Small Scales, Big Impacts

How conservation makes positive impacts for biodiversity and community awareness despite limitations related to the amount of land, number of employees or the size of managed species.

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The pollinator garden at the Toyota San Antonio Visitor and Education Center

Message from our sponsor: TOYOTA

Toyota is always interested in scale. Our lean manufacturing philosophy means that we scale according to market demand, and the diversity of our customer base requires that we maintain scale in our portfolio of products. As members of Wildlife Habitat Council (WHC), Toyota appreciates scale in conservation with 13 WHC Conservation Certification® programs, ranging from 41 to 8,000 acres across a variety of operations and locations. By making conservation accessible at many scales, WHC certification becomes accessible to many employees.

Toyota's Challenge 2050 seeks to establish a future society in harmony with nature. To do this, we are committing to planting forests around factories and connecting nature conservation to the education of children. Both of these approaches can be done at scale, at small sites and at locations with restricted access, limited land or challenging conditions. Both of these approaches wield results that are not constrained by the scale of the effort.

Consider a single tree in a small space. When it's the right tree it benefits biodiversity, and when it's planted in the right place it benefits people. A tree native to its location will host caterpillars, birds and small mammals including bats. It will drink storm water and clean the air. A single tree can shade a building in the summer and provide barrier against winter winds. As Toyota advances its reforestation program, small spaces will become good places for trees.

Toyota's commitment to connect children to nature in an informed and environmentally literate way is a project where the size of the cohort is not a limit on the size of the impact. For every child we reach with environmental education, a family will become more informed. For every classroom that connects to conservation, a community will become enlightened. Children are powerful message carriers so small-group efforts lead to large-scale outcomes.

Toyota is proud to sponsor this white paper on small-scale projects to help spread the word that small sites, small programs and small budgets should not be a barrier to action and can, with good design and creativity, have big and meaningful impacts.

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Introduction

Conventional thinking elevates the notion that corporate conservation success is the domain of large landowners. Mining companies commit to no-net-loss policies, quarries are reclaimed with ecological objectives, paper companies manage large forest tracts with nature in mind, and utility companies embrace integrated vegetation management on sprawling electricity transmission and distribution rights-of-way systems.

But being “large” is not a necessary prerequisite to meaningful action for nature. Small spaces or limited resources need not stop corporate landowners from instituting practices that could provide habitat for small species, reconnect fragments into a mosaic of habitats, or install wildlife structures in limited areas that could have unlimited impacts.

In traditional conservation models, large budgets are considered essential for significant conservation outcomes. This theory also requires large workforces to support meaningful employee or community engagement efforts. However, creative thinking and a working knowledge of conservation context can challenge these notions by enabling projects with positive biodiversity and business outcomes with realistic budget and personnel requirements.

Thinking "smaller" provides private corporate landowners an accessible starting point for action. These actions could develop into gateways for conservation on larger landscapes, and for repetition of small acts of conservation across multiple locations. Designing small for biodiversity is a low risk exercise that can have a high rate of return when a successful small project can be highlighted as an unique but welcome addition to a corporate workplace.

This white paper explores what it means to work on a small scale for a big impact for nature. Case studies analyze how limited outdoor space is not a limit to action, and that green infrastructure projects like rain gardens do not need to be expansive (or expensive) to have a high impact. (Spoiler alert: an impervious surface only requires

Native gardens of any size provide important benefits to bees, butterflies and other pollinators.

7-20% of its area to be converted to rain gardens to make a difference.)

This white paper also looks at how stepping-stone and mosaic habitats address fragmentation (one of the largest threats to biodiversity), as well as how artificial structures for species can be installed in small spaces. Not forgetting the human dimension, this white paper also reviews meaningful efforts with limited resources in terms of employees and budgets.

Beyond corporate ESG (environmental, social and corporate governance) and sustainability reporting, and outside of determinations of risk and materiality, we must acknowledge that the built environment —whether corporate, commercial, residential or industrial— impacts biodiversity. A corporate headquarters in an urban setting, suburban office, industrial park, mine, quarry or rural factory all impact biodiversity. The manufacture, movement and consumption of goods and services impacts biodiversity. Along the value chain, nature is affected but there also exists opportunities to mitigate and create healthy and productive habitats across a variety of scales.

Only one scale truly matters for biodiversity on diverse lands – the timescale. Corporate conservation programs will create much better outcomes if invested in across growing seasons and life cycles. A small project mainstreamed into operations and managed according to conservation objectives and best practices over years can realize meaningful outcomes.

> **Being “large” is not a necessary prerequisite to meaningful action for nature.**

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Limited Outdoor Space

Small garden offers significant biodiversity value

It is not always necessary to have large acreages of land for business to make a difference for nature. Corporate facilities in urban areas or with limited outdoor space can contribute habitats that benefit multiple species. Many studies have shown that small plots of land, if managed appropriately, can have significant impacts on wildlife. Small, highly-mobile species like bees, butterflies and songbirds will move between small patches of habitat within their flight ranges to find all of their life cycle needs.[1] Even in urban areas, small gardens planted with native species and managed with pollinator-friendly practices can help boost populations of pollinators such as monarchs[2] and bees.[3]

Aristeo Construction maintains a small garden designed and managed to benefit local pollinator populations.

The headquarters of Aristeo Construction, a full-service general contractor in Detroit, Michigan, is located in an area of light-industrial facilities and almost 90% paved. Recognizing a need for both employee engagement and biodiversity enrichment, Aristeo focused its conservation program on providing quality pollinator habitat in the form of a native pollinator-friendly garden near its office building and parking lot.

Despite its small size, the 0.05-acre (2,178-square-foot) garden provides significant value to local pollinator populations. When designing the garden, Aristeo considered the needs of local pollinator populations to provide the greatest benefit. The overall design considered multi-seasonal value including over-wintering protection, maximizing sunlight and basking structures. Native tree, shrub, wildflower and grass species were selected to provide habitat needs such as cover, larval host plants and nectar resources throughout the growing season. The species were arranged in a way to improve cover for overwintering pollinators and allows for an abundance of sunlight. Structures such as large rocks and bee blocks were added to provide basking sites and bee nesting sites, respectively.

Employees have been engaged with this project from inception. During development, Aristeo hosted an educational session for employees to learn about

Small gardens can benefit pollinators such as the monarch butterfly.

pollinators, the plants that benefit them and the need to provide habitat. Twenty employees now regularly participate in monitoring and maintenance of the garden, which helps make informed decisions about future management.

Employees also participate in the annual volunteer day and help with garden maintenance like replanting, mulching and weeding.

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The Educational Value of Small Native Gardens

In addition to providing habitat, native gardens offer an ideal opportunity for people to interact with nature and gain a wider interest in nature and conservation issues.[4] Their small size makes the native plants and wildlife more accessible and easier to take in, and adding plant labels or educational signage enables visitors to learn more about the native species they contain.

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Green Infrastructure

Small rain garden provides high-impact ecosystem services

Rain gardens benefit biodiversity and address stormwater runoff.

Green infrastructure projects like rain gardens, bioswales and green roofs can address environmental challenges such as stormwater runoff and the heat island effect. The WHC Green Infrastructure white paper shows how projects can be easily designed to benefit biodiversity, such as by using native vegetation that provides food and cover resources to wildlife.[5] These green infrastructure projects need not be large in size or cost to successfully address environmental challenges. A rain garden of 7% - 20% of the size of the impervious drainage area will manage runoff from most storms.[6]

The ITC Iowa City Warehouse is one of several ITC facilities with rain gardens to manage stormwater runoff. By including native pollinator-friendly vegetation into the garden design, ITC created multiple benefits in a small area.

ITC's Iowa City Warehouse is one of the company's regional operating facilities, located on 20 acres just south of Cedar Rapids, Iowa.

Employees and consultants collaborated to create a rain garden that would benefit biodiversity while also addressing stormwater runoff from the site. Close to 500 native plants were selected for multiple benefits, including food and cover value to pollinators and other wildlife, tolerance of fluctuating water levels, and aesthetics.

During a large storm event this small 804-square-foot rain garden captures over 4,000 gallons of runoff from the building's roof. This stormwater will slowly percolate through the soil over the course of a few days filtering out pollutants and recharging groundwater. The garden incorporates guidelines from the Iowa Rain Garden Design which is considered a model of stormwater quality management in the state.

The garden also benefit pollinators and other wildlife. The native plants provide nectar and pollen for forage and include larval host plants for butterflies. The rocks that edge the garden for aesthetic purposes also double as sites for bees and butterflies to bask in the sun. These considerations have allowed the garden to attract a wide variety of wildlife, including native bees, butterflies, great golden digger wasps and black wasps, spiders, spotted cucumber beetles, flies, grasshoppers, damselflies, lightning bugs, leafhoppers, eastern cottontails and robins.

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Human-made Structures

Even just one bat house provides important habitat

Mexican free-tailed bats roost and raise young in bat houses. Photo: Bat Conservation International

Human-made structures that take up a small amount of real estate can provide high conservation impact. Nest boxes, bat houses, bee blocks and brush piles are relatively easy to construct and can supplement existing habitat on-site with artificial cover for nesting, roosting and shelter. These structures can be very successful in attracting the desired native species relatively quickly when placed in the right location[7,8], and can continue to provide valuable habitat with proper management.

The Argos Newberry Plant's bat roost project demonstrates how artificial structures for wildlife can be both successful and impactful.

The Newberry Plant is a cement production facility in northern Florida on 1,650 acres that includes an active and historic limestone mine surrounded by wooded areas, pastureland and vegetated overburden piles.

A colony of bats was roosting in an administrative building on site when plans were made to remove them. Employees jumped to action and installed a bat house to provide alternative roosting habitat. The first bat house installed was not successful, so Argos partnered with Lubee Bat Conservancy to find a more suitable location. Using acoustic monitoring surveys, the team learned that the site supports a robust and diverse population of bats, including three species that primarily roost in trees (tri-colored bat, eastern red bat and northern yellow bat) and three species that use bat houses (Mexican free-tailed bat, southeastern myotis and evening bat).

Employees installed a new bat house at the historic pit north of the plant, where the surveys had found the most bat activity and an abundant array of mosquitos, mayflies and other night-flying insects that make up the bats' diet. An additional bat house was added a few years later when monitoring found the first box filled to capacity with hundreds of Mexican free-tailed bats. Both bat houses are monitored regularly with the help of Lubee Bat Conservancy and continue to experience high occupancy rates that demonstrate the value of this project for local biodiversity.

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Fragmented Landscapes

Stepping stone habitats restore and reconnect wildlife corridors

Small patches of nature can offer significant value to wildlife when they are managed with connectivity in mind. In fragmented landscapes like suburban office parks, urban industrial areas, and rural mines and quarries, restoring and reconnecting small patches of habitat should be a priority.[9] Even isolated habitat patches have value as "stepping-stones" to provide refuges for wildlife and facilitate migration and dispersal. A chain of stepping-stones can offer cost-effective and practical means of promoting biodiversity in cities where unbroken habitat corridors are difficult to fit into the constraints of an urban landscape.[10]

Creating connectivity between fragmented habitats is vital for the long-term health of biodiversity. Connectivity ensures that wildlife can move between different habitat areas for purposes such as seasonal migration, juvenile dispersal, and finding food or mates. It also facilitates breeding between populations so that they do not become isolated and inbred.

In addition to creating stepping-stone habitat, companies can also create or enhance natural patches as part of a broader matrix of different habitat types. For example, amphibians like salamanders need small vernal pools, short migratory pathways and forested upland habitat to meet their life cycle needs. Creating such small patches within a larger landholding is a valid and useful conservation action.

CRH Americas Acton Quarry in Vaughn, Ontario, created a small vernal pool and enhanced surrounding upland areas, offering significant connectivity benefits for endangered Jefferson salamanders and other amphibians in the area.

Dufferin Aggregates, a subsidiary of CRH Americas, manages the Acton Quarry that supplies aggregates for the construction industry in the greater Toronto area. The property spans 1,002 acres with an active quarry and several historic kilns, as well as abundant forest, grassland and wetland habitat.

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The endanered Jefferson Salamander relies on vernal pools to breed and lay eggs.

The wetland areas on-site include Pool G, a vernal pool constructed in partnership with the Ontario Ministry of Natural Resources to benefit amphibians, including the endangered Jefferson salamander. The pool was designed to meet the needs of the salamanders and other amphibians in the area. Wetland plants were chosen to provide food and shelter, and woody debris was added as attachment sites for amphibian egg masses.

Employees have also enhanced connectivity between the vernal pool and adjacent forest by planting native trees and shrubs in the open space between to facilitate dispersal by mature amphibians between Pool G and other nearby vernal pools where the salamanders and other amphibians breed.

This program contributes to a province-wide effort to protect the Jefferson salamander and extensive monitoring of the vernal pool is done to evaluate success. While the rare Jefferson salamander has not yet been observed, amphibian counts, frog call surveys and egg mass surveys have identified seven other species of frogs, toads and salamanders using the constructed pond.

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Landscaping for Bees

Habitat for small creatures delivers big ecological impacts

There are many species around the world that are small in size but have a significant influence on their surrounding ecosystems, and often on economic systems as well. Among the world's small creatures, bees are arguably some of the most impactful.

There are 20,000 bee species around the world with the largest being only 1.5 inches long, while the smallest is a mere 1/16-inch long. Despite their diminutive size, bees and other pollinators are vital to the world's ecosystems, facilitating plant reproduction by pollinating over 90% of wild flowering plants. Both wild and managed pollinators also support the global economy. Over 75% of the world's food crops rely at least partly on pollination, resulting in $235 to $577 billion of crops benefiting from bees and pollinators each year.[11]

Native bees and other pollinators, such as butterflies and hummingbirds, are an ideal group of species to manage on most corporate landscapes. Although large-scale restoration of pollinator habitat is ideal, small-scale projects like native gardens, demonstration meadows, bee blocks, and insect hotels can offer significant benefits.

At the General Motors (GM) Lockport facility in New York, a variety of native bees benefit from habitat managed to provide multiple life cycle needs including foraging, nesting, basking and overwintering habitat.

Located on 358 acres in western New York, the GM Lockport facility produces automotive components such as engines, radiators and oil coolers. A landscaped area on the site was first developed with small bed gardens and was expanded into a contiguous landscaped habitat that abuts a small creek.

GM manages this habitat to benefit native bees, specifically ground-nesting plasterer bees and cavity-nesting leafcutter bees. The garden's design includes a number of bee-friendly features, including bare ground for ground-nesting bees to build their nests, bee blocks for leafcutter bees to nest, abundant flowering plants for foraging, and rocks for basking. The team also controls invasive thistle to prevent it from overtaking

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There are 20,000 bee species around the world.

the garden. Careful monitoring of bee nesting and foraging activity gives GM employees the data they need to improve the project over time, such as moving the bee blocks to more suitable locations.

Not only does the landscaped area benefit native bees, it also offers educational opportunities. With assistance from partners like the Seneca Zoo and Niagara County Soil and Water Conservation District, employees can learn about the garden while helping with monitoring and maintenance. A walking path and benches also allow employees to enjoy the garden and its wildlife on a day-to-day basis.

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Bee Blocks and Insect Hotels

When space is limited, one effective way to benefit native solitary bees is to provide nesting habitat in the form of bee blocks or insect hotels. These structures are easy to assemble with bricks, wood, leaves, pine cones or other found natural items, and provide nesting sites and shelter for for solitary bees and other beneficial insects such as butterflies, moths, ladybugs, grasshoppers and spiders.

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Species at Risk

Invasive species control of one small creature aids another

Many of the small-sized species that have big impacts are aquatic, such as freshwater mussels. Freshwater mussels can be found throughout the world and are at their most diverse in North America. Because they are filter feeders, North America's native freshwater mussels play an important role in water quality, removing suspended particles and bacteria out of the water along with the plankton they feed on. They also serve as valuable indicators of river health, as they are vulnerable to contaminants, habitat disturbances and aquatic invasive species.[12]

The Exelon Quad Cities Generation Station in Cordova, Illinois works to control invasive zebra mussels in order to protect the small freshwater mussels indigenous to the Upper Mississippi River system.

The Quad Cities Generation Station is one of three nuclear power plants in west-central Illinois, providing electricity for homes and businesses in the region since 1972. The facility is situated on 765 acres on the banks of the Mississippi River and features habitats like prairie and riverine wetlands.

As an active member of the Upper Mississippi River (UMR) Mussel Coordination Team, Exelon works to control invasive zebra mussels and protect native freshwater mussels across 10,000 acres of river habitat. Exelon began monitoring for zebra mussels more than 20 years ago, after their presence was discovered to be at a level that could impact site operations. Water samples are gathered bi-weekly to check concentrations of zebra mussel larvae (called veligers), and sampling structures in the intake bay are used to monitor settlement density and shell size for mature zebra mussels. The data gathered is reported back to the UMR team to inform decision-making about control measures for the species.

To protect native mussels, Exelon and other members of the UMR team gather every August on a nearby property in Cordova, where volunteers clean native freshwater mussels to remove attached zebra mussels that can prevent them from feeding, moving, reproducing, or regulating water as their numbers increase.[13] *The volunteers also stockpile*

North American native freshwater mussels play an important role in water quality.

endangered mussel species at points along the river for propagation activities conducted by Exelon, the U.S. Fish and Wildlife Service, and other members of the UMR team. The State of Montana has allowed for open sustainable hunting opportunities on the site, which was previously closed as private land.

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The Non-Native Zebra Mussel

Just as some small native species can positively impact ecosystems, small invasive species like zebra mussels can cause considerable harm. Since their discovery in 1988, zebra mussels have rapidly spread from the Great Lakes into several river systems in the Midwest.[14] These mussels, which are only ¼ to ½ inch in size, threaten native freshwater ecosystems by outcompeting native mussels, fish, and other species for suspended food particles, changing water clarity and smothering native mussels by attaching en masse to their shells. Zebra mussels also harm local economies and recreation by clogging water intake valves for industrial operations and encrusting equipment like boat motors and hulls, often necessitating costly cleaning and repairs.[15]

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Partnerships

Lean employee teams collaborate with the community for success

The number of on-site employees that can participate in conservation activities may be limited at many smaller corporate landholdings such as transfer stations and terminals, and many other types of corporate lands such as rights-of-way and closed facilities. However, by focusing on a few key activities and soliciting help from outside groups, even teams with just a few members can achieve significant successes.

Small teams benefit greatly by working with local partners who can offer their expertise and assistance, and help increase a program's credibility. The most effective efforts share common goals between team members and partners.[16]

Collaborations come in all forms and require different ways of working together. Each partnership should be tailored to the unique project activities, available resources, team members' knowledge, and the goals and interests of all parties.

In Braithwaite, Louisiana, a strong, ongoing partnership with local schools and organizations allows the two-member team at Freeport-McMoRan Port Nickel to provide strong educational impacts for K-12 students.

On the east bank of the Mississippi River, about 15 miles south of New Orleans, the Port Nickel site is a closed mining operation that is being restored to pre-operations conditions. The 358-acre property contains habitats such as bottomland forest, a pond, grasslands, and imperiled wetlands that Freeport-McMoRan is working to restore.

Wetland restoration efforts began in 2006, and six years later Freeport-McMoRan partnered with local high schools that needed an accessible wetland restoration project to plant seedlings grown by the local 4-H and Coastal Roots programs. The partnership has since grown to include over 160 elementary, middle and high school students who, every year, participate in a variety of wetland restoration and monitoring activities. The curriculum meets Louisiana

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Freeport-McMoRan partners with local schools for on-site STEM learning.

academic standards and imparts fundamental STEM skills such as data gathering and analysis, and working collaboratively. Every spring and fall, students conduct species surveys, learning how to identify and catalog the site's plant and animal species using tools such as iNaturalist, field guides and GPS trackers. Students are also central participants in the wetland restoration efforts. They work to identify which tree species to plant and where to plant them, implement the planting, and evaluate the success of past planting efforts using standardized monitoring techniques.

Through these activities, Freeport-McMoRan hopes to impart not only STEM skills and an appreciation for the natural world, but an understanding of natural resource management and how certain actions, from natural resource extraction to habitat restoration, have an impact on the local ecosystem.

All of this is accomplished by a small on-site team consisting of one representative who oversees and coordinates activities and a caretaker who maintains the trails, dock and other features needed for students to safely participate. The strong, ongoing partnerships between Freeport-McMoRan and local schools and other organizations has allowed the team of two to achieve significant outcomes for conservation and education.

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Scalable, Low-Cost Projects

Educational initiative achieves long-term, inexpensive results

Native landscaping at a 76 gas station in Nevada.

Companies are often looking for ways to engage their employees or the local community but may not have budgets to do so. Fortunately, nature-based educational initiatives can easily be designed as both affordable and scalable to the desired scope while still having a strong impact on learners' knowledge and behavior.

Such educational projects are most successful when they include messages specific to the audience's locale, address the community's values and concerns, and offer resources and specific actions to take. These kinds of programs can result in changes in attitudes, knowledge and even behavior surrounding conservation issues.[17]

The Phillips 66 Habitat and Conservation Education Initiative used educational guides to raise awareness about native landscaping and promote best practices.

Headquartered in Houston, Texas, Phillips 66 is a multinational energy company focused on petrochemicals and natural gas. The company wanted to help improve biodiversity as well as air and water quality at its facilities, so in 2018 the company launched an educational initiative to support its "76" brand of gas stations in California to update landscaping to beneficial native species. Phillips 66 partnered with WHC to develop a guide, which equips station owners with information on how to implement native landscaping. The guide outlines the benefits of native landscaping to pollinators and humans, and provides region-specific planting lists to help them select the best plants for their location. The company's marketing representatives, who work more closely with 76 station owners, helped to promote and distribute the guide.

Following the distribution of the guide, many of the station owners in California indicated an increase in their knowledge about native landscaping, and many even reported implementing native landscaping after just a few months. Phillips 66 plans to build on the success of the pilot initiative by rolling out additional landscaping guides for the other states in the U.S. where it operates as well as the United Kingdom.

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A call to action for corporate landowners

The case studies highlighted in this white paper demonstrate that corporate conservation programs with small-sized habitats, species, projects or teams have many possibilities to make a significant impact for conservation. From small gardens managed for bees or stormwater runoff, to river systems managed for small freshwater mussels, companies around the world need not be limited by size to have a sizeable impact.

Third-party recognition, such as WHC Conservation Certification®, can be beneficial to companies in managing risk, communicating outcomes and meeting biodiversity goals. The WHC standard is designed to provide tangible data on a company's conservation and education activities that go above and beyond compliance. This helps companies demonstrate a long-term commitment to quality habitat for wildlife, conservation education and community outreach initiatives.

Corporate landowners can engage in the following actions to manage meaningful conservation activities involving small-sized habitats, species, projects or teams:

- Download the WHC Project Guidances to assist you in designing a project that will have a meaningful conservation impact, no matter the size of the project, habitat, species or team. These documents provide guidance on how to build a sound conservation project, and strategies to help achieve stronger outcomes.
- Evaluate opportunities to create smaller habitats or structures; assess the size and condition of existing small habitats on-site.
- Survey the property for the presence of diminutive but important species and assess opportunities to enhance their habitat.
- Seek partnerships with and consult with local experts for advice and assistance with designing, implementing, maintaining and monitoring projects.
- Review regional conservation plans to identify priorities for managing small species or habitats, such as pollinators or native gardens, and determine how on-site activities could be aligned with these regional goals.
- Share your story of a successful conservation or education project by seeking WHC Conservation Certification, a rigorous, third-party standard. Through all of the Habitat, Species, and Education and Awareness themes, WHC Conservation Certification recognizes and incentivizes voluntary conservation activities, no matter the size of the project.

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Download WHC Project Guidances at **wildlifehc.org/pg**

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WHC can help support a wide spectrum of conservation activities from the design and planning, to the implementation and management of a program. We do so through a framework that connects business drivers, stakeholder and community relations, and ROI to positive environmental and conservation education outcomes. For more information, please contact us at whcconsulting@wildlifehc.org.

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