



Case Study by CART

Improving Pollinator Habitat on McConnell Air Force
Base

A Case Study on Restoration
March 4, 2024



Introduction

Military lands contain some of the United States' most intact natural areas that provide essential ecosystem services and value for native wildlife. McConnell Air Force Base (AFB), located in Wichita, KS, is part of a regional watershed that drains into the Arkansas River, important for fish and supporting wildlife. The AFB lands were originally native prairie and are a quarter-mile from the Interstate-35 corridor, also known as the "Monarch Highway." This is a key migration flyway for pollinators like the [monarch butterfly \(*Danaus plexippus*\)](#), which is a candidate for listing by the U.S. Fish and Wildlife Service (USFWS) under the Endangered Species Act. Since 2015, federal agencies have prioritized pollinator-friendly practices like habitat restoration along the corridor. Protecting and restoring habitat along the interstate helps preserve important feeding and breeding resources for pollinators year-round, supports monarchs during their fall and spring migrations, and provides educational examples of effective pollinator habitat to the public.

The historical military-base landscape, long accepted by the greater military community, is dominated by mowed turf grass, introduced species of Asian and European tree cultivars, and non-native ornamental shrubs and flowers. These non-native species offer low habitat value to pollinators along this important flyway. Additionally, stormwater at McConnell AFB drains into the local watershed at speeds that channelize waterways and erode banks and base infrastructure. Stormwater management issues jeopardize local ecosystem integrity and increase grounds maintenance costs for the AFB.

Under the Sikes Act, the Department of Defense, in partnership with state and federal wildlife agencies, is responsible for implementing natural resource management practices on military bases that help conserve fish and wildlife resources via [Integrated Natural Resources Management Plans](#). In 2016, USFWS began partnering with McConnell AFB to plant native species and integrate ecosystem engineering on the AFB landscape that utilizes nature-based solutions. Partners selected native species to both benefit pollinators and improve stormwater management and resilience to flood events.

McConnell AFB is one of the largest employers in the Wichita area. To achieve project success, partners worked with the AFB and greater Wichita community to build understanding about the importance of pollinator conservation and demonstrate that changes to the base's landscape would not increase costs.



Key Issues Addressed

Kansas is home to approximately 400 bee and 300 butterfly species whose primary food sources are the flowers and leaves of native plants. Military base managers have traditionally used non-native plant species in their landscaping. These non-native species provide limited food and habitat for native pollinators. Moreover, even though the AFB is located along a key migratory pathway for monarch butterflies, and contains important local natural resources, building a pollinator-friendly landscape had previously not been a priority. Planting native Kansas plants helps support a diversity of pollinators, including the migratory monarch butterfly. Maintaining pollinator biodiversity is key for healthy, functioning ecosystems.

In addition to providing limited benefit to local wildlife, the traditional military landscape does little to support effective stormwater management. Large impervious surfaces like aircraft runways generate fast-flowing stormwater runoff that has the potential to erode the surrounding riparian landscape if it is not effectively managed. The shallow roots of non-native turf grasses offer limited soil structure and resistance to slow fast-flowing stormwater. These landscape features undermine ecosystem integrity and also increase maintenance costs, as regularly mowed turf grasses require more maintenance than native species and provide limited support against erosion. Close mowing inhibits root growth, reducing establishment of deep, fibrous roots that absorb stormwater. Additionally, mowing close to the streambanks can increase erosion from mower and foot traffic. Establishing riparian buffers and native grasses can mitigate these water management issues by stabilizing streambanks and reducing runoff volume and velocity. They also provide key food, nesting, and sheltering resources to native pollinators on the AFB's grounds.

Hesitancy to shift from the predominant landscaping culture on bases is often mired in the perception that native plants are messy or difficult to manage and that they will increase nuisance wildlife in urban areas. To make sure initial native planting efforts

were successful and were sustained, the USFWS worked continuously to engage the greater AFB and Wichita community about the benefits of planting natives, both for pollinators and for benefits to McConnell AFB.



Project Goals

- Incorporate native Kansas plant species and natural ecosystem features that are pollinator-friendly, assist in stormwater management, and are cost effective
- Engage community members in project implementation and provide education on native pollinators and plants
- Secure buy-in from the McConnell AFB community for pollinator-friendly landscapes

Image Caption: *Clasping coneflower in bloom in the stormwater management prairie at McConnell Air Force Base. Courtesy of USFWS.*



Project Highlights

REST AND REFUEL

McConnell AFB is a regional refueling base for military aircraft and a rest stop for monarchs during their annual migration across North America.



- **Hosting Pollinators:** The Kansas Air National Guard helped establish lawn patches of buffalo grass (*Bouteloua dactyloides*) and three species of milkweed (*Asclepias* spp.) to host pollinators during the summer on McConnell AFB. Monarch caterpillars have been observed in these newly planted areas.
- **Planting Natives Species:** To match the base's orderly landscape design and address concerns about the messy look of native species, partners converted three established non-native flower beds into orderly patches of native plants. Purple poppy mallow (*Callirhoe involucrata*), prairie coreopsis (*Coreopsis palmata*), and prairie dropseed (*Sporobolus heterolepis*) are pollinator-friendly plants that require little maintenance and are drought-tolerant and visually appealing. Additionally, partners collected wild-type seeds from local natural areas and native species they planted to provide regionally appropriate options to pollinators.
- **Stormwater Management:** Native Kansas species of big bluestem (*Andropogon gerardii*), switchgrass (*Panicum virgatum*), barnyard grass (*Echinochloa crus-galli*), and swamp milkweed (*Asclepias incarnata*) were planted to form a three-meter-wide vegetation buffer along sections of the riparian corridor on the base. Additionally, the base constructed bioswales, or rain gardens, in areas with heavy stormwater runoff and used exclusively native plants. The bioswales are a nature-based solution that served the dual purposes of providing nectar sources for native pollinators while acting as giant "sponges" to reduce costly stormwater inputs into the base's drainage system.
- **An Outdoor Classroom:** Partners encouraged military families and local schools near the AFB to assist with native plantings.

More than 100 school children, often children of people working on the base, participated in native seed collection, butterfly surveys, and other outdoor experiences to increase their understanding of and engagement with native species. Additionally, homeschooled children of military families formed an after-school ecology club to further explore the environment on the base and learn about native species and their benefits to pollinators.

- **Cutting Costs:** The native Kansas species planted on the base do not require heavy maintenance. Perennial species survive through the winter and only need to be trimmed in late winter for aesthetic purposes. Additionally, once the native perennial plants have been established (after one year), they no longer require watering because their deep roots can tap into groundwater, reducing irrigation costs. An example of an especially cost-effective genus is *Liatris* which is visually appealing, low-maintenance, and produces thousands of seeds every year, which can be collected for seeding in other areas.

Image Caption: *A bumble bee and a skipper sitting side-by-side on the same purple coneflower on McConnell Air Force Base. Courtesy of USFWS.*



Lessons Learned

Partners selected native species appropriate to the region. Whenever possible, they collected wild-type seeds from local natural areas instead of using native plants cultivated through selective breeding by suppliers. Partners assumed that these local ecotypes of native species would be more appealing to pollinators and could maximize benefits. Partners planted seeds in March after cold-stratifying in a refrigerator. Plant plugs were planted in September.

Native Kansas perennial plants have key features not present in non-native species that help manage stormwater runoff. Deep root systems stabilize the streambank and dense stems and leaves reduce flow velocity. Both of these features help reduce stream flashes during heavy rainfall, making these areas more resistant to erosion.

Partners kept AFB employees and the public engaged throughout the project. In the early stages of project implementation, partners integrated native species in high-profile areas so they would be easily noticed. They used ample signage to publicize restoration projects and educate community members about benefits of restoration for both pollinators and the AFB. The signs helped indicate areas being restored to a more native ecosystem—not an area that was forgotten by maintenance or mowers. Additionally, partners distributed briefing materials for every major project to explain what issues were to be addressed through the incorporation of native plants.

By listening to the concerns of the AFB community early on in project implementation, partners were able to ease concerns and build trust through community engagement and consistent communication. For example, AFB community members believed that the introduction of riparian buffers and native grasses would increase the potential for Bird/Wildlife Air Strike Hazards (BASH) because birds would be attracted to the native plants. They were concerned that increased bird presence on active runways could cause severe damage to aircraft, threatening the safety of military personnel. Partners addressed this concern by initiating monitoring of bird species composition and abundance immediately following the installation of the riparian buffers.

The USFWS and partners adapted the language in their outreach materials so that project goals and principles would be better understood by the target audience. For example, focusing on the engineering and low-cost maintenance benefits of projects, as well as sharing examples of successful native landscaping in other sites such as [Tinker Air Force](#) Base, was key for securing buy-in from AFB employees.

Image Caption: *A demonstration prairie at McConnell Air Force Base planted with over 300 milkweed plants. Courtesy of Mike Jungen, USFWS.*



Next Steps

- Monitor riparian buffers for erosion from runoff and prevent encroachment of saplings and invasive plants such as eastern red cedar (*Juniperus virginiana*), curly dock (*Rumex crispus*), and Johnson grass (*Sorghum halepense*).
- Continue maintaining native plants on the AFB to support migrating and resident pollinators.
- Survey for pollinators to track utilization of native plants on the AFB.
- Communicate the project's success at conferences to promote the adoption of these natural resource management practices on other military bases: partners hope framing these restoration practices as a way to address stormwater management issues will motivate other military bases to make similar transitions.

Image Caption: *Volunteers installing a red cedar revetment to a highly eroded section of McConnell Creek. This installation will collect sediment and stabilize the bank to restore the stream channel. Courtesy of Dana Shellhorn, USFWS.*



Resources

June 2021 Case Study Handout

Collaborators

- [McConnell Air Force Base Natural Resources Department](#)
- [U.S. Fish and Wildlife Service](#)

Funding Partners

- Air Force Pollinator Pilot Project grant funded via the U.S. Fish and Wildlife Service and the Air Force Civil Engineer Center

Resources

- [Kansas Air National Guard Native Plantings Brochure](#)



Photo Gallery

- [Photo Albums and Credits](#)

Contacts

- Laura Mendenhall, Fish and Wildlife Biologist, U.S. Fish and Wildlife Service: laura_mendenhall@fws.gov

CART Lead Authors

- Malik Scott, Student Intern, University of Arizona
- Mayra Hernandez, Student Intern, University of Arizona
- Anna Weinberg, CART Research Specialist, University of Arizona: akweinberg@arizona.edu

Suggested Citation

Scott, M., Hernandez, M., Weinberg, A., and Mendenhall, L. (2021). "Improving Pollinator Habitat on McConnell Air Force Base." CART. Retrieved from <https://arccg.is/19Xf8n0>

Image Caption: *Monarch butterfly sitting on butterfly milkweed planted on the edge of a gravel drive on McConnell Air Force Base. Courtesy of USFWS.*

More Information on CART