

IMPACT REPORT

2022-2023



Center for Native Pollinator Conservation



Background Summary

The pollination of plants is the cornerstone of most ecosystems. Ninety percent of flowering plants need the help of animals to move pollen for reproduction. Twenty-five percent of birds and many mammals, from bears, to squirrels, feed on the fruits and seeds produced through pollination. Though we may take their services for granted, our actions, such as reducing and fragmenting their natural habitats, pollution, misuse of pesticides, and the introduction of alien species and diseases, impact pollinators and the services they provide.

The WildCare Institute Center for Native Pollinator Conservation (CNPC) focuses on the importance and diversity of native pollinators for the maintenance and survival of wildlife, ecosystems and agriculture.

The goals of the Center include:

- » Educating people about the importance of pollinators for the plants and wildlife around them
- » Cultivating and supporting local, national and international collaborations to develop pollinator conservation programs and research
- » Advancing our understanding and appreciation of native bees and other pollinators

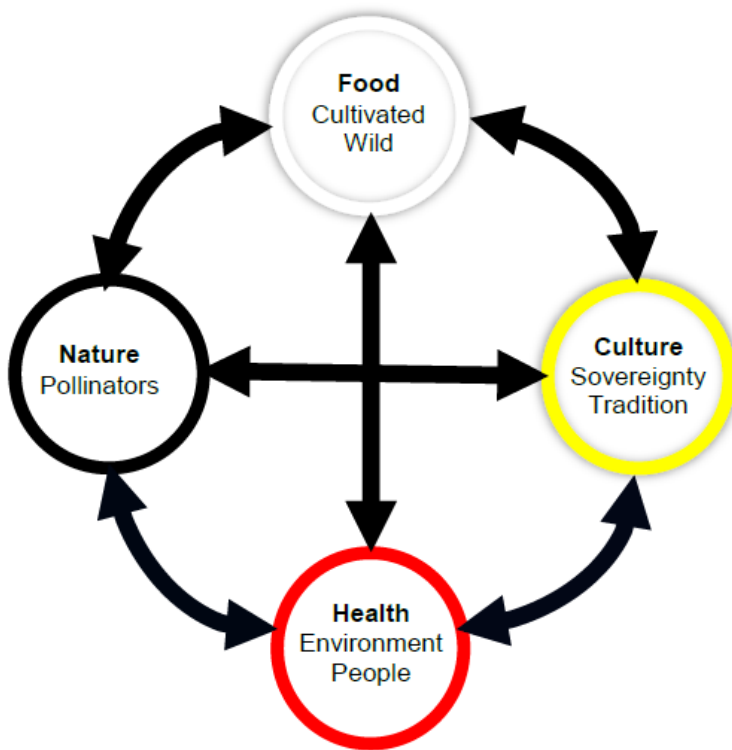
Focal Regions and Species

There are over 20,000 species of bees worldwide, with over 4,000 in North America alone, and over 475 species in Missouri. Bumble bees and squash bees are the flagship species of the Center. Bumble bees are probably the most recognizable bees. Worldwide, there are 250 bumble bee species, with 50 species in North America. These bees are integral for the pollination of many of our crops and the survival of many plants and wildlife. The squash bee is the symbol of the **Native Foods Native Peoples Native Pollinators**, due to their specialization on squashes as part of Indigenous agriculture. Overall, the majority of the CNPC's efforts are focused on native bees. Additional conservation efforts are aimed at monarch butterfly conservation.

Achievements in North America

Center Theory of Change

Currently we are implementing a core strategy: Native Foods Native People Native Pollinators. The strategy focuses on issues of food security of Native Americans and First Nations people, the intersection of wild and cultivated foods, cultural traditions and food sovereignty, healthy lands and people, and nature (as represented by pollinators).



Links affecting Indigenous peoples' food systems, health, culture and the environment. Modified after Turner, Nancy J., Mark Plotkin and Harriet V. Kuhnlein. 2013. Global environmental challenges to the integrity of Indigenous Peoples' food systems. In : Indigenous Peoples' Food Systems and Well Being FAO.

Native Foods Native Peoples Native Pollinators

Over the past two years, the CNPC continued to expand and develop its signature Native Foods Native Peoples Native Pollinators working with Native Americans and on tribal and reservation lands. The CNPC continued its ongoing work with the:

- » Ho-Chunk/Winnebago Tribe
- » Omaha Nation in Nebraska
- » Oglala Sioux (Lakota) on Pine Ridge
- » Confederated Salish and Kootenai Tribes of the Flathead Nation in Montana

In 2022-2023 the CNPC added working with the Ioway Tribe of Kansas and Nebraska and the Otoe-Missouria Tribe of Oklahoma.

The CNPC, continued working with Arise Veterans Foundation, a Native American veterans organization, as part of a three-year USDA grant called "We Are All Related" to educate veterans and others in Indian Country on indigenous and regenerative agricultural practices to improve food security, food sovereignty, economic development and biodiversity in farming. Contributing to this effort, Center director, Ed Spevak presented eight on-line lectures:

- » Introduction to Pest Management
- » Pests and Pesticides
- » Biodiversity and Farming
- » Beneficial Insects for Pest Control
- » Agroecology and Conservation Farming
- » Farm practices and Pest control
- » Planting and habitat for Pollinators and Beneficials
- » Vertebrates Pests and Beneficials, Supporting Birds and Farming

For the Tribal Pesticide Program Council (TPPC) of the EPA, Ed presented two, two-hour on-line courses on Native Bee Biology and Native Bee identification. These TPPC courses are posted for continuing education of TPPC, EPA and Tribal members. Ed also worked, as part of a New Technologies for Agricultural Extension (NTAE) grant, on an animated short on the importance of pollinators to be used with youth in schools in Indian Country.

The CNPC supplied fruit and vegetable seeds for planting on the Winnebago Tribal Farm of the Ho-Chunk/Winnebago Tribe and the Omaha Nation Public School farm of the Omaha Nation, as well as corn for the Omaha Nation Public School. No additional corn seed was supplied to the Ho-Chunk/Winnebago as the tribe has been able to grow and save seeds from previous gifts of corn to the tribe. They now grow enough to meet the needs for their ceremonies and funerals, which is culturally important for the tribe. The Omaha Nation Public School farm is working with students to help supply food for the school as well as tribal community members as well as provide pollinator habitat for native bees.



Students learning the stories of the corn and harvesting from Elders at the Omaha Nation Public School

The CNPC supplied fruit trees to the Winnebago Tribal Farm. Fruit trees will supply needed nectar and pollen for pollinators as well as provide healthy fruit for people. Additional farming and gardening tools and equipment including a seeder were supplied to the Winnebago Tribal Farm. The CNPC continues to work with indigenous communities within the state of Missouri, supplying native trees, shrubs, seeds and equipment for pollinator habitat and regenerative farming to the Coahoma Orchard project, in the Greater Ville area of St. Louis City, supporting individuals of Mississippi Choctaw/African descent.



Students harvesting beans and squash from the Omaha Nation Public School Farm

The CNPC Native Foods Native Peoples Native Pollinators program supports Indigenous farming practices that support pollinators and other wildlife. Indigenous farming works to implement traditional values of respect for land, water, animals, and plants. It supports perpetuating natural balances that form the foundation of sustainable, ecologically grounded agricultural practices. Part of these practices is to reduce, if not eliminate, the use of pesticides that can have unforeseen effects. To this end the CNPC has started supplying barn owl nest boxes, starting with Makoce Agriculture Development on Pine Ridge and Omaha Nation Public School. Rodenticides are commonly used to deal with rodent pest issues in farm areas. However, these rat poisons are now showing up across food chains affecting species from wolves and mountain lions to otters, raccoons, bobcats and domestic pets. Each barn owl nest box will provide accommodations for a family of barn owls. Barn owl diets consist mostly of rodents and studies have found that a family with chicks can consume over 3,000 rodents per year. Reducing the use of pesticides helps people, pollinators and other wildlife.



Barn owl nest box at Makoce Agricultural Development on Pine Ridge (Oglala Lakota), SD

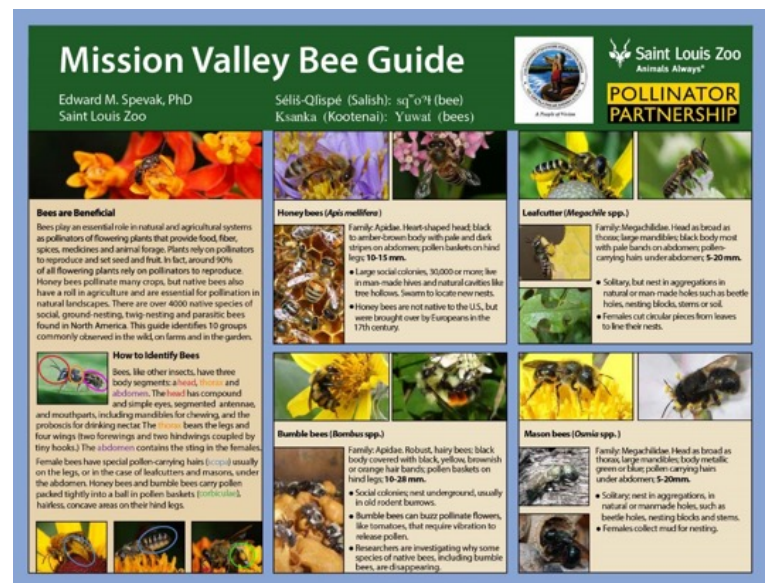
However, it should be noted that owls have differing cultural values across Native American communities being both feared and revered. Differing belief systems across Native American Tribes and Nations include the idea that owls are protective spirits (Dakota and Pawnee), a symbol of death (Ojibwe) or both a spirit of the dead and a provider of wisdom (Omaha). Many of these beliefs are related to different owl species. It is important to work with the Tribes as to both the possibility of using barn owl nest boxes and to their placement in the community.

In September of 2022, Mary Brong and Ed Spevak visited the Confederated Salish and Kootenai Tribes of the Flathead Nation in Montana where they along with colleagues of the CSKT presented to the Tribal Council on assisting the Tribes with pollinator outreach and habitat projects. They also met with colleagues regarding future projects and met with the staff of the Bison Range on designing new graphics that discuss the importance of native bees to traditional plants, their uses and the relationship between bison and bees to create and maintain habitats as keystone species. They also redesigned the two-page Common Bee Guide for use on the Flathead Nation for the Bison Range and Mission

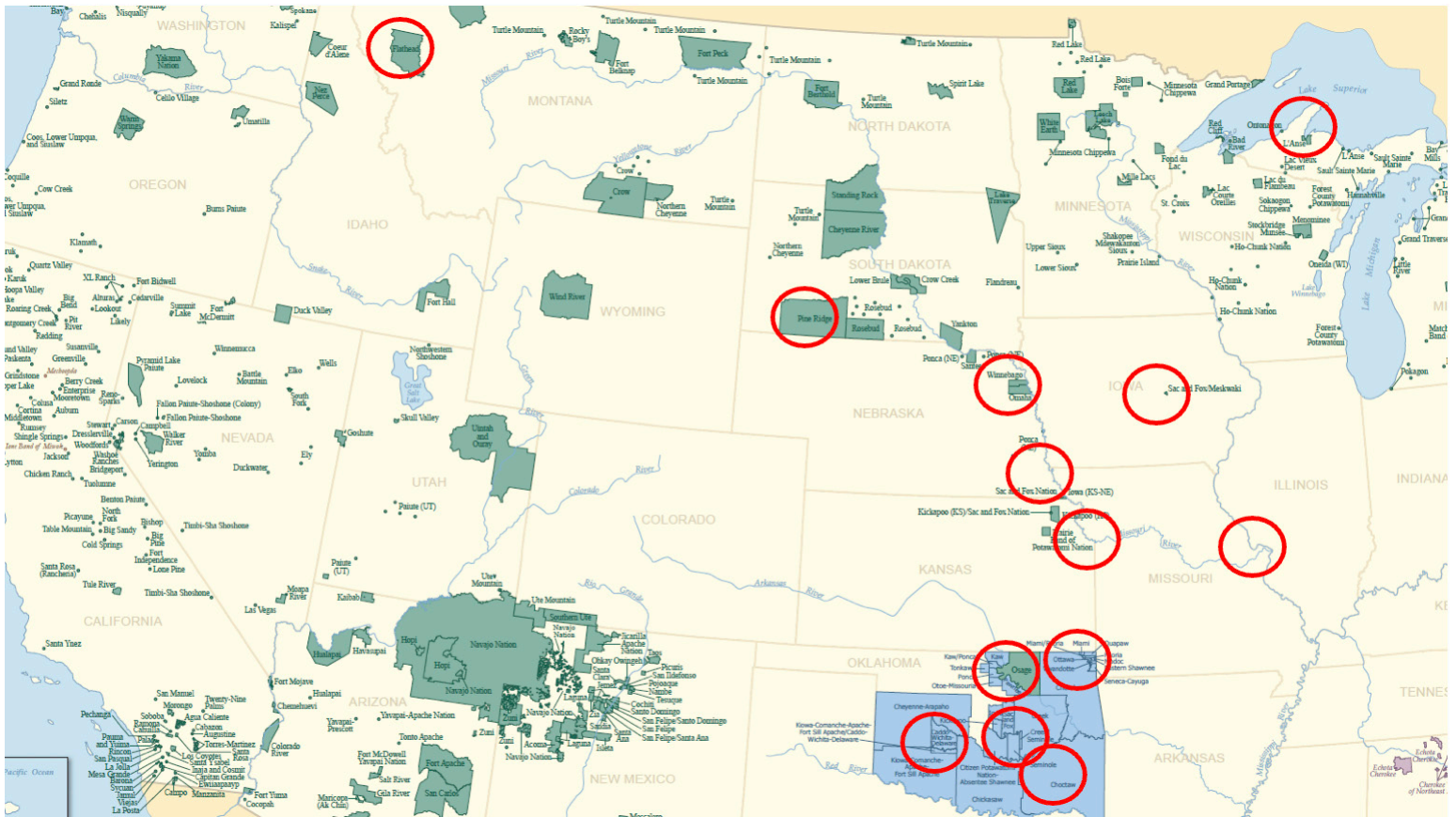
Valley. Working with Tribal representatives they had to change some bee types to represent Montana species, changed the color of the guide to represent the Tribes and added the Salish and Kootenai names for bees: Séliš-Qlispé (Salish): sqʷoʔt (bee), Ksanka (Kootenai): Yuwat (bees)



Visiting the Bison Range. From Left to Right: Whisper Camel-Means (Director, Bison Range; Division Manager for the CSKT Tribal Fish Wildlife, Recreation and Conservation Dept.), Brittani Clairmont (Pesticide Specialist, CSKT Natural Resources Department), Mary Brong (Director of Exhibits and Interpretives Saint Louis Zoo), Ed Spevak, Ph.D. (Director-Center for Native Pollinator Conservation) and Stephanie Gillin (Information & Education Program Manager CSKT Natural Resources Department)



Redesigned bee guide for use by the CSKT



Tribes, Reservations and Settlements where the Center for Native Pollinator Conservation (CNPC) is currently working or developing projects or has assisted projects with Native American communities (as indicated by red circles)

In 2022, the CNPC reached out to the Ioway Tribe of Kansas and Nebraska on how it may assist them with their new Tribal National Park they are developing with biodiversity surveys of the park, and outreach education on pollinators with Tribal members and farmers. Ed visited the Ioway and participated in several education and outreach events with the Ioway Tribe on the importance of native bees and bee identification and a kid’s game on the importance of native bees for our foods and flowers. Preliminary biodiversity studies of pollinators and other invertebrates with Saint Louis Zoo Invertebrate Dept. staff will begin in 2024.

In 2023, Ed Spevak along with colleagues of Indigenous StL and the Alliance for Native Programs and Initiatives (ANPI) (<https://sites.wustl.edu/budercenter/st-louis-community/>) made a multi-day outreach initiative to some of the Tribes in Oklahoma that have historic ties to Missouri. Indigenous StL and ANPI are made up of organizations and community members across the

St. Louis area that work with Native American communities or look to raise awareness of Native American issues within the St. Louis Area and the state of Missouri. Ed along with members of these groups met with representatives of the Myaamia, Quapaw, Cherokee, Osage, Wyandotte, Chickasaw, Pawnee, Otoe-Missouria, Peoria, Comanche, Citizen Potawatomi, Choctaw and Caw Nations, along with a formal meeting at the First Americans Museum in Oklahoma City. Through these meetings, the Center began working with the Otoe-Missouria by supplying them with heirloom vegetable seeds, native wildflower seeds and planting equipment. The Otoe-Missouria are just starting their Food Sovereignty and Food Security program along with habitat restoration for pollinators and other wildlife.



Bison on the American Prairie Reserve, Montana

The Bison-Bee Connection

Bison, like bees, are keystone species. In native grasslands bison grazing increases plant and particularly floral diversity by preferentially grazing on grasses and sedges. Their grazing pattern also creates habitat heterogeneity and they act as seed dispersers, carrying seeds in their hair. All of these activities help to maintain and create habitat for native bees and other pollinators. Bison also perform an activity called wallowing that creates depressions that support other plant species, temporary water holes for amphibians and other wildlife and nesting habitats for ground nesting bees. The CNPC, began supporting a study through equipment purchased for USDA ARS (US Dept. of Agriculture – Agriculture Research Service) researchers on the American Prairie Reserve in northeastern



Left: Bison wallowing.

Montana of the bison wallowing-ground nesting bee connection. Researchers have discovered that these wallows do create additional nesting habitats for ground nesting bees and wasps in a grassland habitat that may not offer them nesting opportunities. This is more evidence that the extermination of the bison has created a loss of biodiversity in prairie and grassland habitats, and restoring bison can help promote biodiversity.

To help restore bison on native grasslands, the AZA formally recognized the new SAFE (Saving Animals from Extinction) North American Bison program co-lead by Ed Spevak and Mollye Nardi (Birmingham Zoo) at the end of 2023. The SAFE program, working with partner AZA zoos and field partners including World Wildlife Fund, Defenders of Wildlife, Inter-Tribal Buffalo Council, IUCN SSC Bison Specialist Group, INDIGENOUSLED and the National Bison Association, will work to raise awareness of the importance of bison for ecological restoration and rematriate bison that supports native bees, monarch butterflies, grassland birds and myriad other wildlife, along with their bio-cultural restoration for the Indigenous peoples of North America. Rematriation is the term used by Indigenous people to describe the process of restoring balance to the world, and in particular, restoring sacred relationships between Indigenous people, their ancestral lands and the buffalo.



Right: Green Sweat Bee (*Agapostemon* sp.), a genus that nests in buffalo wallows in short and tall grass prairies.



Left: The I-35 Monarch Highway. Right: Seeding part of the Monarch Highway in Missouri.

Monarch Butterflies and the Monarch Highway

The I-35 corridor, running from Texas to Minnesota, has been dubbed the “Monarch Highway” as it bisects the central flyway and main breeding area for the Eastern monarch butterfly population. States along the Monarch Highway are working to promote and develop pollinator habitat along I-35 for monarchs and other pollinators.

Through an initial generous anonymous donation of \$100,000 to the Center for Native Pollinator Conservation, work began on the I-35 Monarch Highway pollinator roadsides in Missouri.

Working with the Missouri Dept. of Transportation (MODOT) and DJM Ecological Services, several areas have been improved from the Iowa border to Kansas City. The plan is to create a stepping stone corridor along its migration route and breeding area by planting rest areas, truck weigh stations and interchanges with milkweed and other native wildflowers and grasses. Currently, some 54 acres across six sites have been restored and seeded for monarch habitat. With continued support, additional sites will be restored and stewarded with the goal of MODOT assuming ultimate stewardship of these sites.

60,000 Tree Challenge & Monarch Butterfly Boxcar Relay Event



The CPKC Monarch Boxcar that toured the US.

The CNPC was invited by Canadian Pacific and Kansas City Southern Railroads to participate in the 60,000 Tree Challenge and Monarch Boxcar Relay Events that were held across the mid-west as part of their merger, and to support of monarch conservation. The new CPKC is the only railroad in North America that connects Canada, the United States and Mexico mirroring the migratory route of the Eastern monarch population. The 60,000 Tree Challenge refers to planting 60,000 trees in the monarch overwintering sites in Mexico. The CNPC participated at the event held at the Kansas City Union Station in September of 2022.



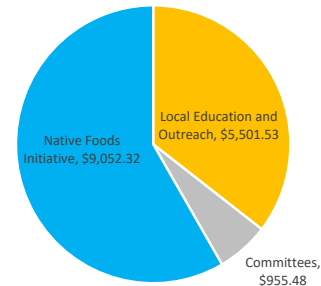
Mary Brong (Saint Louis Zoo) at the CNPC booth for the Monarch Butterfly Boxcar Relay Event at KC Union Station.

The CNPC also continues to work for broader monarch and pollinator conservation through its membership in the Association of Zoos & Aquariums (AZA) SAFE Monarch program, Missourians for Monarchs, Farmers for Monarchs, North American Pollinator Protection Campaign Imperiled Bombus (bumble bee) Taskforce, Honey Bee Health Coalition and IUCN SSC Wild Bee Specialist Group.

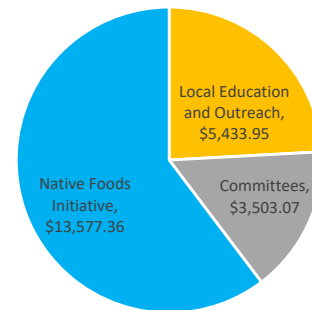
Budget Allocations by Target Programs

In 2022, the budget for the Center for Native Pollinator Conservation was \$14,000. This is an increase of \$6,000 from 2021's budget restrictions from COVID-19 budget reductions. In 2023, the budget for the CNPC was \$15,000. Both 2022 and 2023 budgets were below the pre-COVID-19 budget of \$17,000. Though the CNPC works within its limited operating budget to produce the greatest impact on programs and regions, it relies on additional revenues from the Annual Pollinator Dinner and donations to accomplish its goals. In 2022 and 2023, the Center devoted 58% and 60% of its budget, respectively, on the Native Foods Native Peoples Native Pollinators for onsite work, education and outreach on reservations, discussions with tribal members, and supplying seeds, fruit trees and garden supplies to tribal members. Committee costs are for travel and expenses for in-person meetings, e.g., Honey Bee Health Coalition, Farmers for Monarchs, Missourians for Monarchs, etc.

2022 Pollinator Center Operating Budget Allocation

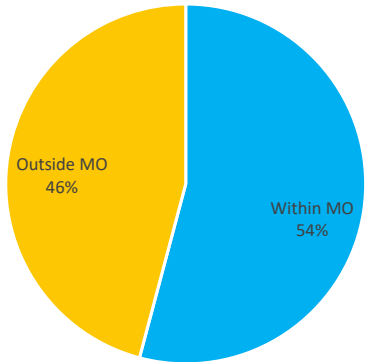


2023 Pollinator Center Operating Budget Allocation

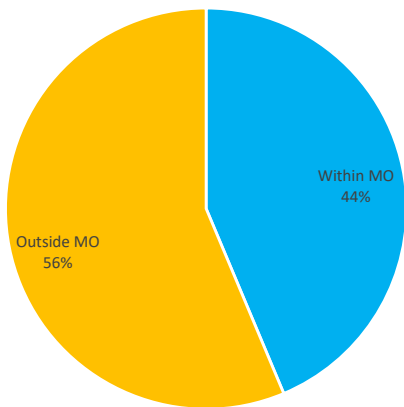


Regionally, in 2022, around 46% of expenses were focused on projects outside of Missouri, 54% of expenses were directed to local and statewide pollinator conservation efforts. In 2023, this proportion essentially reversed with 56% of expenses focused outside of Missouri and 44% directed within. This was due to increased outreach to Tribal communities and the addition of the Otoe-Missouria Tribe of Oklahoma within the Native Foods Native Peoples Native Pollinators.

2022 Conservation Support by Region



2023 Conservation Support by Region



Center Impact FY 2022-2023

Key Results of Strategy 1

[Increase In Heirloom Produce Production]

An increase in Indigenously and regeneratively managed pollinator dependent and pollinator supported crops, e.g., fruit trees and vegetables, as well as pollinator-utilized crops, e.g., corn, increases overall pollen and nectar resources to support wild native bees. Sixty-four varieties of heirloom fruit and vegetable seeds were supplied to the Winnebago Tribe and the Otoe-Missouri Tribe as well as Coahoma Orchard in St. Louis, and 50 pounds of two varieties of heirloom corn seeds was supplied to the Omaha Nation Public School for the school farm. Additionally, farming and gardening tools and equipment for crop production were supplied to the Ho-Chunk/Winnebago and Otoe-Missouria.

Key Results of Strategy 2

[Increase in pollinator friendly/dependent acreage]

Distributed 1,500 native wildflower seed packets at various events. Prepared and seeded 33 additional acres of the Monarch Highway (I-35) in Missouri bringing the total, to date, to 54 acres. Forty-five native fruit trees, including paw-paw, persimmon, serviceberry and chokeberry, were supplied to the Coahoma Orchard project along with 206 native wildflowers of over a dozen species including marsh milkweed, purple coneflower, bee balm, foxglove beardtongue, obedient plant and ox-eye sunflower. All of these species are pollinator dependent and will add resources of pollen and nectar for native bees, flies and other pollinators. Moreover, the fruits from the trees and shrubs will provide for people and wildlife. Fifty-five native wildflowers of 22 species along with seed packets of an additional 66 species, were supplied to the Omaha Nation Public School for the “Medicine Wheel” Pollinator Garden and surrounding habitat to increase pollinator habitat and resources to maintain and improve pollination of their food crops.



“Medicine Wheel” Pollinator Garden at Omaha Nation Public School
(Photo by Suzi French)

Key Results of Strategy 3

[Increase in pollinator diversity and abundance]

As part of an urban orchard project looking at both the effect of increasing nesting sites for native bees on fruit production, and increasing nesting resources for native bees, 12 bee hotels, with over 100 nest holes each, and six raised bee beds were installed in twelve community gardens in St. Louis City and St. Louis County. This 2023 project included University of Missouri-St. Louis, Webster University, and Maryville University. Students monitored bee hotels and bee beds as part of the project with the data currently being compiled and analyzed.

Significant Presentations and Outreach

Presentations regarding the Native Foods Native Peoples Native Pollinators, pollinators and biodiversity were given for the:

- » Wisconsin Tribal Conservation Advisory Council
- » Nebraska Indian Community College
- » Tribal Pesticide Program Council/EPA workshops on
- » Native Bee Biology and Bee Identification
- » Ioway Tribe of Kansas and Nebraska
- » USDA We Are All Related grant Classes
 - » Introduction to Pest Management
 - » Pests and Pesticides
 - » Biodiversity and Farming
 - » Beneficial Insects for Pest Control
 - » Agroecology and Conservation Farming
 - » Farm practices and Pest control
 - » Planting and habitat for Pollinators and Beneficials
 - » Vertebrates Pests and Beneficials, Supporting Birds and Farming
- » TBE Architects
- » Field to Market
- » Association of MO Cooperatives in Jefferson City
- » Sustainability Committee of CropLife America
- » Missouri Humanities Council
- » Living Earth Collaborative

- » Wild Ones
- » Audubon Society of St. Louis
- » Electric Power Research Institute (EPRI)
- » Project Wingspan: Agricultural Lands Habitat Management Workshop
- » AZA SAFE Monarch
- » AZA SAFE North American Bison program at AZA National and Mid-Year Conferences
- » St. Charles County Master Gardeners
- » Lincoln Extension
- » St. Louis County Library

Grants Received

- » We Are All Related (WAAR): Native Ways of Knowing Agri-Sciences - with Arise Veterans Foundation (PI), Pawnee Nation College and Nebraska Indian Community College (NIFA/USDA Agricultural Program Three-Years at \$250,000/year)
- » Maximizing Pollination Services In Urban Orchards – with University of Missouri - St. Louis (PI), Saint Louis University, Webster University, Maryville University, Saint Louis Zoo and Missouri Botanical Garden (USDA NIFA \$633,000.00)

Major Donations

- » Anonymous donation. I-35 Monarch Highway/ Pollinator Roadside, \$100,000

Publications

Maynard, Lily, Paige Howorth, Jaret Daniels, Katie-Lyn Bunney, Rebecca Snyder, David Jenike, Trent Barnhart, Edward Spevak, Patrick Fitzgerald, and Zak Gezon.

“Conservation psychology strategies for collaborative planning and impact evaluation.” *Zoo Biology* (2022); 1–14.

Evans, E. C., J. P. Strange, B. M. Sadd, A. D. Tripodi, L. L. Figueroa, L. D. Adams, S. R. Colla, M. A. Duennes, D. M. Lehmann, H. Moylett, L. Richardson, J. W. Smith, T. A. Smith, E. M. Spevak, and D. W. Inouye. 2023. Parasites, parasitoids, and hive products that are potentially deleterious to wild and commercially raised

bumble bees (*Bombus* spp.) in North America. *Journal of Pollination Ecology* 33(3), 2023, pp 37-53.

Figueroa, Laura L., Ben M. Sadd, Amber D. Tripodi, James P. Strange, Sheila R. Colla, Laurie Davies Adams, Michelle A. Duennes, Elaine C. Evans, David M. Lehmann, Heather Moylett, Leif Richardson, James W. Smith, Tamara A. Smith, Edward M. Spevak, David W. Inouye. Endosymbionts that Threaten Commercially Raised and Wild Bumble Bees (*Bombus* spp.) *Journal of Pollination Ecology*, 34(2), pp 14-36.

Plan For The Future

The CNPC will continue to develop and evaluate its programs with the Native Americans as well as working on additional pollinator projects within the region:

- » The Native Foods Native Peoples Native Pollinator initiative will continue to work with the Ho-Chunk/Winnebago, Omaha, Oglala Lakota, Otoe-Missouria, Ioway Tribe of Kansas and Nebraska and Confederated Salish and Kootenai Tribes (CSKT) to restore habitats and expand planting of pollinator dependent crops and supporting habitats.
- » The CNPC will look to recruit Indigenous students in its projects on reservations and in St. Louis.
- » The CNPC will continue to work with various Tribal members on bee identification to help determine bee diversity and abundance in restoration and agricultural projects/areas.
- » The CNPC will expand its outreach efforts across Indian Country to educate and inform people about the value of native bees and other pollinators and habitat restoration, assist those Tribes and Nations seeking advice, and help as possible.
- » The CNPC will begin projects with the Wichita and Affiliated Tribes.
- » Through the Native Foods Native Peoples Native Pollinators and SAFE North American Bison program work with the Omaha Nation and Winnebago Tribe to restore bison pastures and work with the Otoe-Missouria to develop a bison habitat restoration program and look for other Tribes and Nations that would like to participate and request assistance.

- » Continuing seeding/planting the I-35 Monarch Highway/Pollinator Roadside in NW Missouri with the eventual goal of over 100 acres of native wildflower plantings across all possible interchanges and rest areas from Iowa to Kansas City .
- » Work with the CSKT Bison Range, Makoce Agricultural Development, and Omaha Nation Public School to develop, design and install signage in their Native languages explaining the relationship of pollinators to important plants used by the Tribes. Also, work with the tribes to develop educational programs on pollinators and native plants and food.
- » Continue to support research on the American Prairie Reserve in NE Montana and other areas focused on the effect of bison wallows and grazing on native bee nesting habitat and diversity.
- » Continue discussions with the Yellowstone to Yukon Conservation Initiative (Y2Y) on how to assist the Y2Y in the Idaho Panhandle Bees to Bears Climate Adaptation Project at the Boundary-Smith Creek Wildlife Management Area.
- » Continue working with Arise Veteran Foundation, Nebraska Indian Community College and Pawnee Nation College to educate and train veterans and other members of Indian country on indigenous and regenerative farming practices to support healthy foods, healthy peoples and healthy pollinators.
- » Continue to work with the Tribal Pesticide Program Council of the EPA to support native bee and pollinator conservation.