Enhancing Habitat Connectivity Through Corporate Conservation

The private sector role in reconnecting habitat for ecosystem health and resiliency

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A northeastern coyote at the Bruce Power site in Ontario.

Message from our sponsor

For five years I have had the honor of working with passionate groups and individuals on a variety of grassroots environmental initiatives.

The Bruce Power site is fortunate to be located in rural Ontario, Canada along the biodiverse shoreline of Lake Huron. The majority of our 4,200 employees choose to live, work and play in towns within 25 kilometers of the site, in areas that have ample open spaces and access to nature at every turn. This wealth of natural beauty comes with a great responsibility of ensuring that we, as Bruce Power, take all opportunities to protect, conserve and restore. Thus, our corporate philosophy is to maintain our environmental integrity for future generations.

Bruce Power provides over 30% of the electricity for the province of Ontario, and we pride ourselves on being a leading producer of clean, low-cost and reliable electricity. From an operational standpoint, we acknowledge our site interacts with the environment, and we strive to conduct business with as minimal impact as possible. When exploring community partnerships, we often seek initiatives that help us offset our environmental impact, while also focusing on groups that mirror our corporate philosophies.

Over the years we have provided monetary capacity, as well as technical and labor resources, to a variety of initiatives, which include, among many others, the planting of over 4,600 trees within area watersheds, and the creation of 17 butterfly pods that provide habitat for butterflies and other pollinator species along the shore of Lake Huron. We fund projects with the mindset that people connecting with nature are happier, and happy people result in healthier communities.

We hope this paper inspires other corporations to be active environmental stewards in their communities.

Francis Chua
Director Environment & Sustainability, Bruce Power

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Introduction

Healthy habitats are necessary for plants and animals to survive and thrive. One measure of the health of a habitat is the degree to which it is isolated from other habitats by land management practices or development, commonly referred to as fragmentation. Fragmentation is one of the biggest threats to biodiversity across the planet, as it can prevent species from moving to hunt, mate, disperse to new areas or escape predators. Fragmentation can make natural communities more vulnerable to invasive species and restrict the ability of specialized species to thrive.[1]

When corporate landowners engage in ecological connectivity initiatives to reduce fragmentation, they are contributing to landscape-scale efforts that have benefits beyond the corporate footprint and across the entire ecoregion.

There are many ways corporate landowners can help to reconnect fragmented lands and habitats. They can remove or redesign barriers to species movement, and install wildlife corridors in existing infrastructure or as part of new developments. Land managers can adapt their practices to increase the acreage being managed or restored for ecological outcomes. Corporate landowners can also add lands to existing efforts to maintain or restore connectivity by placing conservation easements on legacy lands or surplus properties.

Corporate landowners can also engage in connectivity initiatives with a human focus, creating awareness experiences for the community through education, recreational access and training initiatives. Corporations can use the lands inside their fence line as outdoor classrooms for environmental and STEM education, hiking or fishing areas, and training centers for skills acquisition in ecological management.

For both ecological and community connectivity, a needs assessment and understanding of the ecological and social contexts are important in determining the delivery and design of the structural response. If a stream corridor exists that can deliver connectivity through restoration, it may be a wiser investment than a constructed culvert or crossing. If an area is rich in recreational access yet is lacking in extracurricular educational opportunities, a community may be better served with walking and hiking trails associated with an educational program or interpretive signage. It's also important to

consider which species will benefit from enhanced connectivity and create habitat linkages to best fit their needs in the landscape. While some species are able to move between high-quality patches within developed landscapes, others with a more limited tolerance for disturbance and fragmentation may require wide, unbroken corridors.[2,3]

Whichever of the multitude of approaches a corporate landowner decides to undertake to address connectivity, the return on investment will be significant. Across Wildlife Habitat Council (WHC) membership and its 660+ programs certified with WHC Conservation Certification℠, success stories abound of minds changed, relationships forged and real ecological value added from innovative land managers looking across their fence lines and understanding that a corporate facility exists not in a vacuum, but in a community.

The following case studies demonstrate some of the ways that WHC-certified programs have enhanced connectivity using a variety of tactics at different scales.

Enhancement of connectivity on working lands is relevant at multiple scales, from hedgerows and tree corridors that connect on-site habitats to wildlife corridor networks that span large regions or cross international borders.[4]

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Contributing to large-scale wildlife corridors

Perhaps one of the more publicly visible connectivity tactics is in the creation of large-scale wildlife corridors that connect habitats on a landscape, regional or international scale. These types of corridors often follow geographic features like mountain ranges or rivers that provide natural routes for dispersal or migration, or they can involve strategic creation of a network of habitat linkages through more developed landscapes.

Large-scale corridors are essential for large mammalian predator species such as bobcats, grizzly bears and coyotes that traverse substantial distances as part of their daily movement patterns. They are also important for migratory species, including pronghorns and caribou, that move long distances between breeding and overwintering areas on a seasonal basis, as well as species that disperse long distances as young adults.[5]

Well-known systems of this scale include the Yellowstone to Yukon Conservation Initiative, an interconnected series of corridors on public and private lands that crosses the U.S.-Canada border to provide connectivity for grizzly bears and other broad-ranging species in western North America. In Australia, the Great Eastern Ranges Initiative encompasses the longest adjoining mountain forests and woodland systems, providing connectivity for two-thirds of the continent's imperiled species and three-quarters of its vegetative communities along the eastern coast from Victoria to far north Queensland.[6]

At the Santa Susana Field Laboratory in Ventura County, California, Boeing has created an important link in a large-scale wildlife corridor.

The 2,849-acre Santa Susana site has a rich history. Virtually every major U.S. space program, from the first manned Mercury flights to the Apollo moon landings and Space Shuttle fleet, owes part of its success to Santa Susana. It was also the site of energy research and development for the U.S. government, including leading-edge nuclear, solar and sodium technology. After more than 50 years of operation, nuclear research ended in 1988 and rocket engine testing ceased in 2006.

In recent years, the site's soil and groundwater have been undergoing remediation to ameliorate the impact of past activities and demolition of retired structures. The site is home to several species of concern, including the federally-listed Braunton's milk vetch and the rare Santa Susana tarplant.

Cougars utilize the wildlife corridors on the Santa Susana site to roam a large region in California.

Santa Susana provides valuable habitat connectivity on a regional scale, serving as a vital link in a wildlife corridor that connects the Los Padres National Forest to the Santa Monica Mountains and the Pacific Ocean. This corridor is used by several predatory species, such as golden eagles, Cooper's hawks, coyotes, cougars and bobcats, as well as large herbivores like mule deer. These species all have larger home ranges but face heavy fragmentation of their habitat from roads and other development in this region.

The chaparral and scrubland habitat on-site is an important part of that corridor. Boeing focuses on preserving and improving these areas that provide high-quality habitat for species of concern, working closely with conservation partners to enhance efforts. In 2005, Boeing implemented a prescribed burn of the chaparral and is allowing it to naturally regenerate. Partners, such as Pollinator Partnership and the local Audubon chapter, assist with collecting data on use of the site by pollinators, birds and other wildlife and evaluate the impacts of demolition and remediation activities on these species. Pollinator Partnership also assists with creating pollinator habitat on-site to promote native pollinator populations. Encouraging the presence of pollinators contributes to conservation of the Santa Susana tarplant, which cannot self-pollinate and requires native bees to reproduce.

Boeing recognizes the importance of educating the public, elected officials and regulators in these conservation projects and engages in a variety of year-round activities to teach and inform. This includes hosting site tours and lectures, as well as presenting and providing research on habitat management activities to non-profit organizations.

The program at Santa Susana has been WHC-certified since 2012.

Examples of engineered, managed and constructed corridor solutions that are commonplace in public areas include highway over and underpasses, removal of fencing and roadside barriers, management of hedgerows, and instructional signage.

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Creating movement routes for non-migratory species with smaller ranges

Non-migratory species with smaller ranges also require necessary connectivity to allow them to move freely between habitats. These small- to medium-scaled corridors can provide routes of dispersal for young adult animals, or they can connect different habitats needed for breeding, foraging and escape cover. Often, smaller connectivity enhancements can be accomplished entirely within the scope of the site.

Covia's Tunnel City in Wisconsin enhanced connectivity for the Karner blue butterfly by creating small-scale movement corridors between foraging and breeding habitats on-site.

The Tunnel City site includes an operating metallic mineral mine that utilizes open pit quarrying to produce industrial sand, as well as an abandoned and collapsed railroad tunnel that serves as a valuable hibernaculum for several bat species. The site also provides valuable habitat for eastern bluebirds and pollinators.

Covia's conservation activities include habitat enhancement for the federally-endangered Karner blue butterfly. The initial activities began in 2012 when Covia partnered with the Wisconsin Department of Natural Resources (DNR) to restore habitat for the butterfly with native plantings, focusing particularly on planting wild blue lupine and nectar-bearing wildflowers. Wild blue lupine is vital to the Karner blue butterfly, which relies exclusively on this plant as a food source while in the larval stage.

Covia created movement corridors by opening up dense forest habitat and planting native species between the existing butterfly habitat and the restored oak savannah habitat. Activities also included the creation of a pollinator garden and planting of other native species at the site.

Surveys for the butterfly occur during the two major flight periods when adult butterflies emerge from their cocoons for a period of about 5 to 7 days to feed and reproduce. The results of these surveys show that Karner blue butterflies, as well as a number of other butterfly species, have begun using several of the enhanced habitat areas. This survey data is reported annually to the Wisconsin DNR.

Tunnel City has been WHC-certified since 2013.

Karner blue butterflies rely exclusively on wild blue lupine as a food source while in the larval stage.

In south Florida, Waste Management's (WM) Okeechobee Landfill created small-scale forested corridors that enhance connectivity between several of the site's habitats.

The Okeechobee Landfill comprises approximately 4,100 acres and includes an active landfill and other operational areas, as well as a mixture of upland and wetland habitats, including pine flatwoods, upland oak scrub, hardwood forests, pasture grasslands, bay swamps, cypress forest lining a creek, freshwater marshes and open water.

As part of the mitigation plan, WM created 18 acres of freshwater marsh within an existing pasture located between forested wetland and xeric oak scrub habitat. In an effort to enhance the outcomes of mitigation, the company created a small, wooded corridor connecting the three habitats. WM also engaged the community and used the corridor development as an educational opportunity, inviting fourth-grade students from area schools to help plant 100 slash pine saplings over the course of several events from 2013 through 2015.

These hands-on learning opportunities were complemented by lectures about the site's habitats and wildlife, and the function and necessity of wildlife corridors. The resulting corridor is 0.20 acres in size, with plans to extend it further through additional educational events. The corridor provides important habitat connectivity for white-tailed deer, coyotes, bobcats, and small mammals, as well as food and cover for a variety of mammals, birds and invertebrates.

The Okeechobee Landfill conservation program has been WHC-certified since 2003.

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Closing habitat gaps between adjacent areas

In addition to creating corridors between habitats, companies can enhance connectivity by adding on to existing habitat patches or by filling in gaps between patches, such as reforesting a cleared area adjacent to a forest or between two remnant forest stands. Similar to other connectivity tactics, these actions result in reduced fragmentation of the landscape and facilitate movement for target species for breeding, foraging and overwintering habitats. When comparable habitat types are connected in this manner, it also reduces the amount of habitat edges and potentially creates more habitat with "interior" conditions, which is preferred or even required for many species with low tolerance for disturbed habitat.

CRH Americas Materials' Dufferin Aggregates Acton Quarry in southeastern Ontario, Canada enhanced habitat connectivity for salamanders and frogs, which breed in vernal pools and forage and overwinter in adjacent forest stands.

The Dufferin Aggregates Acton Quarry is a limestone quarry encompassing 1,002 acres adjacent to the Niagara Escarpment. Much of the Quarry's conservation efforts revolve around a 2-acre portion of the site that includes forest habitat and a man-made vernal pool, which are managed to benefit amphibians and other wildlife.

The vernal pool—a type of ephemeral wetland important for amphibian breeding—was constructed in 2011 through a process of excavation, grading, tree planting, and seeding native wetland plants, with additional native plantings and other improvements made in subsequent years. The pool was carefully designed to benefit amphibians like the endangered Jefferson salamander, and its location was selected for its proximity to known amphibian habitat. In

Vernal pools serve as breeding grounds for amphibians like this spring peeper frog.

particular, it is close enough to several known breeding pools for Jefferson salamanders to allow for dispersal of the salamanders to and from the new vernal pool.

In an effort to connect the vernal pool to the nearby forest, trees were planted in the gaps to reduce fragmentation and improve connectivity within these wooded areas. The connected stands of deciduous and mixed forest are used for foraging and overwintering by other amphibians such as spring peepers, grey treefrogs and mole salamanders. Regular monitoring such as groundwater and surface water monitoring, frog call surveys, amphibian egg mass surveys, and vegetation surveys are used to evaluate the project and inform future activities.

The Dufferin Aggregates Acton Quarry won the WHC Wetlands and Water Bodies Project Award and the WHC Reptiles and Amphibians Project Award in 2017 for its activities related to the creation and management of the vernal pool for amphibians.

This program has been WHC-certified since 2017.

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Partnering with neighbors to coordinate management

Adjacent properties, when managed as one habitat, can make a significant positive impact by establishing a larger, more cohesive tract of habitat that can provide important connectivity for native wildlife.

Neighboring landowners working cooperatively and coordinating management of the lands can be especially valuable in ensuring that wildlife has access to necessary food, cover, water, and space when a property is lacking in one or more of these components. Additionally, sharing the workload of habitat management between two landowners can help save time and expenses.[7]

CEMEX's Lyons Cement Plant in north-central Colorado works with neighboring lands owned by Boulder County to restore short-grass prairie and manage for black-tailed prairie dogs.

The Lyons Cement Plant is an active mine site in the foothills of Colorado's Rocky Mountains that manufactures Portland cement. The property encompasses 2,010 acres, most of which is in various stages of reclamation for disturbance by quarry operations.

Reclamation, which started 20 years ago, has focused on restoration of native short-grass prairie in the Dowe Flats Quarry area of the site. The restored prairie is designed to complement the remnant patches of prairie that can be found on-site as well as the surrounding grasslands owned by Boulder County, enhancing connectivity between the adjoining properties. After the soil has been prepared, CEMEX seeds native prairie grasses and wildflowers, which are then monitored for growth every other year to evaluate

Black-tailed prairie dogs gather atop their muddy burrow.

the success of native species establishment. Management also includes the use of a goat grazing service as well as periodic herbicide treatment to combat weedy and invasive species in the grasslands and encourage the growth of perennial native plants. Through reclamation, CEMEX aims to achieve a healthy soil profile that can support healthy, self-sustaining short-grass prairie in which black-tailed prairie dogs can safely dig out their burrows without the likelihood of collapse. So far, over 220 out of the 800 acres of old mine land have been reclaimed as short-grass prairie.

Both the on-site prairie and the adjacent grasslands owned by Boulder County provide habitat for black-tailed prairie dogs. The plant partners with the county to coordinate management of both the site and adjacent county-owned grasslands to benefit prairie dogs.

The Lyons Cement Plant first achieved WHC Conservation Certification in 2010.

Grasses and leafy vegetation make up 98 percent of the diet for black-tailed prairie dogs. They occasionally eat grasshoppers, cutworms, bugs and beetles. Black-tailed prairie dogs do not need to drink water—their primarily herbivorous diet provides all of the moisture content that they need. [8]

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Managing rights-of-way as connected native plant communities

Rights-of-way (ROWs) describes land managed for the passage of utility or transportation infrastructure across a parcel of land. In the U.S. alone, there are over half a million miles of ROWs for high-voltage electrical transmission, oil and gas pipelines, roads and railroads, and more running through a myriad of land cover types and terrains.

The linear nature of ROWs makes them well-suited to serve as wildlife corridors when managed as native plant communities. Interconnected, managed ROWs can serve as migration or dispersal routes for wildlife species, while still providing for the safe, efficient operation and inspection of utilities.

Several companies of the Exelon Corporation maintain successful conservation programs within its electrical transmission ROW system by coordinating habitat management activities with adjacent landowners.

Across Exelon's electrical transmission system, thousands of acres of ROWs are maintained locally as open, low-growing habitats such as meadows and prairies that provide value to pollinators, grassland birds and other wildlife while also remaining compatible with operational needs for safe, reliable transmission of electricity. Exelon maintains WHC-certified programs ranging from a portion of a ROW comprising a few acres to a regional system consisting of tens of thousands of acres.

In Maryland, BGE works with the Patuxent National Research Refuge to implement integrated vegetation management (IVM) to control invasive plants and maintain compatible native communities for pollinators and other wildlife along 200 acres of ROW that runs through the refuge.

ComEd partners with a neighboring private landowner to manage the West Chicago Prairie site and the adjoining property as one contiguous natural area that includes prairie, wetlands and oak savanna.

In Pennsylvania, PECO works to align IVM activities across the system's 12,000 acres of ROWs with regional conservation efforts and coordinates management efforts with surrounding state game lands, parks, and protected lands.

At the ComEd Kloempken Prairie site in Illinois, employees collaborate with the Forest Preserves of Cook County Kloempken Prairie to coordinate management of the ROW's habitat with the contiguous prairie and herbaceous wetlands on the preserve.

A bumblebee on milkweed on a Pepco ROW in Maryland.

The establishment of ROWs often results in fragmentation of the habitat through which they run, resulting in an edge effect, in which two habitat types meet with an abrupt, defined edge with no transitional area. Those habitats can be significantly impacted for some distance from the edge.

The Enbridge Big Sandy Pipeline is a ROW in eastern Kentucky that is managed to reduce edge effects and provide connectivity for birds, pollinators, white-tailed deer and bats.

The Big Sandy Pipeline comprises 824 acres and crosses the Yatesville Wildlife Management Area (WMA) for 1.8 miles. In 2008, Enbridge began working with the WMA to manage the ROW to benefit species like nesting songbirds, pollinators and bats, and align ROW management with management goals for the WMA.

Together, Enbridge and WMA created feathered edges along the ROW's edges by planting trees and shrubs. This helped to reduce edge effects in the surrounding forest and narrowed the width of the ROW to discourage the presence of cowbirds, which can displace native birds. The ROW was also seeded with species that benefit pollinators and birds. Structures were installed to provide cover habitat, such as songbird nest boxes and rocket-style bat houses.

The ROW vegetation is maintained with routine mowing every 3 years, as well as the use of prescribed burns in certain parts of the ROW.

Game cameras were installed to assess use of the ROW by wildlife, particularly large animals like white-tailed deer. Vegetation surveys have also been conducted in cooperation with WMA to check the ROW for invasive species, growth of native grasses and shrubs, and survival of the tree and shrub plantings.

This program has been WHC-certified since 2007.

ROWs do not universally provide connectivity. ROWs can bar movement by some species, such as reindeer in Europe that will not cross roads with overhead power lines,[9] and various forest songbirds that are reluctant to cross openings.[10]

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Engaging the community in connectivity initiatives

To be truly successful, long-term connectivity initiatives cannot occur in isolation. Creating opportunities for local communities to participate in the design process and assume management responsibilities for these initiatives supports connectivity by promoting a feeling of ownership in the corridor and enhancing understanding and awareness of local biodiversity needs. It also supports socio-economic resilience and livelihood by enabling community members to share in the economic and ecological benefits of connected landscapes and enhanced natural resources.[11]

At Monsanto Brazil's Semente Genética-Cachoeira Dourada/MG in southeastern Brazil, forest connectivity efforts are incorporated into forest corridors on-site as well as through community participation in planting and caring for trees off-site.

Located along the Paranaiba River within Brazil's Cerrado biome, the Cachoeira Dourada facility covers 1,255 acres, including over 400 acres of forest habitat managed to benefit birds and to provide educational value to the local community.

Monsanto has engaged in revegetation and reforestation efforts on former row crop fields, with the aim of establishing natural corridors to benefit local avian populations and other wildlife traveling between forest fragments in the area. Employees have planted nearly 15,000 trees from over 30 native species since 2006. These corridors have been further enhanced for avian species with the addition of structures such as nest boxes. Monitoring of bird use has demonstrated the value provided by the corridors.

Students planting trees at a Monsanto site in Brazil.

An important aspect of the site's program includes outreach to the nearby communities of Cachoeira Dourada and Capinópolis. Through the annual tree seedling distribution program, Monsanto has distributed over 1,000 tree seedlings to community members since 2009. Many community members even provide the company with feedback on how much the seedlings they received in previous years have grown. By providing community members with the opportunity to engage in these connectivity activities, not only are the benefits of the site's natural corridors enhanced, awareness of local biodiversity is increased, and community members share in the ecological benefits.

The program at Semente Genética - Cachoeira Dourada/MG first achieved WHC certification in 2016.

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A call to action for corporate landowners

As this white paper demonstrates, businesses from all sectors can engage in conservation efforts to enhance connectivity at many scales, and for a wide variety of species. From site-level habitat linkages to regional corridors, corporate landowners can implement management activities that reduce habitat fragmentation and enhance the movement of wildlife across the landscape.

The following are ways in which corporate landowners can engage in actions to enhance connectivity.

- Download habitat and species management WHC Project Guidances, as well as the WHC Integrated Vegetation Management Project Guidance, to assist you in designing a project that will have a meaningful conservation and education impact. The documents provide guidance on how to build a sound conservation project and strategies to help achieve stronger outcomes.
- Assess whether there are any fragmented tracts of habitat on-site or on adjacent lands that could be connected through creation of a wildlife corridor.
- Evaluate site features that might serve as movement corridors for wildlife, including both natural features like rivers and streams as well as man-made features such as rights-of-way, trails and hedgerows. These corridors could be protected from human activity, enhanced with native plantings or otherwise managed to ensure they provide quality movement corridors for wildlife.
- Talk to neighboring landowners and land managers to uncover opportunities for coordinated management of habitat across property lines.
- Research large-scale corridors in the region and determine whether habitat management on-site could contribute to these regional connectivity efforts.
- Demonstrate your connectivity environmental stewardship by seeking WHC Conservation Certification, a rigorous, third-party standard. Through all of the Habitat and Species Management themes, WHC Conservation Certification recognizes and incentivizes voluntary conservation activities that incorporate enhancement of connectivity.

Endnotes

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Download WHC Project Guidances at **wildlifehc.org/project-guidances**

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WHC can help support conservation education 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 outcomes. For more information, please contact us at strategyandplanning@wildlifehc.org.

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