty-five thousand acres of the Rio Chama watershed in New Mexico. After the imminent spraying was revealed, we unified a group of partners that halted the spray. A second spraying proposal, which would have impacted more than 2.5 million acres north of the Grand Canyon—including National Monuments that are considered biodiversity hotspots—was canceled by federal regulators after we raised serious concerns. We also helped drive legislative changes in seven states to increase oversight of disposal of unused insecticide-treated seed, halt inappropriate insecticide uses on state lands, and restore the ability of cities to regulate the use of highly toxic insecticides in their communities.

Technical support: The pesticide team developed and implemented protocols to ensure that nursery suppliers and recipients of Xerces' habitat kits take steps to reduce pesticide use and protect pollinators. We also guided revisions to Bee Better Certified production standards to

Narrowleaf milkweed growing in Nevada. Millions of acres of western rangelands have been protected from aerial spraying of insecticides. Photograph by the Xerces Society / Stephanie McKnight.

ensure that the program maintains consistency as it expands to countries where pesticide regulation is not as strong.

Research: With our partners at the University of Nevada Reno, we designed and implemented a project to investigate risks posed to pollinators by mosquito sprays. Volunteers in Iowa, Massachusetts, and Georgia gathered samples after either residential or municipal treatments. We are currently analyzing the data to understand if and how that contamination could harm non-target invertebrates.

Outreach: Our message about pesticide risks and alternatives reached more than twenty-three thousand people via events, podcasts, and webinars. Several webinars were presented to the Bee City and Bee Campus network to help build affiliates' capacity to effect change. In addition, our media coverage related to pesticides was seen by more than three million people.

Xerces' Living Farms Project supports farmers in taking actions such as growing flowering cover crops, which helps pollinators and other beneficial insects, while boosting both rainwater infiltration and carbon sequestration. Photograph by the Xerces Society / Jessa Kay Cruz.

The Living Farms Project

The Xerces Society's Living Farms Project brings pollinator conservation to farms and food suppliers through comprehensive support for habitat installation and biodiversity practices on farms. With decades of agriculture and conservation experience, Xerces staff can assist farmers with transition to Bee Better certification and other regenerative goals, such as the planting of carbon-sequestering pollinator hedgerows and cover crops, planning for mitigation of pesticide risk and integrated pest management (IPM), assessments for meeting biodiversity criteria, and the enhancement of natural pest suppression.

Thanks to a partnership with the California Citrus Quality Council, Sunkist Growers, and the California Farm Bureau, Living Farms staff secured funding through the California Department of Agriculture's Healthy Soils Block Grant Pilot Program to help support habitat work on citrus farms over the next three years. The project will be working with citrus growers in eleven counties in the San Joaquin Valley and Southern California, bringing to them the technical expertise and funding they need to undertake work on soil health, carbon sequestration, and pollinator conservation.

Major Retailers Give Boost to Bee Better Certified

In January, Kroger, the largest grocery chain in the United States, announced that all suppliers of fresh produce will need to adopt integrated pest management. Bee Better Certified was listed as one of the certifications that enables suppliers to meet that requirement. This follows similar commitments made by Walmart and Giant Eagles last year, acknowledging the value that Bee Better Certified brings to growers. We are very grateful to our partners at Kroger and the IPM Institute for building such a robust sourcing platform, and we look forward to engaging with growers over the coming years to help them meet the needs of retailers seeking to create more sustainable supply chains. For more information about Bee Better Certified, visit beebettercertified.org.

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Visit us at xerces.org or contact us at 855-232-6639.

The Pawnee montane skipper is a small butterfly that lives only in the South Platte Canyon River drainage system in Colorado. Photograph by Craig Hansen, USFWS / CC BY 2.0.

A $35 per year Xerces Society membership includes a subscription to *Wings*.

On the cover: A male Fender's blue. This butterfly was once considered extinct, but has made a remarkable recovery since its rediscovery in Oregon's Willamette Valley in the late 1980s. Photograph by Wolfram Burner / CC BY-NC 2.0.

XERCES SOCIETY
for Invertebrate Conservation