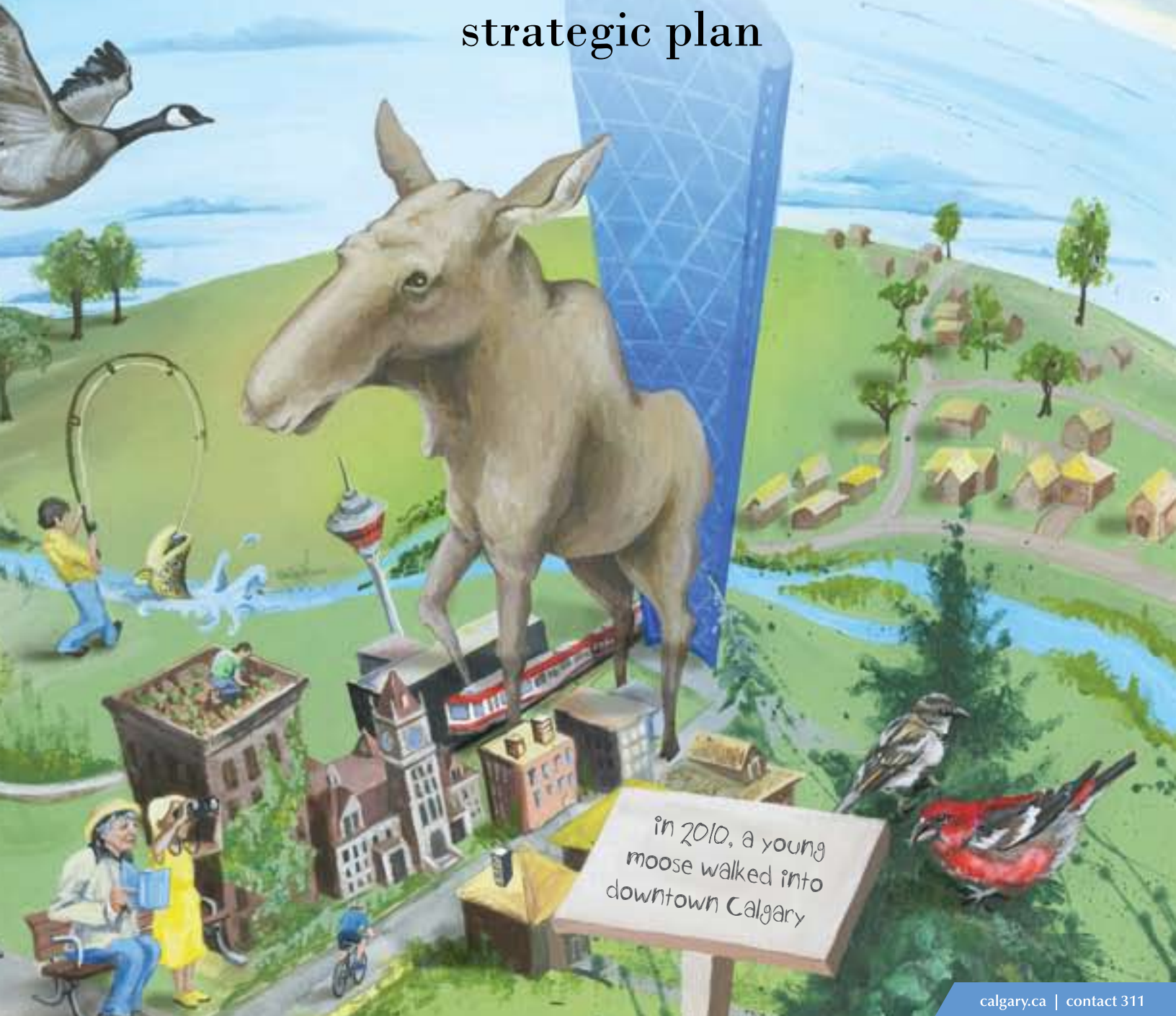


Our BiodiverCity

Calgary's 10-year biodiversity
strategic plan



calgary.ca | contact 311

Onward / The City of Calgary is committed to protecting and restoring the natural environment.



THE CITY OF
CALGARY
PARKS



Artist Statement

All my work as an illustrator begins with an otherworldly vision, inspired by either word imagery or my direct observations. In an attempt to replicate my vision, I quickly blur the lines between reality and a playful dream, creating exaggerations and combining odd relationships. Taking inspiration from the City of Calgary's plans I made a point to illustrate the progression of the relationship between two perceived dissimilar things. Through the use of both acrylic and watercolour painting, I introduced a combination of both detailed representations in acrylic paint and vague abstract simplicity in watercolour allowing a transition in visual focus. Connecting different elements together amplifies the illustrations in a visually powerful and fun way.

Nicole Sweazey

www.nicolesweazey.com

N Sweazey

In brief

The challenge

The City of Calgary needs a comprehensive and systematic approach to protecting, developing and managing its natural and built environments for healthy ecological processes in support of biodiversity.

Why this approach

Biodiversity conservation is a part of Calgary's history, is widely supported by Calgarians, is endorsed by many City of Calgary Council initiatives and is necessary for life.

The solution

Our BiodiverCity, Calgary's 10-year biodiversity strategic plan is based on principles for the protection, development and management of Calgary parks and ecosystems in support of biodiversity. *Our BiodiverCity* aims to provide a framework for City staff to foster more resilient, biologically diverse open space and neighbourhoods that support positive outcomes for Calgarians, visitors, wildlife and plant communities.

The structure of *Our BiodiverCity*

This plan builds on the *City of Calgary Biodiversity Report 2014*. *Our BiodiverCity* introduces biodiversity by aligning it with nature, discusses pressures on biodiversity and outlines our current responses to these pressures. These introductory sections are meant for everyone, to engage people with nature and biodiversity in the context of our city. This document culminates in a strategic plan, developed for those who will implement the plan and hold The City accountable.

Our vision

Calgarians value our city's diversity and richness in wildlife, vegetation and landscapes; The City of Calgary and citizens work to integrate our actions and the built environment with an ecological network that is healthy, connected and well managed.

Our guiding principles

1. Ecological literacy
2. Ecological resilience
3. Collaboration
4. Integration

Measuring success

By 2025, we will:

1. Evaluate landscapes in Calgary and set targets for conservation measures to identify, protect and manage ecological cores and corridors.
2. Restore 20 per cent of Calgary's current open space to increase biodiversity.
3. Identify invasive species in Calgary's open space and complete strategies for their management.

Habitats found in Calgary

Natural habitats

Forest

Aspen
Balsam poplar
White spruce
Douglas-fir

Shrubland

Riparian tall
Upland tall
Upland low

Grassland

Riparian gravel sand shoulders
Open water streams
Emergent wetland vegetation
Open water wetlands

Semi-natural habitats

Manicured green space
Gardens
Treed boulevards
Agricultural areas
Storm ponds/reservoirs

Built habitats

Roadways
Railways
Parking lots
Buildings
Bare ground

Wildlife and plants found in Calgary

52 mammals

2 non-native*
10 status species⁺

365 birds

8 non-native
71 status species

4 reptiles

4 status species

6 amphibians

3 status species

22 fish species

2 non-native
1 status species

845 vascular plants

148 non-native
53 status species

101 non-vascular plants

7 status species



Great Plains Ecoregion
of North America

Natural area and awareness

19 per cent of Calgary is identified as a natural area.

31 per cent of Calgarians are able to define biodiversity as a variety of plants and animals; an additional 13 per cent define it as a diverse nature/environment.

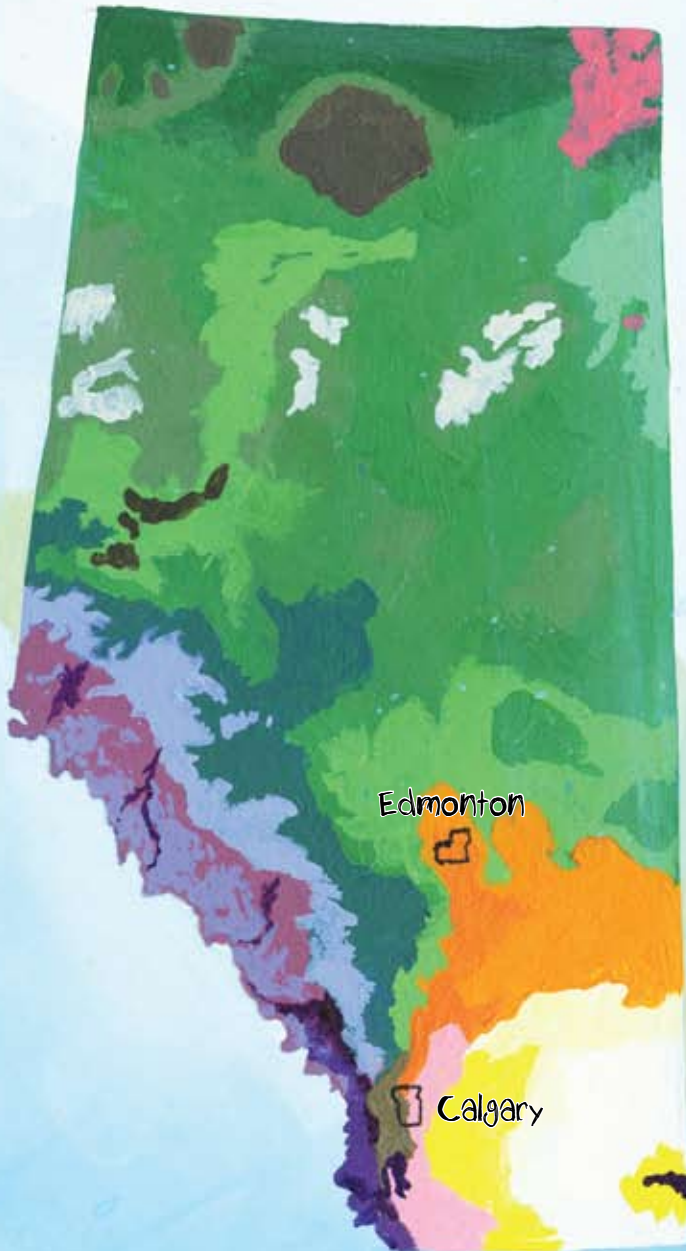
Urban infrastructure challenges to wildlife movement

Total animals killed on Calgary roadways (2005–2014)

2 Bears
3 Cougars
772 Coyotes
5,152 Deer
48 Moose

Estimated financial cost of collisions[#]

\$45,376,000



Parkland Natural Region (Central and Foothills)



Grassland Natural Region (Foothills Fescue)

* Non-native refers to any species that have been introduced as a result of human activities.

⁺ Status species are tracked provincially through Alberta's General Status of Wildlife Species Report and/or federally through the List of Wildlife Species at Risk. They are considered at risk of extinction or extirpation.

[#] Average direct costs of collisions include vehicle repair, towing, animal disposal and accident attendance/investigation and reflect current values within Calgary.ⁱ



Welcome

An introduction

At the launch of this biodiversity strategic plan for Calgary, we asked stakeholders, “What do we need in place to advance positive actions towards biodiversity conservation? What could be done to encourage an understanding of biodiversity and foster our relationship with it?” We heard that the document needs to be widely accessible, and made available in a medium to engage people with biodiversity.

We also asked, “How could the plan tell a story about our city’s biodiversity, why we should protect it and how we can protect it?” The direction we have taken within this document is a result of stakeholder feedback. We begin by introducing biodiversity, connecting it to Calgary’s nature, describing our pressures on it and discussing how we’ve been responding to these pressures. The document culminates in a strategic plan, which is for those who will implement the plan and hold The City accountable. Our plan is for integration. We aim to understand and successfully integrate the processes of urban development and conservation. We look forward to working with citizens and stakeholders as Calgary’s story of biodiversity continues to evolve.



THE CITY OF
CALGARY
PARKS



Contents

Welcome

An introduction 4

Why conserve nature in Calgary?

Nature and biodiversity 6

Understanding biodiversity

Biodiversity and nature 11

Nature and biodiversity in Calgary

A brief look at a history of change..... 14

Pressures

On Biodiversity..... 18

Opportunities

Responding to pressures 23

Our plan for biodiversity

Calgary's 10-year biodiversity strategic plan 26

Our biodiversity projects

Three on-the-ground initiatives 33

Afterword

Concluding thoughts 39

Glossary

List of specific terms used in this document 40

Direction

How we're positioned for biodiversity planning
and management 42

Engagement

How we connected with stakeholders and experts 43

Acknowledgements

Our thanks and appreciation 44

Notes

Literature and sources referenced 46



Why conserve nature in Calgary?

Nature and biodiversity

Nature is our life-support system. It is where we engage in activities for fun; it's somewhere we can escape and recharge. Nature is our economic base. It is a diversity of landscapes. These lands provide for parks, urban development and resources for numerous goods and services. In the form of public parks, nature

provides vital spaces for us to participate in civic life and be engaged citizens. It provides us with rich soil, clean air and pure water. In the form of densely vegetated riparian areas along rivers, streams and wetlands, it provides habitat for wildlife and buffers the effects of flood waters on our city.



Nature is the
heart and lungs
of our great
neighbourhoods

... why conserve nature in Calgary

Calgary has always been defined in part by its natural environment. Historically, the city occupied frontier lands with a high level of biodiversity where a rich natural resource base offered economic opportunity. Today, Calgarians and visitors cherish a contemporary portrait of a city of trees, rivers, wildlife, prairie grasslands and parks. Calgary has a history of protecting nature. However, like many other North American cities that experienced rapid growth in the post—World War II era, our city has expanded into surrounding lands, sometimes without taking the value of nature and its services into account.

It is forecast that Calgary will grow in size and double in population over the next 60 years from its current 1.2 million residents. How we incorporate this demand is both a development choice and an environmental choice. We need to accommodate growth; we also need to protect nature. As a city, we can make balanced choices. In the process of urbanization, we can place value on nature solely as a land bank for development, or we can build communities that respond to nature, that protect ecological networks and build natural processes into what we create. Developing a city does not have to happen at odds with ecological conservation. Seen through a more holistic lens, development offers an opportunity to meet both environmental and urbanization needs, which are ultimately connected to social and economic goals and the general welfare of Calgarians.

Still, the environmental impacts of urbanization are not fully understood. **As a city we need to better understand the complex interactions between growth, our day-to-day life and conserving nature. We need to understand how urban development and management aid or restrict what nature provides us. We need to carefully consider how to best develop Calgary, how to conserve and manage functional natural areas, how to bring nature into what we build and how to work with Calgarians and experts to address these questions to meet the needs of citizens.** We need a vision and a plan of action.

We start with the knowledge that there *is* nature in Calgary. It's in our parks and open space, in our streets and gardens, on what we build. We appreciate nature and value it, even if we can't fully comprehend or quantify it. We know that nature's diversity awards us with tangible personal, social, cultural, environmental and economic benefits.

Calgarians' support for conserving nature in Calgary was evident in the results of a 2014 survey, which shows that eighty-nine per cent of Calgarians believe life in Calgary is better because of public parks. Seventy-two per cent believe one person can do something to help the environment. Ninety-one per cent agree that a world-class city is a city with a sustainable urban forest comprised of many healthy trees. Eighty-six per cent agree that parks are an important part of our city's cultural and natural heritage. Finally, seventy-three per cent believe that an important feature in a park is biodiversity. These numbers highlight the important role nature plays in Calgarians' lives, and our understanding of the connection between nature and biodiversity.

Council declared support for biodiversity conservation when it adopted the *Municipal Development Plan* (MDP), The City's key document for directing land use, growth patterns and infrastructure in Calgary. Section 2.6.4 of the MDP outlines the following policies for biodiversity:

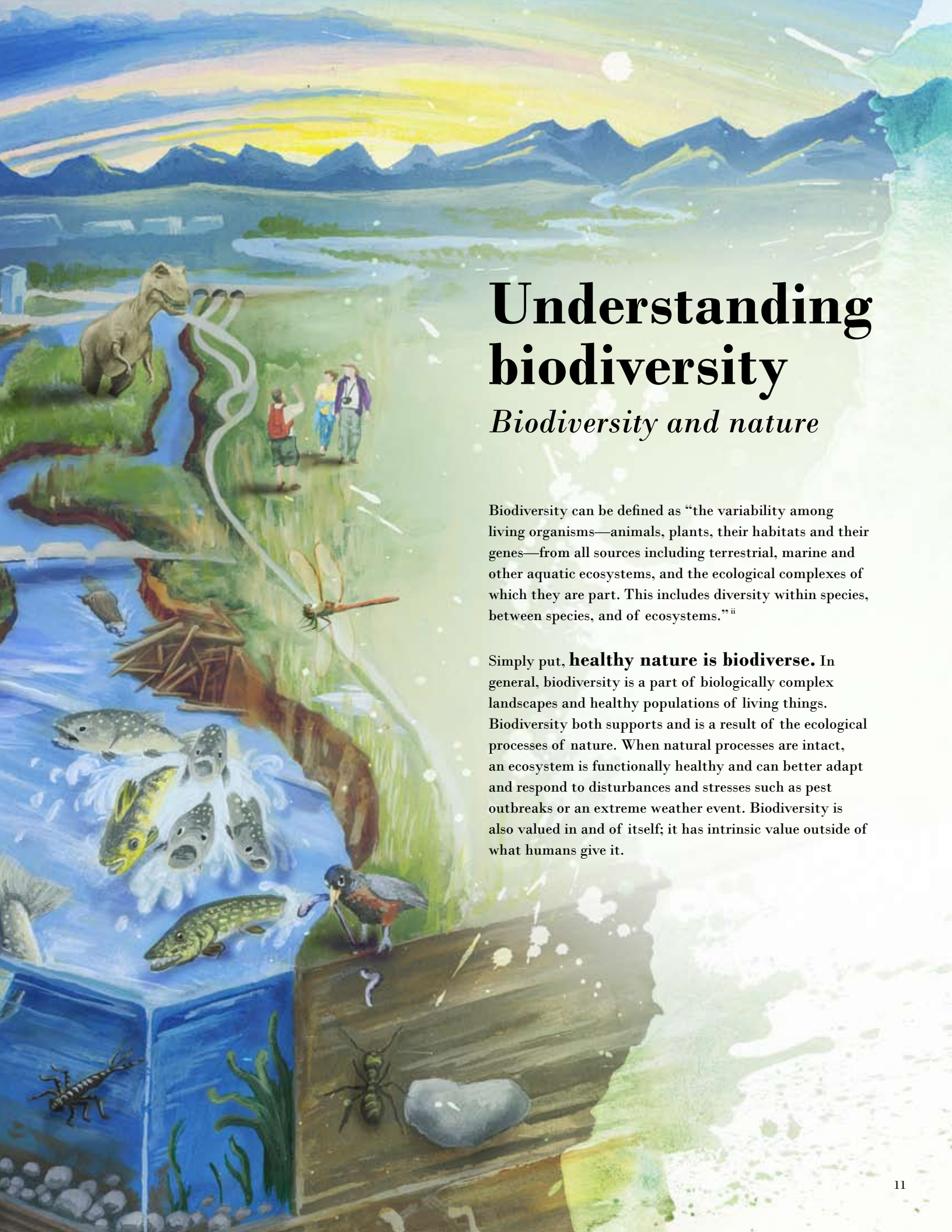
- l. Monitor and manage invasive species that pose a threat to biodiversity and undermine an area's ability to protect water resources.
- m. Manage natural areas and open spaces primarily to conserve and promote native biodiversity.
- n. Ensure the systematic conservation of land and water to reduce habitat fragmentation and ensure wildlife and fisheries connectivity.
- o. Re-establish open space connections, where feasible, to link important habitat areas within the city and region.

With recognition of Calgarians' and Council's support for biodiversity, and the city's unique history of conservation, this preface to our strategic plan narrates an overview of nature in Calgary, where we're going and the foundation we've built to help us stay on course. We paint a picture of Calgary's roots, and what plans we have to remain connected to our natural world. We emphasize Calgarians' appreciation for nature and describe what initiatives we need to have in place to continue enjoying the benefits of it.

How can we develop Calgary's natural and built environments in a balanced way? How best can we manage Calgary's parks and ecosystems? How can we connect with Calgarians to ensure we understand, appreciate and work collaboratively to conserve nature? This strategic plan helps us address these questions.



We need intact
natural processes
to be healthy



Understanding biodiversity

Biodiversity and nature

Biodiversity can be defined as “the variability among living organisms—animals, plants, their habitats and their genes—from all sources including terrestrial, marine and other aquatic ecosystems, and the ecological complexes of which they are part. This includes diversity within species, between species, and of ecosystems.”ⁱⁱ

Simply put, **healthy nature is biodiverse**. In general, biodiversity is a part of biologically complex landscapes and healthy populations of living things. Biodiversity both supports and is a result of the ecological processes of nature. When natural processes are intact, an ecosystem is functionally healthy and can better adapt and respond to disturbances and stresses such as pest outbreaks or an extreme weather event. Biodiversity is also valued in and of itself; it has intrinsic value outside of what humans give it.

... *understanding biodiversity*

As an analytical tool, the amount of biodiversity can be used to indicate the quality of the natural or built environment. Each species has its own specific set of habitat requirements it needs to thrive. Some species are generalists: for example, deer and magpies flourish in a wide variety of urban environments. Other species have much more specific requirements for survival.

For example, the sharp-tailed grouse disappeared from the city of Calgary because of the loss of suitable mating habitat. If Calgary's natural areas were more diverse, then there might be an area of suitable mating habitat that would meet their specific requirements. For species like this to persist in an urban setting, we need to understand their habitat requirements so that we can ensure their survival. In this example, healthy, diverse habitats provide more opportunities for the sharp-tailed grouse to persist. It is in this way that biodiversity can be used to indicate an area's habitat quality.

The ecological processes behind biodiversity provide Calgarians with important goods and services as well. From the food we eat and the water we drink to the materials that are used to build our homes and the parks where we play, biodiversity plays an essential role in the ecological processes behind these products and services. Thus biodiversity and healthy ecosystems make a positive contribution to our economy and quality of life. Additionally, our health is supported by biodiversity. It has been shown that time spent in a park or garden improves focus, concentration and overall mental health. **We need biodiversity to be personally and socially healthy; it is a core component of strong, cohesive and inclusive communities.**

We can measure biodiversity in many ways. We could count the number of wildlife species in the city, we could look at the genetic differences within a population or we could look at the diversity of habitats and the species they support. Another powerful way to understand diversity in Calgary is to observe what's around us by going for a walk.

Let's choose a neighbourhood. This neighbourhood, like many in Calgary, has trees, shrubs, grasses, and vegetable and flower gardens. Perhaps we see potted plants hanging from each light pole along a roadside. One house has a vegetated roof. There are birds perched amongst the branches; a squirrel runs across the street. There's a swale along the road that carries rainwater to a pond. We could measure the biodiversity of this area. We could count the types and amount of trees, insects and birds. We could count the types and amount of flowering plants and note their diversity, identify the different species of flowering plants and also note the different varieties of a particular species. Or perhaps it's winter and there are no flowers at all. Changing seasons show us how dynamic the expression of biodiversity is. In winter, some processes become dormant and some species migrate. And then spring arrives and growth starts and species return.

Nearby to our neighbourhood is a large natural area, perhaps Nose Hill Park, Griffith Woods or the continuous shoreline of the Elbow River. These natural areas are some of the most biodiverse and species rich in Calgary. These areas are a critical component of Calgary's biodiversity. They are the core areas of nature in the urban environment where ecological processes tend to be the most intact and healthy; areas that many species rely upon for survival.

Our walk could end in Weaselhead Flats.ⁱⁱⁱ Here, the Glenmore Reservoir was built on the Elbow River in the 1930s to supply Calgary with drinking water. It was created by flooding the Elbow River valley immediately downstream of the Tsuu T'ina reserve. Weaselhead Flats was acquired from the Tsuu T'ina as a part of this development and is formed, in part, from sediments accumulated from the flooding. For much of its history, it was part of a military base and was used for combat training until 1948.

Notwithstanding the disturbance that came with military tank training, this park is home to a wide variety of species: it is perhaps the most species-rich natural area in Calgary. Weaselhead Flats is dominated by white spruce and trembling aspen, and also has a riparian area made up of willow, tall shrubs and some balsam poplar. The area contains one of the largest stands of coniferous forest in the city, which is home to both red- and white-winged crossbills.

At the mouth of the Elbow, where the river flows into the Reservoir, is a large delta of wetland habitat and associated species. These diverse habitats allow for an equally varied range of birds and other wildlife. Three species of hummingbirds and numerous waterfowl, including migratory loons and tundra swans, use this special area. The mud and sandbars of the delta provide habitat for shorebirds such as lesser yellowlegs and American avocets that feed upon aquatic insects in the nutrient-rich shoreline deposits.

Because Weaselhead Flats is located where the open prairie to the east transitions to the cooler foothills of the Rocky Mountains, this park's habitat is connected to much larger habitat areas in the mountains and foothills that are home to wild species rarely seen in Calgary. As a result, this park provides the best opportunity to see black bears or other large wildlife within the city's park system.

Weaselhead Flats offers an illustration of natural processes at work: we can see how a park can support a wide array of urban biodiversity now and into the future when it is protected or well managed, even though it was highly disturbed in the past. As a result, Weaselhead Flats helps support the ecological system in Calgary, and Calgarians in general. An example of just one ecological service provided by the park is pre-treatment of our drinking water. Without this and other ecological processes that occur in Weaselhead, the cost of treating our drinking water would be exorbitant. Its recreational value and effect on neighbouring property values can also be quantified.

We can leave Weaselhead Flats now; end our walk and use our imagination. From Weaselhead Flats, we can broaden our thinking to consider Calgary as a whole, or the region where Calgary is situated, or all of Canada, or even the entire globe. We can measure biodiversity, and connect with it, at all of these levels. From a small scale like our urban homes to a massive scale like the entire planet, we can draw relationships between natural and built environments. Both of these places and all of these scales are vital to protecting biodiversity, because the ecological processes that support biodiversity are part of a complex, dynamic, integrated, multi-scaled system. How we disrupt or take actions to protect nature in Calgary can, for example, affect people living in communities as close as next door or as far as the other side of the globe.

Drinking water is a perfect example of a resource affected by ecological processes that we can examine to appreciate the scales of biodiversity, and how distant ecosystems benefit us locally. Water quality can be understood as a product of the quality of the watershed, and our municipal water supply goes far beyond municipal borders. Intact and healthy ecosystems in our watershed, extending upstream from Calgary to the Rocky Mountains, act as natural purifiers of the water we consume here in Calgary. In turn, the quality of our watershed affects water quality downstream to the Hudson Bay in central Canada, over a thousand kilometres away.

Understanding biodiversity as part of our urban infrastructure and assets, as part of our social and natural capital, as something that is at once local, regional and global, and as part of what defines our city, helped us develop our vision for biodiversity in Calgary. To better understand where we want to go, to strive for our vision, we need to understand where the city came from, and where it is now. Let's take a look at Calgary's history of change.

Nature and biodiversity in Calgary

A brief look at a history of change

“Changes in urban vegetation over time clearly reflect constantly shifting human value judgments, socioeconomic cycles and evolving technological advances in transportation, communication and construction.”

- Botanist Peter del Tredici^{iv}

In *The City of Calgary 2014 Biodiversity Report*,^v we reviewed the current state of biodiversity in Calgary. We detailed Calgary’s wildlife and habitat types and its natural ecosystems. We outlined The City’s current approach and tools to managing its biodiversity, as well as how we work with citizens and stakeholders in support of biodiversity. This review provided one of the initial steps we are making towards biodiversity conservation in Calgary. Below, we highlight some of the key elements from this report to provide context for this strategic plan.

When the glaciers began their retreat approximately 14,000 years ago, they left behind a landscape of glacial lakes, moraines and river valleys. Calgary was founded in one of these valleys, at the confluence of two rivers: the Bow and the Elbow. Our city is on the western edge of the Canadian Prairies, where the foothills extend into the Rocky Mountains. The transition between the prairies and the foothills creates a complex landscape rich in ecological diversity.

There is evidence of human occupation in this area dating back 8,000 years. European contact occurred in 1787. To regulate the fur trade, the North West Mounted Police settled the area in 1875. Calgary was officially incorporated as a town in 1884 with a population of just 428 people. It was incorporated as The City of Calgary in 1894.

Each of these periods is associated with different types of activities on the land. Hunter–gatherers followed animals, such as bison, as they moved with the seasons. Bison were hunted more easily in large groups, by stampeding them over a cliff or down a steep hill such as the Paskapoo Slopes in Calgary.

With farming and cattle grazing, wildlife habitat continued to change or was lost altogether. Settlers brought their agricultural technology and European conception of landscape beauty to Calgary. The parks they built were designed to mirror the geometric designs of their urban homelands. Later, trees were added along streets to beautify them. Again, new wildlife habitats were lost, and created, with the land management and development practices that evolved in the historic urban core of Calgary.

Support for natural area conservation grew as well, particularly in the 1960s and 1970s, with organizations such as the Calgary Field Naturalists’ Society (currently Nature Calgary) advocating for the protection of significant natural areas throughout the city. These areas now form the backbone of our city-wide natural environment park system. We continue to protect, where we can, natural areas in the ongoing urban development that accompanies Calgary’s growth.



The landscape
shapes us and
we shape it

... *nature and biodiversity in Calgary*

Our perceptions of what constitutes quality open space in Calgary have changed over time and continue to be dynamic. As the city has grown from a frontier land to a significant urban centre, our understanding and appreciation for natural systems has changed as well. For example, in 1994 City Council approved the *Natural Area Management Plan*, which set out for the first time policies and guidelines for active management of natural areas in Calgary. Other significant documents emerged around this time, including the *River Valleys Plan*, the *Nose Hill Park Master Plan* and the *Calgary Urban Park Master Plan*; documents which, when taken together, provided broad direction for the protection and management of significant landscapes in Calgary.

The provincial Government of Alberta and the federal Government of Canada have stronger and broader powers to directly regulate environmental issues such as air and water quality, pollution, wildlife management and species at risk. The City of Calgary, however, made a major policy step for biodiversity conservation in 2009. In a process called Plan It Calgary, over 18,000 Calgarians were involved in creating a long-term vision for Calgary. The result was two statutory documents: the *Municipal Development Plan* (MDP) and the *Calgary Transportation Plan* (CTP). The MDP addresses future land uses, services and transportation systems within the city. It aims to balance land use, infrastructure servicing and environmental objectives. The CTP recognizes that the transportation system can “either enhance or degrade the environment depending on how well it is integrated with its surroundings.” Section 3.12, Environment and Transportation, reads:

Objective: Protect air, land, water and biodiversity in the planning, design, operation and maintenance of all transportation infrastructure.

A supporting policy to the objective states:

3.12(c) Preserve and enhance biodiversity to support the natural environment in and around mobility corridors.

The MDP outlines a series of clear environmental policies. Section 2.6, Greening the city, prioritizes maintaining biodiversity and landscape diversity, as well as integrating and connecting ecological networks throughout the city. It states:

It is clear that Calgarians want a healthy natural environment and aspire to a lifestyle that will reduce their ecological footprint. They want to manage and protect the air, water, land and biodiversity to benefit themselves and future generations. Environmental stewardship is a shared responsibility of government, business, communities and individual Calgarians. The City of Calgary is committed to leading and inspiring actions to reduce Calgary’s ecological footprint and to conserve, protect and enhance the environment locally and regionally.

The City recognizes the need to partner with adjacent municipalities and regional neighbours to develop strategies for protecting watersheds, habitats and biodiversity and to establish ecological networks that benefit the region as a whole.

Subsection, 2.6.4 Ecological networks, reads:

Objective: Maintain biodiversity and landscape diversity, integrating and connecting ecological networks throughout the city.

An ecological network is a network of natural areas and open space providing the conditions necessary for ecosystems and species populations to survive in a human-dominated landscape. This network is one of the defining features that establish Calgary’s character, sense of place and quality of life. The components of the network include the river valley system, natural environment parks, regional and neighbourhood parks, pathways, linear parks, school sites, community gardens and urban plazas. These provide a haven for many plant and animal species.

The real power of natural areas and open spaces—and their ability to significantly improve the quality of life in communities—lies in viewing and applying them as a system, rather than in individual components, that responds to the social needs (often recreational) of the city’s population. Open spaces can be viewed as a structural pattern of landscape elements. These elements, patches and corridors join together to form a matrix. The overall pattern determines flows and movements of species in and through the landscape. A functioning ecosystem conserves biodiversity and contributes to the cleaning and production of air, land and water. These benefits can be retained by systematically acquiring land for the primary purpose of protecting beneficial ecosystem functions.

This biodiversity strategic plan provides a more detailed course of action for the higher-order plans of the MDP and CTP to incorporate biodiversity principles into the protection, development and management of Calgary’s natural and built environments.

In 2011, Council committed to signing the *Durban Commitment: Local Governments for Biodiversity* and formally joined Local Action for Biodiversity (LAB), a global urban biodiversity program coordinated by ICLEI—Local Governments for Sustainability (previously International Council for Local Environmental Initiatives). ICLEI was founded in 1990 when more than 200 local governments from 43 countries convened at the UN World Congress of Local Governments for a Sustainable Future. By signing the Durban Commitment, The City acknowledged its accountability and responsibility for the health and well-being of Calgary neighbourhoods through protecting, sustainably using and managing biodiversity while recognizing biodiversity’s role as the foundation of our existence.

The LAB program prescribes the following five-step process to create and act upon our plan for biodiversity protection:

1. Develop a biodiversity report documenting the current state of biodiversity and its management in Calgary. (This is *The City of Calgary Biodiversity Report 2014*);
2. Ensure long-term commitment by Council to sustainable biodiversity management through formally signing a local government biodiversity declaration. (This is *The Durban Commitment: local governments for biodiversity*);
3. Develop a 10-year biodiversity strategic action plan and framework that includes commitments to biodiversity implementation plans and integration within broader city plans. (This is what you are currently reading);
4. Have Council formally accept the 10-year biodiversity strategic action plan and framework. (This is the document, “Biodiversity Council Policy,” which is taken from the section “Our plan for biodiversity” within this document); and
5. Implement three new on-the-ground biodiversity initiatives by the end of the 10-year program (described later in this document).

The development and ultimate Council acceptance of *Our BiodiverCity* represents steps three, four and five in the LAB program. Our BiodiverCity declares our commitment to protect and enhance biodiversity at the local level, and regularly monitor, report and act on the state of biodiversity within Calgary. This plan establishes clear, strategic and comprehensive principles to consider biodiversity in all aspects of local planning and management, from land use and mobility to social and economic development. This plan commits The City to continue raising awareness of the value of biodiversity; to ongoing engagement with our stakeholders to ensure participation and involvement in biodiversity conservation locally, regionally and globally; and to three on-the-ground projects. This plan helps us to continue building a corporate story of biodiversity conservation.

To better understand our vision for biodiversity conservation, we need to understand how we currently disrupt the ecological processes that support biodiversity. With awareness comes opportunity to act positively.

Pressures

On biodiversity

There are common challenges in all cities that directly affect biodiversity conservation and ecological processes. These are habitat fragmentation, habitat loss and invasive species. They are generally a consequence of urban growth, consumption, pollution and overuse of natural resources and areas. The processes by which the pressures occur are numerous and complex; however, we can categorize them into four broad themes:

Awareness pressures

Gaps in awareness of biodiversity can occur at two levels: Firstly, we may personally and/or collectively lack an awareness of how our behaviours can affect biodiversity. Secondly, our knowledge is limited: many species and ecological processes and connections are unknown or not described scientifically. Therefore, we can't be aware of our long-term impact on them. Further, we cannot be aware of the impact our actions have if we do not have a measurable baseline to work from. A lack of awareness can prevent us from taking effective action to mitigate our impacts (as a City and as individuals) on biodiversity. Calgarians may also feel they lack opportunity and ability to engage with this issue, or don't realize how simple actions can contribute to biodiversity conservation. A lack of knowledge and awareness of biodiversity can often lead to some of the pressures described below.





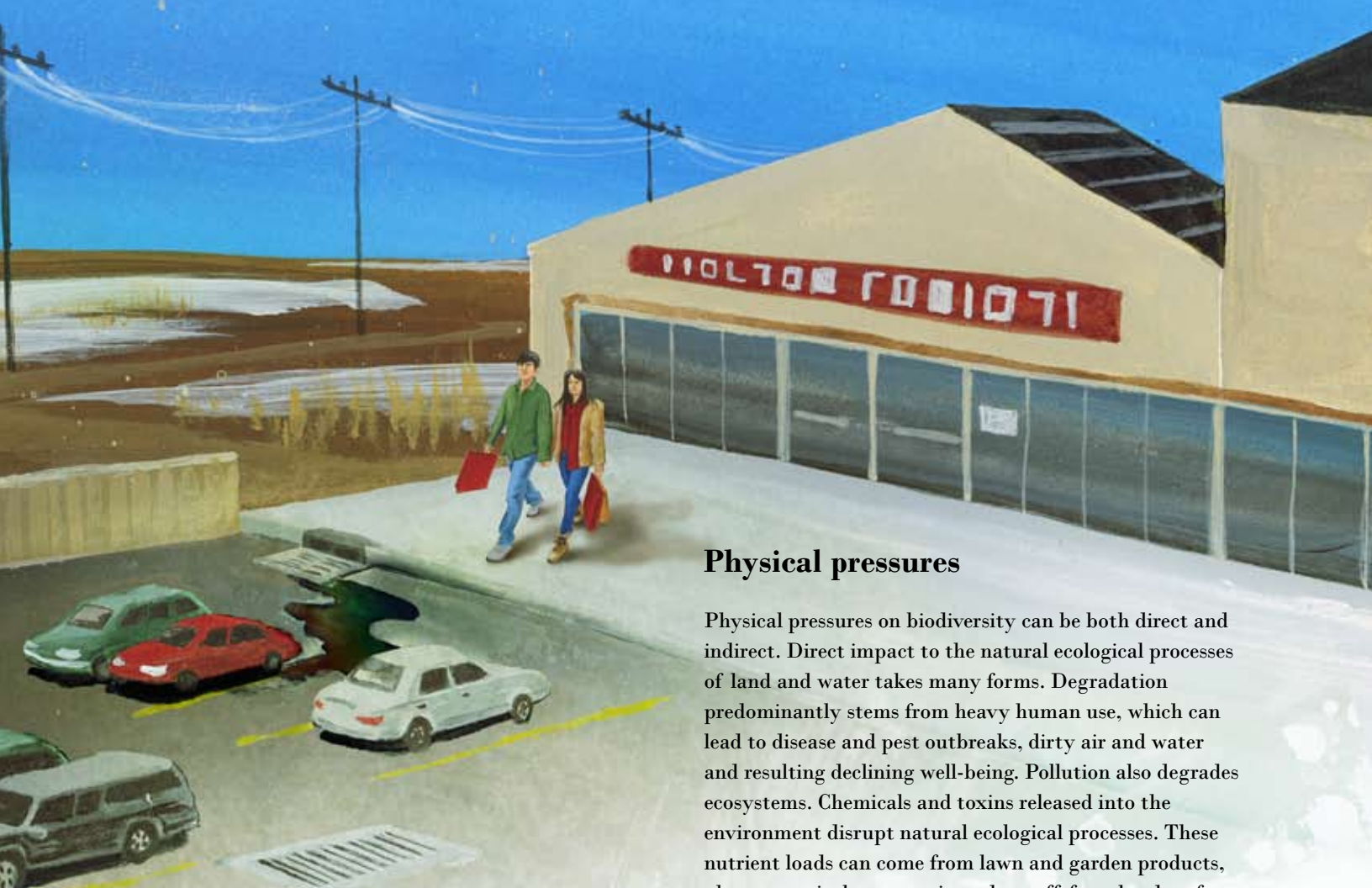
How we live can
work against nature

... *pressures*



Legislative pressures

When there is an absence of rules or a lack of commitment to the judicious and timely application of those rules, it becomes challenging for municipalities, businesses or citizens to protect biodiversity. Legislation can conflict in competing development or land use priorities. There also tends to be numerous stakeholders with varied interests, and the effects of this are compounded by unclear legislation and intent. Lack of rules, lack of clarity, and the presence of conflict, multiple perspectives and varied interpretations can hinder conservation measures. Currently, The City lacks a bylaw that directly addresses protecting or conserving areas for biodiversity. Having a clear bylaw in place could help alleviate the conflicts described above.



Budgetary pressures

When there is a lack of knowledge or clear legislative direction in biodiversity conservation, it becomes challenging for decision-makers to allocate limited finances to conservation. Additionally, it is often difficult to assign an economic value to biodiversity and ecosystems and the goods and services they provide, such as food, flood mitigation and human well-being. Therefore, these considerations tend to lose out when competing with initiatives that have a more direct and obvious financial interest. In many cases, we recognize an ecosystem's economic value only after the ecosystem has been lost or compromised with resulting land management inputs.

There is also a cost to managing biodiversity. Efforts to preserve and protect species, habitats and ecological function, while also mitigating for any losses, may result in a trade-off: some areas may not support all types of development and some park spaces may be subject to usage constraints. However, like all municipal infrastructure and assets, from roads to buildings to playgrounds, the natural environment needs a financial commitment to support its responsible management.

Physical pressures

Physical pressures on biodiversity can be both direct and indirect. Direct impact to the natural ecological processes of land and water takes many forms. Degradation predominantly stems from heavy human use, which can lead to disease and pest outbreaks, dirty air and water and resulting declining well-being. Pollution also degrades ecosystems. Chemicals and toxins released into the environment disrupt natural ecological processes. These nutrient loads can come from lawn and garden products, pharmaceuticals, contaminated runoff from hard surfaces such as parking lots and roadways, and industry effluent. Additional pressure can come from structural hazards such as buildings and freestanding structure guy-wires that hold towers erect, and vehicular hazards when wildlife must cross roads to move between essential habitats: these can all contribute to significant wildlife injury and losses.

Indirect pressures on biodiversity tend to be associated with climate change. These include an increased frequency of extreme weather events and rising mean temperatures over the long term; more droughts and decreasing water supply for drinking, irrigation and industrial processes; extreme rainfall events that can lead to erosion, siltation and degradation of local water bodies and overland flooding; temperature fluctuations that may affect plants and animals, too, through a change in range, loss of natural prey-predator relationships and the introduction of invasive species and diseases.

Recognition of these pressures on the ecological processes behind biodiversity provides us with the opportunity to take action. What follows is an overview of some of our current actions that support and improve urban biodiversity in Calgary, and how these actions are addressing pressures on biodiversity.





Opportunities

Responding to pressures

Progress towards biodiversity conservation comes from government policy, public literacy and action, grassroots initiatives, business strategies and a multitude of design solutions.

Conservation is not simply about protecting or fencing off large areas of natural habitat. It's about managing natural areas for long-term sustainability and broadening the objectives of city development projects to value biodiversity and ecosystems. When we expand the scope of an initiative to include biodiversity benefits, we can advance the goals of conservation without the initiative exclusively being a conservation program. Examples of this approach in practice follow.

There are many ways Calgary can conserve biodiversity as a part of everyday business. For example, stormwater ponds that traditionally do not support high biodiversity can be engineered to support greater ecological processes. They can be vegetated with rich and complex plant communities that also allow for the interception and infiltration of rainwater through the soil. Besides preserving hydrological function, these stormwater ponds can enhance water quality by reducing the amount of pollutants carried by rainwater and runoff into rivers and wetlands.

A 384-hectare industrial development planned in east Calgary includes wetlands and natural animal corridors along streams that will be conserved or reclaimed. The percentage of conserved landscape will be higher in comparison to standard industrial land development practices. The plans also include planting a diversity of native and drought-tolerant vegetation.

A new cemetery planned for southeast Calgary will include native landscaping to increase vegetation diversity and to promote connectivity with an adjacent wetland. Increased topsoil depth means lands will better absorb rainwater, thus improving water quality by reducing runoff into the wetland. Deep topsoil will also support the growth of healthy, complex plant communities and minimize irrigation requirements. In addition, staff will provide education programs to advance awareness of these initiatives.

A waste management facility in Calgary has established a wetland monitoring program to assess impacts on and monitor the health of wetlands that extend into the facility. The program will establish baseline conditions at the wetlands prior to facility expansion to ensure the site is not negatively impacting these wetlands.

... opportunities

Ecological literacy in Calgarians is increasing with park stewardship programs. From litter pickups in parks to volunteering as a park interpreter, these initiatives encourage a conservation ethic in participants and help to model career and lifestyle choices to become lifelong stewards of the environment.

Calgary schools are piloting “A Year for Nature.” This involves an environmental educator from The City working with teachers to assist in connecting their curriculum with the natural environments and biodiversity surrounding their schools and describing stewardship actions students and teachers can take.

The City has taken a strong position on water quality and water resource management, and recognizes the value in protecting riparian areas and upland habitat. Water management initiatives have evolved and grown in scope from site-specific practices and consumer education to larger-scale actions such as changing bylaws to make water efficiency a requirement and working with industrial and commercial consumers to realize the value of water conservation over the long term.

However, the lack of a system-wide approach to biodiversity planning and management has hampered its effectiveness. **Successful biodiversity conservation requires recognition of how we can understand, change and/or improve upon our behaviours that affect ecological processes. We can then advance new ways to better integrate with and be more responsive to biodiversity and ecosystem function.** This requires interdisciplinary planning and action tailored to the environmental and urban qualities of a specific area. This strategic plan establishes the principles, commitments, procedures and performance measures to create the system-wide approach necessary to support urban biodiversity.







Our plan for biodiversity

Calgary's 10-year biodiversity strategic plan

Our vision

Calgarians value our city's diversity and richness in wildlife, vegetation and landscapes; The City of Calgary and citizens work to integrate our actions and the built environment with an ecological network that is healthy, connected and well managed.

Our principles

As natural systems are dynamic, we recognize the indefinite time horizon for achieving biodiversity conservation in Calgary. A principled approach—rather than a goal-based approach—enables us to be dynamic in our actions as we move towards our vision. We have established four central principles to guide our decision-making. They act as a foundation for our behaviours and actions towards biodiversity conservation.

Ecological literacy: The City of Calgary supports the conservation and appreciation of biodiversity by cultivating knowledge and understanding about ecological processes, personal stewardship actions and Calgary's natural heritage.

Ecological resilience: The City of Calgary plans, protects, manages and restores open space in Calgary for productive, diverse, healthy ecosystems with the capacity to recover from disturbance and adapt to change.

Collaboration: The City of Calgary works jointly and shares responsibility with individuals and groups to advance biodiversity and ecological resilience locally, regionally and globally.

Integration: The City of Calgary works with communities and businesses to build neighbourhoods that support local biodiversity conservation, healthy ecological processes and provide equitable access to nature.



integrating nature
into Calgary's
communities

... our strategic plan

Our commitments

Our commitments outline how we are dedicated to supporting our vision of biodiversity.

Ecological literacy

- a) Develop volunteer initiatives and education programs to support environmental stewardship and biodiversity conservation in collaboration with schools, communities and citizens.
- b) Ensure appropriate City of Calgary staff, Council, businesses and communities have access to training and information to advance the goals of biodiversity conservation, through procurement practices; building and site design; open space planning and management, as well as awareness of invasive species, habitat fragmentation and loss, indirect pressures on biodiversity and how they disrupt ecological processes.
- c) Set objectives and targets for biodiversity conservation across appropriate literacy initiatives.
- d) Make biodiversity conservation a common element in municipal decision-making.

Ecological resilience

- a) Monitor the city's natural areas and water bodies to develop an approach that ensures they are more resilient to disturbance while retaining healthy function, structure, feedback loops and integrity.
- b) Retain, acquire and maintain large contiguous or connected natural areas, with supportive built environments, providing connections with the greater region.
- c) Reduce direct pressures on biodiversity through managing appropriate access and use in areas rich in biodiversity and natural heritage.
- d) Reduce invasive species through identifying threats, implementing measures to prevent their establishment while monitoring and controlling these species where necessary.
- e) Conserve habitat function by supporting native and non-invasive locally adapted species.
- f) Maintain significant ecological processes such as fire and flood in appropriate natural areas.

Collaboration

- a) Recognize the financial, social and environmental cost of removing or modifying natural systems in developing Calgary and include consideration of these costs in municipal decision-making.
- b) Recognize biodiversity and healthy natural systems as an aspect of good economic development in Calgary.
- c) Partner with researchers, government and institutions to advance research and innovation in biodiversity conservation.
- d) Remove knowledge and institutional barriers to protecting biodiversity.

Integration

- a) Increase habitat diversity in private, public and institutional open space to support ecologically healthy neighbourhoods and aid appropriate access to and use of nature for citizens.
- b) Develop a database that integrates land use and biodiversity data to support strategic management of Calgary's ecosystems.
- c) Plan and manage Calgary parks and open space as a connected network of habitats and wildlife movement corridors, with the aim of reducing roadway collision threats and related human-urban wildlife conflict.
- d) Develop infrastructure that mimics and incorporates ecological processes.
- e) Manage open space to positively respond to both sudden and gradual environmental changes, such as extreme weather events and climate change.
- f) Preserve rare landscape features and critical habitats within and between neighbourhoods.

Our procedures

Meeting our commitments will require specific actions. We have established four procedures, each with multiple initiatives in support of the procedure. With the launch of each project, the City will develop roles and responsibilities, budgets, stakeholder engagement plans and specific performance measures to ensure and monitor successful execution.

Procedure 1

Foster ecological literacy

Increase public understanding of biodiversity and ecological processes to encourage positive actions that support environmental conservation.

The following are possible practices and projects that would support the procedure:

- a) Deliver a city-wide ecological literacy program.
- b) Work with key partners to promote community engagement with broader ecological stewardship initiatives, such as building pollinator-friendly and biologically diverse community gardens, developing wildlife habitat conservation initiatives and establishing neighbourhood greening programs.
- c) Develop and implement a framework to integrate knowledge of Calgary's natural heritage into conservation and education opportunities.
- d) Develop and implement a strategy to inspire citizens to take positive stewardship actions through volunteer, school, corporate and community environmental education programs and initiatives.
- e) Provide a range of programs and tools that encourage Calgarians to engage with biodiversity in the city's built and natural environments.
- f) Continue the biodiversity oral history project to showcase Calgarians' personal connections to biodiversity.
- g) Establish an artist-in-residence program to advance biodiversity literacy.

Procedure 2

Improve the city of Calgary's ecological functions

Restore degraded habitats and manage biodiversity to increase the overall health, function and resilience of Calgary's open space and neighbourhoods.

The following are possible practices and projects that would support the procedure:

- a) Implementing habitat restoration projects in critical areas for local ecosystem function, structure, quality and resilience.
- b) Develop and implement management plans for all status species in Calgary parks and open space.
- c) Restore underused manicured park space to increase plant diversity and habitat complexity and function.
- d) Encourage the restoration of private, community, business and institutional lands.
- e) Develop and implement landscaping design guidelines to establish appropriate soil fertility, volume and management that support the land use goals of new or redeveloped open space.
- f) Develop and implement a list of preferred planting species for developers and The City of Calgary.
- g) Implement strategies to reduce invasive species and their spread in Calgary.
- h) Develop and implement alternative open space management practices including grazing, prescribed burns and restoration, as well as educational messages and opportunities for public understanding.

... more strategic plan

Procedure 3

Instill biodiversity values across The City of Calgary

Collaborate to establish conservation values and practices into planning, managing and operating The City of Calgary and living in Calgary neighbourhoods.

The following are possible practices and projects that would support the procedure:

- a) Encourage champions within The City of Calgary to help ensure biodiversity principles are adhered to throughout City planning, managing and implementing initiatives.
- b) Develop and implement a biodiversity communications strategy.
- c) Initiate a biodiversity steering committee with representatives from The City, Council, local businesses, environmental non-governmental organizations, academia and citizens at large to advance the commitments of *Our BiodiverCity*.
- d) Continue to identify and align with other City plans, strategies and programs that have biodiversity-related components.
- e) Develop and implement a biodiversity project recognition program for community, private business and City projects.
- f) Ensure biodiversity goals are captured in appropriate city planning frameworks, for example the *Corporate Project Management Framework*.
- g) Develop policies and guidelines to ensure people are allowed equitable access to areas of biodiversity.

Procedure 4

Integrate with wildlife, plants and natural heritage

Conserve lands and waters that are critical in retaining essential local ecosystem function, structure, quality and resilience, while ensuring appropriate access and use.

The following are possible practices and projects that would support the procedure:

- a) Develop and implement an assessment of existing Calgary parks that would aid in setting conservation priorities and monitoring health to create and sustain functional habitat.
- b) Develop and implement policies and guidelines to conserve and connect ecological cores and corridors through a city-wide review of existing and proposed open space. These may include design requirements of green roofs and living walls; protection of ecological cores and corridors; design of wildlife crossings for urban barriers; park design; regulation of topsoil conservation; salvage/relocation of vegetation and habitats; bylaws; and design development guidelines.
- c) Map and implement a framework to acquire lands of high ecological and cultural value that can't be otherwise protected through the subdivision process.
- d) Establish data-sharing agreements and strategic collaborations with government, industry, research organizations, other municipalities and the public.
- e) Develop and implement a municipal wildlife management strategy.
- f) Work collaboratively with neighbouring and regional municipalities to identify opportunities to increase biodiversity across the region.
- g) Develop and implement an incentive program to promote the use of ecological easements.

Measuring success: three biodiversity targets

Under the section “Pressures on biodiversity,” we noted three common challenges in cities that directly affect biodiversity conservation and ecological processes: habitat fragmentation, habitat loss and invasive species. We’ve developed three broad-scale targets to monitor these pressures and therefore to measure the successful trajectory of our strategic plan.

By 2025, we will address three pressures on biodiversity in the following ways:

Habitat fragmentation

Evaluate landscapes in Calgary and set targets for conservation measures to identify, protect and manage ecological cores and corridors.

Habitat loss

Restore 20 per cent of Calgary’s current open space to support the conservation of biodiversity.

Invasive species

Identify invasive species in Calgary’s open space and complete strategies for their management.

Implementation of the strategic plan

Our BiodiverCity defines a strategic direction for conserving biodiversity in Calgary over the next 10 years that aligns with international, federal and provincial initiatives. Our next step is to develop an implementation plan that establishes the methods, targets and reporting mechanisms for executing this strategic plan.

The implementation plan will necessarily reflect the dynamic nature of ecosystems and a growing city, and will be structured to adapt to those changes as circumstances warrant. Through the implementation plan, we will report on our progress towards the biodiversity targets we established earlier in this document. The report will outline our current and future biodiversity conservation projects and programs established under our four procedures. Managing for the conservation of biodiversity will be an ongoing task that will be incorporated into normal operations and management of nature in Calgary’s parks and neighbourhoods. The implementation plan will ensure we are using the best available science and practices to achieve success.

Although we’ve identified possible practices and projects to support our recommendations for conserving biodiversity, we recognize there are numerous ways to align with our vision for biodiversity in Calgary. Initiatives that may appear to overlap should be considered complementary rather than repetitive, as we know conserving biodiversity can often involve reiterative, ongoing and long-term projects to ensure intended ecological functions are being achieved.

The implementation plan will follow the principles, commitments and procedures outlined in this document and will be consistent with the theme established in this strategic plan: integrating with Calgary’s nature through conservation practices and collaboration efforts. We will work across City business units and departments and connect with specialists, researchers, educators and practitioners to implement *Our BiodiverCity*. We will seek collaboration across industry sectors and across different scales, from regional landscapes to backyards. We will continue our work with international organizations and keep up to date on research and innovative practices. We will acknowledge the work done by citizens to enhance or conserve biodiversity in their gardens and neighbourhood parks, or to simply lessen damage to biodiversity through environmental stewardship. The first step in our implementation plan will be carrying out three biodiversity projects.



Collaborating to
restore and protect
biodiversity

Our biodiversity projects

Three on-the-ground initiatives

Through our partnership with LAB (Local Action for Biodiversity), we have committed to carrying out three initiatives as a tangible demonstration of our principles to begin the implementation of our strategic plan. Together, the initiatives establish biodiversity evaluation criteria, and use these to: 1) establish criteria to identify critical habitat areas and linkages between habitats for biodiversity conservation; 2) inventory critical ecological areas in conjunction with a metric for collecting data on landscape features and reporting; 3) ensure policies and programs are in place to protect, re-establish and manage these areas and connections, and develop new ones as necessary; and 4) provide a basis for education of and collaboration with Calgarians.



... three on-the-ground initiatives

Project 1

An Ecological Integrity Index for Calgary's natural areas



Scope

An Ecological Integrity Index (EII) evaluates the quality of Calgary's natural environment parks through the development of a scoring system (index) that grades a park's condition against human disturbance impacts. EII scores reflect the diversity of plants in forest, shrub and grassland habitats, as well as the integrity of habitat patches under the pressures of urban use. These scores will be used to help The City describe the health of individual parks and track changes in plant diversity and habitat condition. The index will also be employed on a city-wide scale to aid in planning new parks, ensure connection across Calgary's park system and prioritize habitat management activities such as restoration and trail design. Using EII scores in planning will help to minimize the negative effects of our ecological footprint on biodiversity.

Biodiversity pressure targeted

The two pressures this project is responding to are budgetary and physical.

Goal

The aim of developing the EII is to have a quantifiable, repeatable measure that can be used to distill the complexities of ecological process and function—at both a local park and city-wide landscape scale—into individual health scores for natural environment parks.

Timeframe

This is a two-year work program with potential to expand as needed.

Determining success

The success of the Ecological Integrity Index depends on the use of clear, repeatable measures that, combined, reliably predict park habitat health. Once the EII model has been developed and finalized, we will generate scores for all natural environment parks in Calgary. These EII scores will be verified by field surveys at representative parks.

Communications

Project elements will be shared with various audiences as follows:

- a) Once the model has been finalized, City of Calgary Parks staff will be trained on the model and related field survey methods.
- b) Opportunities for encouraging Calgarians to interact with the EII tool through citizens collecting data are being explored.
- c) EII scores will be incorporated into Calgary's development planning process and reported to the public via The City's Open Data Catalogue.
- d) A description of the Ecological Integrity Index model and its development will be submitted to a scientific periodical for peer review and publishing.

Project lead

City of Calgary Parks (Urban Conservation)

Project 2

The landscape ecosystems work program

Scope

The landscape ecosystems work program will develop city-wide policy and technical guidelines for planning, managing and monitoring functional habitat and linkages between habitats. The program will be based on a landscape ecology approach to developing open space: the patch, corridor and matrix typology (MDP 2.6.4). This "open space typology categorizes open space based upon physical similarities. These categories serve as an evaluation framework to determine the value of the ecological network and the associated sensitivities that should be considered prior to any development/activities occurring."

The program will focus on determining the scope of the ecological network, desired network outcomes, technical definitions, and how the relative initiatives translate into aiding community development processes such as design standards and development guidelines. We will consider the program in the following framework:

- a) Policy: legislative direction and bylaw adherence
- b) Technical: acquiring landscape data (topology, soils, vegetation, etc.)
- c) Design: how the open space system can be composed
- d) Management: how the system is managed for long-term biodiversity conservation

Biodiversity pressure targeted

The three pressures this project is responding to are legislative, budgetary and physical.

... three on-the-ground initiatives

Goal

We aim to develop clear and consistent policy and technical guidelines to establish or sustain connected, resilient and representative habitats within an open space system that supports biodiversity and ecological processes. The policy and technical guidelines will support and direct identification of what's on the landscape, what's worthy of protection, how to create the open space network, how to implement the design and how to manage the landscapes once they are brought under City ownership.

Timeframe

This is a five-year work program with potential to extend as needed.

Determining success

Success will be determined by acceptance and understanding of the landscape ecosystem approach in community development by Council, Administration and stakeholders. The consistent application and implementation of this type of open space network will result in lands coming into City inventory that have a higher Ecological Integrity Index and lower long-term maintenance costs, which support greater biodiversity in an urban context.

Communications

Widespread stakeholder and community engagement will ensure a diversity of internal and external interests are represented and appropriately reflected in the policy and technical guidelines. Engagement will adhere to The City's *Engage Policy* and the *Engagement Framework*, both adopted by Council in 2014.

Project lead

City of Calgary Parks (Urban Conservation)

Project 3

A Mental Models Analysis of citizen engagement and education in biodiversity

Scope

This research project will rely on interviews with Alberta-based experts on urban biodiversity, as well as interviews with citizens of Calgary, in order to develop a model of how people think about and understand urban biodiversity. While the geographic location for this project is the city of Calgary, the results of this research project could be applied in urban centres across North America, Europe and beyond; publication of academic papers on project results will facilitate this.

Biodiversity pressure targeted

The two pressures this project is responding to are budgetary and awareness.

Goal

Past research has shown that engagement, education and outreach efforts are often less effective when land managers and agencies do not have a clear understanding of what people know, don't know or need to know about a particular topic (in this case, urban biodiversity). Unfortunately, very few studies have focused on systematically exploring the specific information needs of citizens regarding urban biodiversity initiatives, or how urban biodiversity is conceptualized. This research project aims to close that gap.

Timeframe

This project will be completed in 2015.

Determining success

One of the key goals of this research project is to identify misconceptions and gaps in citizens' knowledge about urban biodiversity, and highlight what people see as the risks and benefits associated with improving the city's natural biodiversity. Thus, success will be determined, in part, through the identification of these knowledge gaps for the purpose of future communication, education, and engagement activities around urban biodiversity in Calgary. The results of this research project will be presented at an academic conference and will be published in an academic journal. Therefore, reviews and feedback by scientific peers will be another indicator of success.

Communications

A call for study participants will be made through local community organizations, community gardens, and other citizen groups; this—in and of itself—will help to raise awareness about the project as the research progresses. Coverage in *UToday*, the University of Calgary's regular newsletter, and through the Urban Alliance (a City/University research, outreach, and engagement partnership) can also be requested. Finally, the results will be shared in academic journals, at conferences and meetings, and in publications geared to a non-scientific audience.

Project lead

University of Calgary researchers





Exposing the
hidden past of
Calgary's ecosystems
for the future



Afterword

Concluding thoughts

Nature benefits us. Ecological processes provide water safe for drinking and irrigation; they help moderate the extremes of weather and local climate; they mitigate flooding; they impart resistance to weeds and pest invasions. We enjoy nature for the recreational opportunities it offers. Being in nature contributes to our psychological well-being by providing a physical space to connect with and recharge emotionally. We must integrate with it.

With this strategic plan we seek integration: to recognize that Calgary as a city of almost 1.2 million people is not separate from its natural environment, but rather dependent on the services provided by intact and healthy ecosystems, the nature in our natural parks and along our streets, yards, buildings and neighbourhoods.

As ecologist Hillary Rudd writes, it is vital to “enhance the matrix of backyard habitat, planted boulevards, and utility rights-of-way found in a city.” Strengthening such networks should support wildlife protected in urban parks and refuges, and the seasonal migrants that sometimes depend on urban habitat for their survival.^{vi} Integrating with nature is a city-wide concept, and extends to a regional scale.

A city that is responsive to nature can mutually benefit its people and wildlife. This is why we aim to integrate with nature. Nature is part of our heritage, part of our identity; its beauty contributes to our sense of who we are as Calgarians. Integration is a must; it provides us with opportunities to engage and connect with each other and champion being Calgarian.

Biodiversity is our life-support system and is essential infrastructure in Calgary. The Calgary we build and live in is a part of nature. It’s our choice how well we integrate the two. Coupling and finding balance in the processes of urban development and conservation—and understanding how they best integrate—is a challenge we’re aiming to meet as the city of Calgary continues to evolve.

We are taking a comprehensive, integrated, multi-scale approach to planning and managing the ecological system of Calgary.^{vii} Our vision is to value Calgary’s diversity and richness in wildlife, vegetation and landscapes. We will work to integrate our actions and built environment with an ecological network that is healthy, connected and well managed.

Glossary

List of specific terms used in this document

Biodiversity: The variability among living organisms—animals, plants, their habitats and their genes—from all sources including terrestrial, marine and other aquatic ecosystems, and the ecological complexes of which they are part. This includes diversity within species, between species, and of ecosystems (International Union for Conservation of Nature).

Conservation/conserve: Is an approach to ecosystem and species management. It aims to maintain the continuity of a species' population and habitat system, and implies the necessity of management to retain and/or sustain the area's natural significance.

Ecological footprint: A measure to analyze the effect of human activities on the environment; it is a measurement of the resources consumed and the waste produced compared to nature's ability to provide resources and absorb human waste.

Ecological network: The distribution and suitability of habitats as perceived and used by animals in their movement through habitat areas and connections between habitats.^{viii}

Ecology: The branch of biology that deals with the relations of organisms to one another and to their physical surroundings (Oxford Dictionaries).

Ecosystem: A dynamic system of plants, animals and other organisms, together with the non-living components of the environment, that functions as an interdependent unit.

Environmentally Significant Area: An area that has been assessed prior to potential development and which, because of its features or characteristics, is significant to Calgary from an environmental perspective.

Habitat restoration: The active process of assisting, through land management activities, the recovery of a degraded habitat to initiate or accelerate its succession towards a reference habitat. The range of habitat restoration types includes reclamation, naturalization, rehabilitation and restoration. See Restoration/Restored for further details.

Invasive species: Invasive alien species or invasive species are non-native species that have been introduced, intentionally or unintentionally, from other countries or ecosystems and threaten Alberta's ecosystems and biodiversity (Alberta Environment and Sustainable Resource Development).

Landscape connectivity: The degree to which landscape facilitates or impedes flora and fauna movement among ecological resource patches and habitats.^{ix}

Native species: Species present in part or all of a specified region without direct or indirect human intervention, growing within their native range and natural dispersal potential (Alberta Conservation Information Management System).

Natural area: Land comprised predominantly of native species and natural ecosystems.

Natural environment park: A City of Calgary-owned park where the primary role is the protection of an undisturbed or relatively undisturbed area of land or water, or both, and which has existing characteristics of a natural/native plant or animal community and/or portions of a natural ecological and geographic system.

Natural heritage: Natural features consisting of physical and biological formations or groups of such formations, which are of particular value from the aesthetic or scientific point of view; geological and physiographical formations and precisely delineated areas which constitute the habitat of species of animals and plants, valuable or threatened, of particular value from the point of view of science or conservation; natural sites or strictly delineated natural sites of particular value from the point of view of science, conservation or natural beauty, or in their relation to the combined works of man and of nature.^x

Naturalization: A type of habitat restoration. The deliberate reintroduction of species that are native to a given area or are well adapted to the climate circumstance; activities that are intended to improve and enhance the natural environment. The biodiversity and ecosystem function of a naturalized ecosystem is lower compared to a reference habitat but higher compared to a reclaimed ecosystem.

Natural Region/Subregion: Natural Regions are the largest ecological classification unit in Alberta and allow for the geographic classification of the province based on ecological criteria. Each Natural Region is further categorized into Natural Subregions.

Nature: The phenomena of the physical world collectively, including plants, animals, [micro-organisms], the landscape, and other features and products of the earth, as opposed to humans or human creations (Oxford Dictionaries).

Open space: Includes all land and water areas publicly owned and offering free public access that are not covered by structures. Open space includes parks, roadway greens, recreation fields, cemeteries and green infrastructure such as swales and storm ponds.

Park: A specific-use open space area that is managed to provide opportunities for recreational, educational, cultural, ecological, historical and/or aesthetic purposes.

Reclamation: A type of habitat restoration that aims to stabilize disturbed lands to an ecologically productive use. A reclaimed ecosystem has less biodiversity and ecosystem function compared to a reference habitat, and the least compared to other types of habitat restoration.

Rehabilitation: A type of habitat restoration. The repair of ecosystem function and biodiversity along a natural successional trajectory to a level similar to, but lower than, a reference habitat.

Resilience: The amount of change a system can undergo (its capacity to absorb disturbance) and remain within the same regime—essentially retaining the same function, structure and feedback.^{xi}

Reference habitat: The target ecosystem for restoration of a degraded habitat. The reference habitat may be described from historic or contemporary data sources, or may be physically represented by undisturbed, similar native habitat appropriate for the site conditions of the degraded habitat, and which may be adjacent to the project site or elsewhere in the Natural Region/Subregion.

Restoration/restored: A type of habitat restoration. The process of fully re-establishing a target level of ecosystem function and biodiversity to a degraded habitat as defined by the reference habitat, including species composition and vegetation community structure.

Riparian areas: Areas where the plants and soils are strongly influenced by the presence of water. They are transitional lands between aquatic ecosystems (wetlands, rivers, streams or lakes) and terrestrial ecosystems.

Status species: These species are tracked provincially through Alberta's General Status of Wildlife Species Report and/or federally through the List of Wildlife Species at Risk. They are considered at risk of extinction or extirpation.

Stewardship: Individuals or groups feel a sense of ownership, connection or attachment to parks and open space that result in behaviours and actions, which maintain, protect and preserve those areas.

Watershed: Watersheds include groundwater, springs, wetlands, ponds, streams and lakes as well as all land that drains into these linked aquatic systems. Watersheds reflect both the natural characteristics of their geography and the impacts of human activities within them.

Direction

How we're positioned for biodiversity planning and management

The following plans provide overarching strategic direction for biodiversity planning and management in Calgary.

International

Convention on Biological Diversity: Strategic Plan for Biodiversity 2011–2020 (2010)

Originating at the 1992 Rio Earth Summit, in 2010 the Convention on Biological Diversity developed the *Strategic Plan for Biodiversity 2011–2020* to provide a current overarching framework on biodiversity for the entire United Nations system and others engaged in biodiversity management and policy development.

Parties agreed to translate this overarching international framework into revised and updated national biodiversity strategies and action plans. Canada is a signatory of the convention. One of the obligations under the convention is the preparation of a national biodiversity strategy.

Federal

Canadian Biodiversity Strategy (1995)

The Canadian Biodiversity Strategy was a response to the Convention on Biological Diversity established at the 1992 Rio Earth Summit. *The Strategy* was developed as a guide to implement the biodiversity convention in Canada. It recognizes existing constitutional and legislative responsibilities for biodiversity in Canada and emphasizes the importance of inter-governmental cooperation to create policy, management and research conditions necessary to advance biodiversity conservation. Federal, provincial and territorial governments, in cooperation with stakeholders and members of the public, will pursue implementation of the directions contained in *The Strategy* according to their policies, plans, priorities and fiscal capabilities.

Provincial

South Saskatchewan Regional Plan (2014)

The South Saskatchewan Regional Plan establishes a long-term vision for the region encompassing Calgary. It aligns provincial policies at the regional level to balance Alberta's economic, environmental and social goals. It sets desired economic, environmental and social outcomes and objectives for the region. It describes the strategies, actions, approaches and tools required to achieve the desired outcomes and objectives. It establishes monitoring, evaluation and reporting commitments to assess progress and provides guidance to provincial and local decision-makers regarding land use management for the region.

Engagement

How we connected with stakeholders and experts

Over 70 individuals and organizations were involved in creating this strategic plan:

- Local, regional, provincial, federal and international participants.
- Business units and departments across The City of Calgary.
- Park stewardship groups, biologists, experts in environmental education, academic researchers, community representatives and City staff.

We connected with stakeholders in the spring and summer of 2013 at several engagement sessions.

- A background information document was sent to stakeholders prior to engagement sessions.
- Sessions were composed of six to eight people and held in the format of an open conversation guided by a few questions. (The summer stakeholder sessions were put on hold until the fall due to Calgary's historic June flood.)

A summary of what we heard during our sessions was sent out to participants and stakeholders, who were later provided with an opportunity to respond to the document.

An outline for this document was developed based on the stakeholder input, literature review and review of current practices in strategic plans for biodiversity.

In January 2014, the outline was sent to stakeholders with feedback requested.

In June 2014, a draft of the strategic plan was circulated with feedback requested.

In October 2014, a final draft was circulated with feedback requested.

In December 2014, a final version was circulated for review.

The final version, including illustration, layout and design, was completed in March 2015.

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- Community Neighbourhood Services
- Corporate Properties
- Engage
- Environment and Safety Management
- Fire
- Law
- Local Area Planning and Implementation
- Office of Land Servicing and Housing
- Office of Sustainability
- Parks
- Recreation
- Strategic Initiatives
- Transportation Sustainability Strategy
- Waste and Recycling
- Water Resources

Along with the following stakeholders external to The City of Calgary:

- Alberta Wilderness Association
- Bow River Basin Council
- Canadian Parks and Wilderness Society
- Community Garden Resource Network, a project of the Calgary Horticultural Society
- Edworthy Park Heritage Society
- Federation of Calgary Communities
- Friends of Nose Hill
- ICLEI
- Nature Calgary
- University of Calgary

Notes

Literature and sources referenced

- i Huijser, M.P. *et al.* 2009. Cost–benefit analyses of mitigation measures aimed at reducing collisions with large ungulates in North America; a decision support tool. *Ecology and Society* 14(2):15 [online] <http://www.ecologyandsociety.org/issues/article.php/3000?>
- ii This is a “The International Union for the Conservation of Nature” definition. This body is partnered with ICLEI—Local Governments for Sustainability; Local Action for Biodiversity, whom The City is partnered with.
- iii The overview of Weaselhead Flats is taken from *The City of Calgary’s 2014 Biodiversity Report*. A copy can be found through Local Governments for Sustainability, www.iclei.org/lab.
- iv Tredici, P.D. 2014. “The Flora of the Future.” Posted April 17, 2014. <http://places.designobserver.com/feature/flora-of-the-future-urban-wild-plants/38417/>
- v For an overview of Calgary’s biodiversity: ecological classification, watersheds, habitat types and common species found in Calgary, see *The City of Calgary’s 2014 Biodiversity Report*. A copy can be found through Local Governments for Sustainability, www.iclei.org/lab.
- vi Rudd, H. *et al.* 2002. Importance of Backyard Habitat in a Comprehensive Biodiversity Conservation Strategy: A Connectivity Analysis of Urban Green Spaces. *Restoration Ecology* 10(2):368–375.
- vii See *Urbanization, Biodiversity and Ecosystem Services: Challenges and Opportunities* (2014) for a lengthy discussion.
- viii Adapted from Forman, R. 2014. *Urban Ecology: Science of Cities*. Cambridge University Press.
- ix Adapted from Taylor, P.D. *et al.* 1993. Connectivity is a vital element of landscape structure. *Oikos* 68(3):571–573.
- x From the Convention Concerning the Protection of the World Cultural and Natural Heritage, the General Conference of the United Nations Educational, Scientific and Cultural Organization meeting, 1972, Article 2.
- xi Walker, B and Salt, D. 2006. *Resilience Thinking: Sustaining Ecosystems and People in a Changing World*. Island Press.



