

Bringing Biodiversity Back to IL Prairies



As the hot summer sun beat down, Bethanne Bruninga-Socolar walked across the prairies at Nachusa Grasslands,

meticulously sampling bees with a hand net and recording which flowers they were found pollinating. Fast forward several months later to a lab where Bethanne and her fellow researchers were about to make a big discovery.

"There was a bit of excited profanity," Bethanne recalls, when she and her colleagues realized that one of the samples had yielded a federally and state-endangered species: the rusty patched bumble bee. This important pollinator, which can be identified by a rust-colored mark on its back, is the first bee to be placed on the endangered species list. "This is really good news for Nachusa," Bethanne explains. "Sean Griffin, my collaborator, and I were already seeing strong signals in the data from our long-term monitoring study that bee communities are doing really well at the preserve. Finding an endangered bumblebee species is additional evidence that Nachusa is doing a good job of conserving native bee diversity."

Rusty patched bumble bees once occupied grasslands and tallgrass prairies across the Upper Midwest and Northeast. These bees and other native species perform the important work of pollinating crops such as blueberries, cranberries and clover. They are also able to pollinate tomatoes—which non-native honey bees cannot—through "buzz pollination," wherein the bee vibrates its body to shake pollen loose. In total, bees like the

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Spotlight on Staff Science

This spring, we're celebrating several staff promotions, as well as welcoming new faces to TNC!







Megan Baskerville, who was recently promoted to the role of Illinois agriculture program director, is working with local and national partners to track adoption of soil health practices through the use of satellite imagery. The Operational Tillage Information System (OpTIS) monitors the adoption of no-till, conservation tillage and cover crop practices that help keep our soil healthy and our water clean.

Jen Jenkins, the new natural infrastructure project manager, is working with the urban conservation team, partners and local communities to apply natural infrastructure solutions equitably to urban stormwater issues. She is currently helping kick off a five-year pilot study of StormStore, a stormwater trading project in Chicago and Cook County, that will be conducted in two priority watersheds in partnership with the Metropolitan Water Reclamation District (MWRD).

In her recent promotion to aquatic ecologist, **Krista Kirkham** will serve as the lead technician and outreach coordinator for TNC's Mackinaw Program research sites, including the Paired Watershed Project, Franklin Research and Demonstration Farm and Bloomington Drinking Watersheds Project. She'll collect stream and wetland water samples to determine how agricultural best management practices, specifically constructed wetlands and cover crops, improve water quality at the farm scale and small watershed scale.



Karen Petersen joined the Illinois chapter in a new role: climate change project manager. She has been working to lead a team through the development of climate change strategies focused on policy, natural climate solutions, climate adaptation and renewable energy siting that can have the biggest impact in Illinois. Read more about her work on page 6!

OUR WORLD CAMPAIGN SURPASSES GOAL

TNC launched the Our World campaign with a goal of raising \$7 billion globally to address the most pressing conservation issues for nature and people. Thanks to generous donors like you, we've reached that goal! You also helped us surpass our chapter goal of \$110 million; through your support, we have raised more than \$120 million! Thank you again for helping us reach this conservation milestone. Donations to the campaign are still being accepted at **nature.org/OurWorldIL**.

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 ${\tt cover}$: Bethanne Bruninga-Socolar. Photo courtesy of Bethanne Bruninga-Socolar; Rusty patched bumble bee. @ Bethanne Bruninga-Socolar

THIS PAGE: Megan Baskerville © Caroline Wade; Jen Jenkins Courtesy of Jen Jenkins; Krista Kirkham Courtesy of Krista Kirkham; Karen Petersen Courtesy of Karen Petersen

Advocating for Chicago's Communities and Trees

One thousand, five hundred: that's how many trees Rachel Patterson, Jake LePretre and other members of the Imani Green Health Advocate team surveyed in the summer and fall of 2019. With each one, they examined various metrics, including "the three d's"—defoliation, discoloration and fine twig dieback to gain a clearer picture not just of quantity, but of the overall health of trees in the Chicago neighborhoods of Morgan Park, Roseland, South Shore, South Chicago, Auburn Gresham and Grand Crossing.

"In some neighborhoods the trees were healthy, but in others, the trees were sickly and there wasn't as much biodiversity," Rachel says.

Research shows that urban trees provide myriad benefits to both people and nature, from giving migratory birds a place to rest to boosting human health conditions by cleaning and cooling the air we breathe.

"That's something I really learned during this program, that the health of your environment equals your physical health," Jake shares.

Understanding whether communities have enough trees—and the right kind of trees— to make tangible impacts on human health is the next step, and why the Advocates' research is so crucial.

"Emergent research shows that mature trees provide more benefits to people and nature than young trees," says Rachel Holmes, TNC's urban forestry strategist, who worked with the Advocates. "Larger tree crowns, meaning leaves and branches, can yield more human health benefits such as reduced effects of childhood asthma, reduced risk of obesity, reduced blood pressure and increased mental well-being. The Advocates' monitoring helps ensure that trees reach maturity and can provide optimal benefits for people and nature." One of the Advocates' key findings is that these neighborhoods need a greater diversity of trees. Many of the sampled trees show signs of stress, and the fourth most common tree recorded was ash, which are likely to be killed by the emerald ash borer, a non-native invasive bark-boring beetle. Having trees of different species, sizes and ages ensures that Chicago's urban canopy will be resilient in the future, especially as climate change brings more intense storms, flooding and shifts in temperature.

Education was another important part of the program.

"We went door to door in these communities, explaining what we were doing, how trees can benefit mental and physical health and asking if residents were interested in having more trees planted," Rachel Patterson explains.

"When I found out that my community in Chatham had one of the highest rates of respiratory illness, I had to use that knowledge," she added. "I emailed the pastor at St. Dorothy's where I attended school, explained the program and asked if they wanted trees. My goal was to plant one, but they ended up planting five: a mix of fruit trees and other species. When I come back to visit in 20 years, they'll be bearing fruit."

The Advocates' findings were reported in Advocate Trinity Hospital's 2017-2019 Community Health Needs Assessment, which will be used to identify key health priorities in these communities. Going into its third year, the Imani Green Health Advocate program is a career development program TNC launched with Imani Village, a sustainable, intergenerational community founded by Trinity United Church of Christ to foster lifelong education, health and economic development in Pullman and the surrounding neighborhoods of Chicago. Imani Works!, Advocate Health Care, The Morton Arboretum, the U.S.D.A. Forest Service and the University of Illinois-Chicago are supporting the program.

CONTINUED FROM COVER

rusty patched bumble bee and other native insects provide \$3 billion in pollinator services each year, in addition to the important role they play in local ecosystems.

"As pollinators, bumble bees help wildflowers reproduce, which in turn provide seed and fruits for native wildlife," says Bill Kleiman, the project director at Nachusa. "Unfortunately, most of the grassland habitats these bees rely on have been lost, degraded or fragmented by conversion to other uses."

This loss has caused the bee's populations to plummet by 90 percent since the 1990s. But research and restoration efforts at places like Nachusa provide an opportunity for a comeback.

"The study we conducted was important because we are able to see which particular bee species was pollinating different plant species," Bethanne says. "My goals with this project are two-fold: to describe the network of interacting plant and bee species in tallgrass prairie, and to determine whether the plants bees are interacting with differ in prairie sites with bison versus those without bison. And as we continue our long-term monitoring work, we will start looking at whether the bee community at Nachusa is shifting with climate change." Those discoveries will help scientists make decisions to help the prairies at Nachusaand the bees and other species that rely on them-to thrive. The recent sighting of the rusty patched bumble bee, as well as other rare insect species, indicates efforts are already heading in the right direction. In the summer of 2019, PhD student Katie Dana observed a Northern dusk singing cicada, a species with limited distribution in Illinois, in one of Nachusa's oak woodlands. Joyce Gibbons, a dragonfly monitor at the preserve, spotted several fawn darners, a unique species that flies not only during the day, but also at twilight and into the evening. And as summer gave way to fall, Rich Teper and Wayne Schennum recorded three marked noctuid moths, which are listed as an endangered species in Ohio and as rare in Wisconsin, during their 2019 moth survey.

"The moth's caterpillar feeds on stiff goldenrod, which is abundant at Nachusa due to the restoration process," says Dee Hudson, a Nachusa volunteer who also works at the preserve. "As a result, Nachusa has created a safe habitat for this species, and so many others, to flourish."

Help Protect Southern Illinois' Dogtooth Bend

Dogtooth Bend is an agricultural community in southern Illinois that has experienced devastating flooding in recent years. Conservation easements will increase the land's ability to store floodwater, provide financial relief to landowners who have experienced prolonged flooding and repetitive crop loss, provide habitat and migration corridors for birds, fish and other wildlife and improve water quality. You can get involved by contributing to the Dogtooth Bend Match Fund. Donations made to the effort by June 30, 2020 will be matched dollar-for-dollar by Tom and Sue Pick and Floodplains Forever. For more information, contact Ken Modzelewski at 773-398-7993.

BIODIVERSITY ON THE MOVE

As the climate changes, shifts in the weather and local habitats will impact biodiversity in Illinois. Here's a look at some of the species that could leave the state, as well as those that may begin to appear.

Heading Out

These species may see their ranges move north as Illinois gets warmer. They may have a smaller distribution or disappear from the state completely.



Bobolink: This iconic grassland bird has already declined by approximately 90 percent in Illinois. The temperatures and moist

grasslands they prefer are shifting northward with climate change, and bobolinks will probably migrate through Illinois to nest farther north in the future.

Moving In

As the climate changes, these species are likely to expand into Illinois from the south.



Little sulphur butterfly:

Also known as the "little yellow butterfly," this species already pulses northward into

central and northern Illinois in warm summers, but will probably be able to overwinter and increase its numbers in the state in the coming years. One of its favorite host plants is partridge pea, a native prairie plant with yellow flowers.

Black-bellied whistling

duck: Your first glimpse of this duck might not be where you expect, as they like to rest in trees! This species is moving north quickly, with the first recorded nesting in Illinois within the past few years.



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Sugar maple: This native tree species has recently increased in forests across the region because of wetter conditions and fire

suppression. In the coming decades, hotter temperatures will likely limit its distribution from southern Illinois. This makes it important for forest managers to restore native species that are projected to do well in future warmer conditions.



Shortleaf pine:

Once a dominant tree community over much of the Ozarks,

this species is known for its long, clear trunk and broad, open crown. In the future, it is likely to thrive in southern Illinois as its range expands northward. In turn, this might allow bird species like the brown-headed nuthatch to expand its range to Illinois as well.

Conservation News in Brief In Illinois, Agriculture Can Help Tackle Climate Change

While reducing emissions in high-emitting sectors like energy, transport and industry is critical for limiting global warming, our science shows that nature itself can also play an important role in fighting climate change. Not only can nature help to build important resiliency to a changing climate, but it can also reduce overall emissions.

According to global studies, the most significant opportunities for natural climate solutions are protecting and restoring forests. However, in Illinois, with no tropical forests in sight, our opportunities look a bit different. Led by Karen Petersen (see page 2 for Karen's bio), the Illinois chapter has analyzed how natural climate solutions can help us meet our goals. In Illinois, the biggest low-cost opportunities for employing natural climate solutions exist in the agricultural sector, where large-scale adoption of cover crops and cropland nutrient management could mitigate nearly 10 megatons of carbon annually. Cover crops, which are grown during the off season when fields are fallow, help to increase the carbon stored in soils, while efforts to improve the management of nitrogen fertilizers reduce nitrous oxide emissions and the energy emissions associated with fertilizer production.

"These two sustainable farming methods are already being employed by some Illinois farmers to improve soil health, yields and water quality," Karen says.



"Our agricultural team, led by Megan Baskerville, has established strong relationships with the agricultural community and is already working to build the capacity of farmers and increase the adoption of these practices across the state. There is also a large opportunity to increase the uptake of these agricultural best management practices through sensible climate change policy."

Partnering for Community Green Space in Chicago



In Marshall Square, a west-side Chicago neighborhood still feeling the impacts of an industrial legacy, many green spaces are underutilized and even unfamiliar to residents.

"We'd discuss parks and gardens in meetings, and we quickly realized that many community residents and partners around the table had never even been to these spaces," says Forrest Cortes, TNC's director of community engagement in Chicago. "If community members don't even know where these places are, there's no way they are reaping the full suite of health benefits that nature provides. We had to ask ourselves, how can we meet the needs of the community we intend to serve?"

To answer that question, TNC is collaborating with Latinos Progresando (LP), an organization that delivers high-quality information and resources for people to build secure, healthy and productive lives. Together, the partners created a concept called the Green and Blue Exchange, through which community members and partners toured local green spaces by bus and bike to imagine enhancements and programming that could improve resident health and well-being, while also deepening connections to nature.

Following the initial tours, LP and TNC launched a small grant program to support community groups that host events in Marshall Square green space. Using a collaboratively designed storytelling framework that includes video footage and interviews with community members and partners, LP and TNC will document their shared work and the environmental and community health journey of Marshall Square over the next two years. These next steps are made possible by funding from the TNC Global Diversity, Equity and Inclusion team and the TNC North America Cities Partnership Fund, which was launched through private support.

Cover crops. © Jason Whalen; Blue & Green Exchange attendees toured green spaces in and near Marshall Square.

Getting the Dirt on Biodiversity Underground

Visit one of TNC's preserves across the state and you're likely to see myriad species, from vibrant wildflowers buzzing with pollinators to colorful migratory birds journeying to summer breeding grounds. What you won't see is the millions of worms, microbes and other organisms below your feet that ensure the health of these habitats for both people and nature.

"Understanding soil biodiversity is really important, because more than 25 percent of global biodiversity lives in the soil, yet because we can't see it, we tend to ignore it," says Elizabeth Bach, the ecosystem restoration scientist at Nachusa Grasslands.

"My research focuses on soil ecology, exploring how belowground biology supports tallgrass prairie ecosystems through plant-soil interactions and nutrient and carbon cycling," Elizabeth explains. "Understanding these processes is vital to protecting and restoring Earth's most threatened ecosystems and the contributions they provide to humanity."

Elizabeth collaborates with researchers across the country and the world in her work. In 2019, her collaborative research efforts with a global team made the cover of *Science* magazine. The topic? Earthworms.

"Earthworms are really important to our ecosystems because they are eating dead plant litter and pulling that matter down into the soil where it can help store carbon," Elizabeth says. "Their tunneling also changes the way air and water move through the soil, so they can make a difference in how prone an area is to flooding and erosion."

As the *Science* article explains, Elizabeth and the team's study revealed something surprising. Across the globe, aboveground biodiversity tends to be greatest at the equator and lower at the poles. But it appears that earthworm diversity does not decrease with increasing latitude. Elizabeth stresses that more research is needed to better understand these species and their connection to nature above ground, especially in the tropics.

"We really need to think about soil as its own ecosystem, one that can change depending on location, climate and other factors," she says. "And we need to remember that soil organisms aren't just cycling things underground, they are contributing to life above ground. Soil critters consume dead plant and animal material, reincorporating it to living organisms and releasing nutrients that growing plants need. In this way, organisms in the soil really are the link between life and death."





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