A PLANNER'S GUIDE

TO THE

BIODIVERSITY

CONSERVATION STRATEGY

FOR THE

GREATER VANCOUVER REGION

Environment Canada
Canadian Wildlife Service
Pacific Wildlife Research Centre
RR#1 5421 Robertson Road
Delta BC V4K 3N2

Prepared by Elaine Anderson, MCIP, P.Ag.

Table of Contents

Introduction

This guide is intended for use by municipal planners. It provides an overview of the land cover and biodiversity maps developed for the Biodiversity Conservation Strategy (BCS) for the Greater Vancouver Region in 2006, and describes how the mapping data might be used at the local level to plan for the protection, enhancement, and restoration of biodiversity.

The BCS provides an overall picture of habitat types and relative biodiversity across the region. This ‘bird’s eye’ view allows municipalities to see how their green space protection (e.g. parks, greenways, riparian corridors) aligns with neighbouring municipalities. It also shows important areas that are outside of municipal jurisdiction such as the Fraser River, Boundary Bay, the North Shore mountains, and the United States. Connections to these areas through municipalities are important for wildlife as they migrate or disperse from their home ranges.

In order to keep this guide as succinct as possible it does not go into great detail about the strategy itself or the mapping methodology. However, references are provided throughout the guide and in the bibliography if readers are interested in learning more about biodiversity and the BCS for the Greater Vancouver Region.

1.0 Municipal Benefits from Biodiversity Protection

This section describes some of the benefits municipalities derive from local biodiversity protection.

1.1 What is biodiversity and why should we protect it?

The term biodiversity is a contraction of the two words ‘biological’ and ‘diversity’. Generally speaking, ‘biodiversity’ refers to the variety of life on Earth and the natural patterns it forms (UN, 2000). The Biodiversity Conservation Strategy for the Greater Vancouver Region defines biodiversity as the variety of plants, animals and microorganisms and the terrestrial, aquatic, and marine ecosystems of which they are a part (Axys, 2006).

Over the past century, biodiversity around the world has been decreasing at an alarming rate. Although species extinction is a natural part of the evolutionary process, it is estimated that species are disappearing at 50-100 times the natural rate as a direct result of human activities. Most of the terrestrial biodiversity in the world is found in forests, but in the last century almost half of the Earth’s original forests have been destroyed (UN, 2000).

Loss of habitat and fragmentation of habitat are two of the greatest threats to biodiversity. Habitat fragmentation occurs as a result of large natural areas being reduced in size and separated into discrete parcels (ELI, 2003). The smaller the habitat patch size the greater the probability that a species will disappear because larger patches tend to have more natural resources and healthier ecosystems. Connectivity between patches generally improves the opportunity for species to thrive (ELI, 2003).

British Columbia (BC) is Canada's most ecologically diverse province (BCMOF, 2006). Three-quarters of Canada's mammal species are found in BC, with 24 found only in BC. Altogether, there are 1138 species of vertebrates in BC, comprised of the following:

- 488 species of birds
- 468 species of fish
- 142 species of mammals
- 22 species of amphibians
- 18 species of reptiles
  (BCMOE, 2006)

BC provides important bird breeding habitat with more than 250 bird species breeding in the province. Of those 250 bird species, 162 of them (55%) do not breed anywhere else in Canada. Invertebrate species are thought to number between 50,000 and 70,000 species, including 35,000 species of insects (BCMOE, 2006).

There is also a wide diversity of plants in BC. There are about 2790 native vascular plant species, with nearly 27% of these considered to be species at risk. There are approximately 1000 bryophytes (mosses and liverworts), 1600 lichens, 522 species of attached algae and over 10,000 species of fungi in BC (BCMOE, 2006).

Urbanization has had a significant impact on wildlife habitat, particularly in the southern part of the province, resulting in an increase in wildlife species "at-risk". The BC Ministry of Environment (BCMOE) recommends that local governments use environmental planning at the landscape or community level to identify and protect environmentally sensitive areas and wildlife corridors (BCMOE, 2006).

Although municipalities are limited in the amount of biodiversity or habitat that they can realistically protect during development, there are opportunities to incorporate biodiversity conservation, enhancement, and/or restoration during community planning (or in municipal policies and programs).

In undeveloped, or 'greenfield', areas there is an opportunity to identify and protect habitat areas during the community planning process. In previously developed, or 'brownfield', areas, there is an opportunity to develop new habitat areas and/or to link with existing habitat in the community or across the region.

The BCS data, combined with local information, provides opportunities for municipalities to plan for biodiversity conservation, enhancement, and/or restoration. Some of these opportunities are discussed in Section 4.0.

1.2 Benefits to the Municipality

The values associated with protection of biodiversity extend beyond preservation of individual species to the benefits provided to the community as a whole. Loss of biodiversity can interfere with essential ecological functions and services that are currently provided for free by nature. Some of these services would be almost impossible to replace, such as the role that birds and insects play in the pollination of plants (UN, 2000). The protection of biologically diverse areas can improve aesthetic values, provide green space for recreational activities, help moderate temperature, provide shade, and decrease run-off from streets and other impermeable surfaces (ELI, 2003; Hudson, 2000; O'Neill, 2002).

As part of the research conducted for the BCS, a 'CITYgreen' analysis was performed on selected watersheds in the region. This GIS software uses land cover information to model the environmental and economic benefits provided by trees and other green land cover. CITYgreen allows a community to quantify existing tree canopy cover and model alternative development scenarios. This tool may be useful for municipalities looking for the opportunity to compare the value of retaining trees and other green land cover with the cost to provide these services. The software assesses how urban forest cover impacts stormwater runoff, water quality, air quality, and carbon storage and sequestration (Axys, 2006).

2.0 Overview of the BCS data

This section provides a brief overview of the purpose of the overall Biodiversity Conservation Strategy for the Greater Vancouver Region as well as the purpose of the mapping that was conducted as part of the strategy.

2.1 Biodiversity Conservation Strategy

The purpose of the Biodiversity Conservation Strategy (BCS) is to assess the status of biodiversity in the region, develop regional biodiversity management strategies, evaluate the benefits of biodiversity conservation, and communicate this information to municipalities in the Greater Vancouver Region (Axys, 2003).

The Project's core planning and technical partners are: Environment Canada, Ministry of Environment, the Fraser River Estuary Management Program (FREMP) and the Burrard Inlet Environmental Action Program (BIEAP), and the Greater Vancouver Regional District (GVRD). A working group comprised of municipal representatives and other stakeholders has also been involved in the development of the strategy.

A great deal of research has gone into the development of the BCS. The following documents were prepared as part of the strategy. They provide extensive background information on the issues, roles and responsibilities, socio-economic benefits, and priorities related to biodiversity conservation in the region. The results of this research are summarized below. The documents are available online at: www.gvrd.bc.ca

2.1.1 Biodiversity Conservation in the Greater Vancouver Region: Issues and Strategic Directions Research. Phase One: Review of Key Biodiversity Conservation Issues, Roles and Responsibilities. Axys Environmental Consulting Ltd. (2003).

Overview: Numerous common policy and planning initiatives used in the Greater Vancouver region are identified in this report. They include:

- Park acquisition and planning
- Watershed planning
- Integrated Stormwater Management Planning (ISMP)
- Greenways and green corridor planning
- Integrated pest management
- Vegetation management
- Environmental Sensitive Areas (ESA) programs
- Best Management Practices (BMP) programs
- Watercourse classification programs
- Local area plans
- Identification of Development Permit Areas (DPA)

Common stewardship initiatives used in the region include:

- Active management of conservation areas
- Habitat enhancement and restoration
- Stream, shore, and reef keeping programs
- Fisheries enhancements
- Creation of wildlife corridors
- Identification and preservation of wildlife trees
- Slope stabilisation
- Stormwater management
- Forest stewardship
- Wetland/bog conservation
- Agricultural land conservation and enhancement

2.1.2 Biodiversity Conservation in the Greater Vancouver Region: Issues and Strategic Directions Research. Phase Two: Socio-economic Values of Biodiversity in the Greater Vancouver Region. Gustavson Ecological Resource Consulting (2003).

Overview: This report identifies the importance of using appropriate economic instruments to support land use decisions that are based on social values. Economic instruments to support biodiversity include:

- Taxes
- User fees
- Final demand interventions (e.g. green certifications)

The report recommends the use of a framework to consider the full range of socio-economic benefits to support improved biodiversity conservation decision making. The report identifies some biodiversity conservation initiatives that have municipal policy importance. They include:

- Integrated Stormwater Management Plans
- Tree protection
- Establishment of greenways, forest, aquatic, wetland conservation areas
- Management of private land use for biodiversity conservation

2.1.3 Biodiversity Conservation in the Greater Vancouver Region: Issues and Strategic Directions Research Phase Three: Priorities, Opportunities and Strategic Direction. Axys Environmental Consulting Ltd. (2002).

Overview: This report provides a synthesis of Phases One and Two. It provides the following recommendations for biodiversity conservation in the region:

- Regional coordination
- Address gaps, overlaps, and conflicts in the administrative framework
- Build on what's already in place
- Monitor success

2.2 Biodiversity Conservation Strategy Mapping

Biodiversity mapping was conducted for the entire Greater Vancouver Region in order to produce a 'Management Picture' for the region to facilitate biodiversity conservation planning at the regional, watershed, and local levels. The mapping integrates a variety of environmental and other relevant data into a series of maps that identify important habitat areas, connectivity, relative biodiversity, and reservoirs and refuges (Axys, 2006).

2.2.1 Method

A great deal of GIS data was integrated to create the final biodiversity maps. Because the integration of data involved a very complex technical process, this section is not intended to provide a comprehensive review of the method, but rather to provide an overview of the method in order to explain how the biodiversity maps were created. A complete explanation of the method used to integrate and interpret the map layers can be found in: "Assessment of Regional Biodiversity and Development of a Spatial Framework for Biodiversity Conservation in the Greater Vancouver Region" (Axys, 2006).

The following data was integrated to create the final biodiversity maps:

- Satellite-derived land cover based on 2002 Landsat 7 imagery
- 2002 Baseline Thematic Mapping (BTM)
- 2001 land use data from the Greater Vancouver Regional District (GVRD)
- Wetlands (from Canadian Wildlife Service and Terrain Resource Information Management (TRIM))
- Intertidal data (extracted from Canadian Hydrographic Service charts)
- Watercourses (from the TRIM 1:20,000 scale map sheets)

- Slope classes (based on the 1:20,000 scale Terrain Resource Information Management [TRIM] digital elevation model [DEM])
- Forest cover data at 1:20,000 scale from the BC Ministry of Forests
- Biogeoclimatic Ecosystem Classification (BEC) coverage (at the 1:250,000 scale)
- Roads from the British Columbia 1:20,000 scale Digital Road Atlas

Additional information about these map layers can be found in: "Assessment of Regional Biodiversity and Development of a Spatial Framework for Biodiversity Conservation in the Greater Vancouver Region" (Axys, 2006).

2.2.2 Key Content

This section describes the key content, or outcomes, of the GIS map analysis. A refined land cover classification map was created from 15 metre satellite-derived land cover data. Habitat classifications were created based on 'green' land cover types extracted from the Ministry of Sustainable Resource Management (now the Ministry of Agriculture and Lands) 2002 satellite imagery data for the region. Additional data from the list above was integrated and interpreted to 'build' the final biodiversity maps for the region. The key maps resulting from this process are listed below and discussed in Section 3.0.

- Land Cover/Habitat mapping
- Reservoirs and Refuges
- Connectivity
- Relative Biodiversity

The regional mapping ultimately provides a landscape level, coarse scale, indication of potential habitat across the region based on land cover classification.

2.2.3 Limitations of the Data

This section describes the limitations inherent in the regional mapping. The limitations are largely due to the complexity of integrating information across municipalities in a consistent and scientific manner. The limitations are noted here not to undermine the regional mapping, but rather to provide planners with a sense of what the mapping can provide and what additional information needs to be integrated at the local level. A discussion about the types of information that could be integrated at the local level is provided in Section 4.0.

The mapping is limited by a number of factors which should be kept in mind when using the mapping at a local level.

- The land cover mapping was derived from 2002 imagery, so changes in the landscape since that time will not be reflected in the mapping.
- The habitat areas have not been ground-truthed so the structural complexity and species diversity is not known.
- Local knowledge should be integrated wherever possible because the interpretation of the data was conducted at a coarse level and may not pick up finer features in the landscape (e.g. small wetlands).

- There may be some errors in habitat classifications due to the scale at which the interpretation was conducted. Local knowledge should be integrated at the municipal level to confirm or revise the habitat classifications.

3.0 Key Map Overview

This section summarizes the key biodiversity maps that resulted from the BCS mapping. These maps are likely to be of the most benefit to municipalities because they distill a great deal of complex data into relatively simple 'pictures' of biodiversity in the region. The description of each map includes the following information:

- Relevance to municipality
- Data limitations
- Adding value to municipal information

The names used to identify these maps are the same names that are used in: "Assessment of Regional Biodiversity and Development of a Spatial Framework for Biodiversity Conservation in the Greater Vancouver Region" (Axys, 2006). The figure numbers that are used in the Axys report are provided in parenthesis here in order to simplify identification of the applicable map in the Axys report. An explanation of how the biodiversity mapping could be used to plan for biodiversity at the local level is provided in Section 4.0.

More detailed information about these maps and others that were created for the BCS can be found in: "Assessment of Regional Biodiversity and Development of a Spatial Framework for Biodiversity Conservation in the Greater Vancouver Region" (Axys, 2006). The GIS data files will be available on-line at www.shim.bc.ca

The following maps are reviewed in this section:

- Habitat Types *(Figure 14)*
- Habitat Reservoirs and Refuges *(Figure 15)*
- Connectivity *(Figure 17)*
- Relative Biodiversity *(Figure 18)*

In order to simplify the information, the four key maps are described in the following pages in separate tables. Each table is followed by the map it describes. These maps are intended to illustrate the type of information that is available to municipalities at a regional scale. They should be used as 'context' maps to compare biodiversity across municipalities in the region. In order for this information to be of most benefit at a local scale, municipalities will need to access the data files for their municipality (www.shim.bc.ca) and incorporate the data into their mapping systems.

Section 4.0 provides suggestions on how the BCS mapping data might be incorporated into specific municipal mapping and planning scenarios.

Table 1 HABITAT TYPES MAP *(FIGURE 14)*

Description	Illustrates the location of 13 habitat types across the region based on the 2002 satellite-derived land cover classification.
Relevance to municipality	• This map provides the opportunity to identify key habitat areas in the municipality and could be used to optimize green space management for human and wildlife needs. • It also shows how habitat in the municipality links up with habitat across the region. • With this knowledge planners can identify what needs to be protected, enhanced, or restored in order to provide habitat connections. • Ideally municipalities should plan for, and protect, contiguous corridors that link habitat reservoirs and refuges across the region with as many connections as possible.
Data limitations	The data does not reflect detailed site conditions such as structural diversity or complexity. As a result, it may over or under rate certain habitat types. Local knowledge and ground-truthing should be conducted to augment the data.
***Adding value to municipal information** *See Table 5 (Section 4.0)	Agricultural Land Use Inventory Environmentally Sensitive Areas Mapping Integrated Stormwater Management Plans Municipally Owned Land

HABITAT TYPES MAP *(Figure 14)*

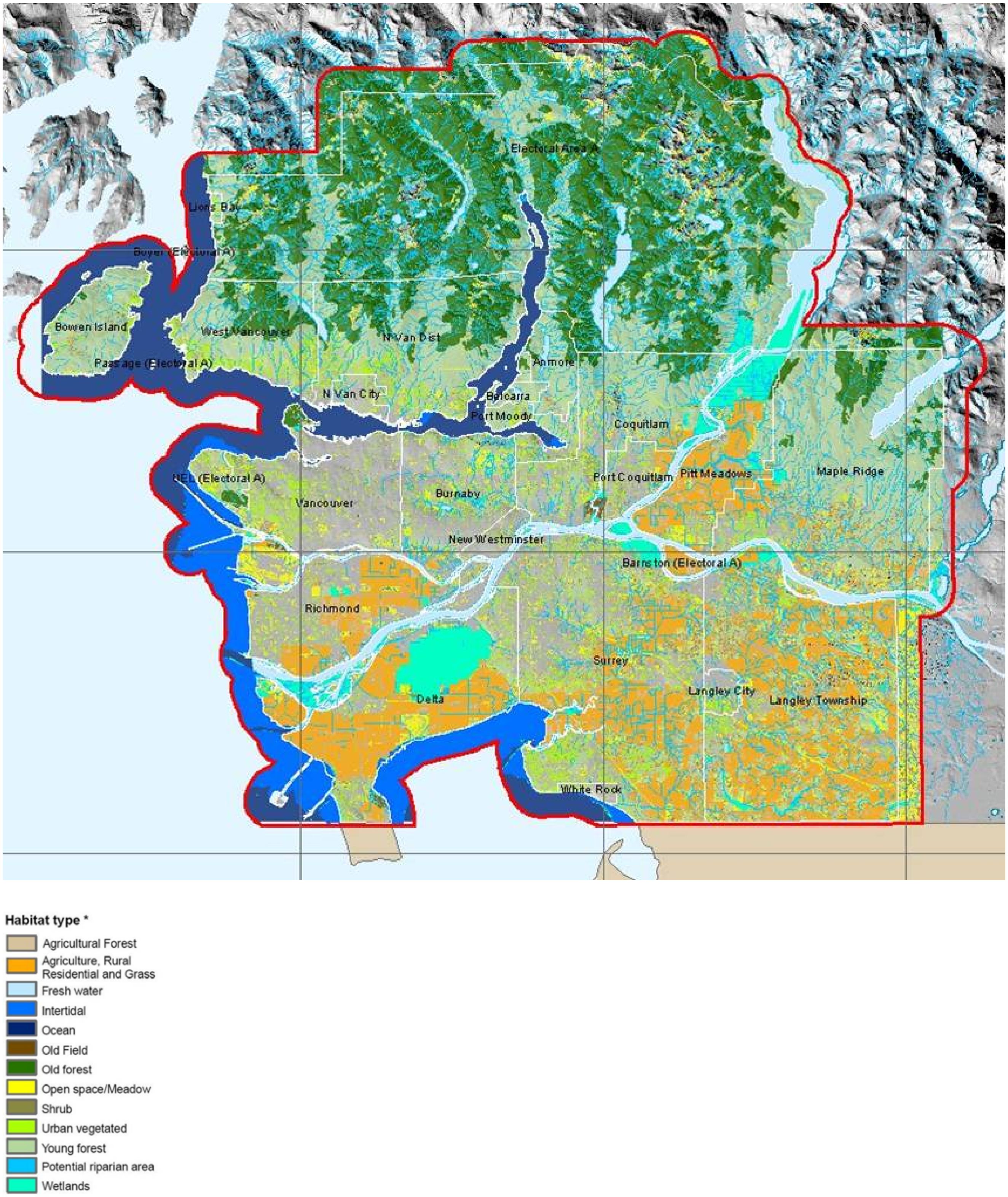
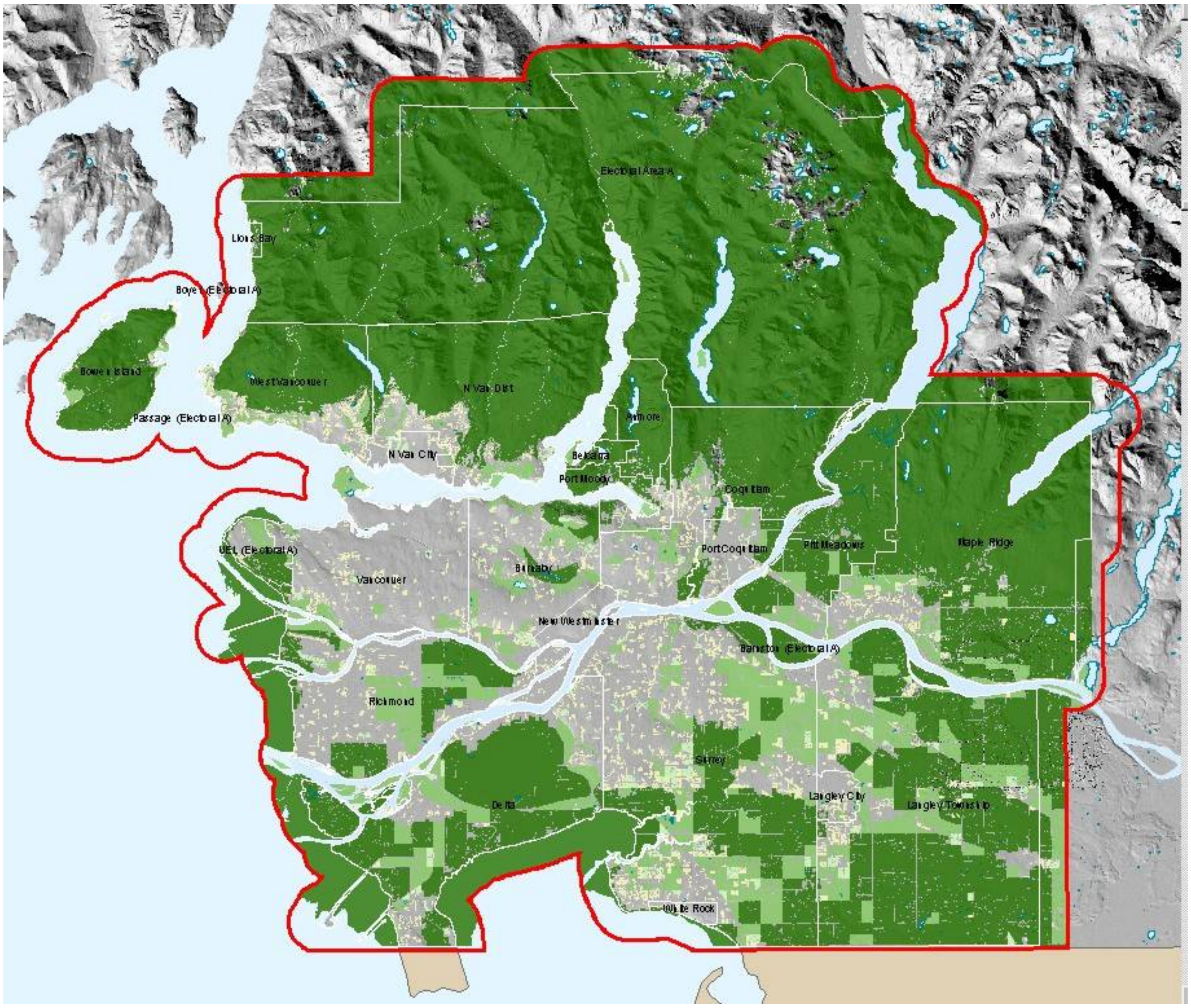


Table 2 HABITAT RESERVOIRS AND REFUGES MAP *(FIGURE 15)*

Description	This map shows the areas in the region that have been identified as *habitat reservoirs* or *refuges*. *Habitat reservoirs* are areas of relatively natural habitat that have sufficient size and ecological integrity to support a range of native species, including species that require interior habitat. Habitat reservoirs are between 30–200 ha in size. *Habitat refuges* are patches of habitat that provide food, shelter, and/or other needs for wildlife. Habitat refuges are between 2–30 ha in size.
Relevance to municipality	• This information will help municipalities to identify important patches of habitat in their community. • Fragmentation of these patches should be avoided as this will reduce the value to wildlife. • This map should be used in conjunction with the 'Connectivity' map to ensure that habitat patches are connected across the landscape.
Data limitations	The habitat reservoirs and refuges were identified based on the presence of contiguous habitat. They were not identified based on habitat type. Consequently some habitat patches may be more valuable to certain species of wildlife than others. Local knowledge should be used to identify the type and quality of habitat present.
***Adding value to municipal information** *See Table 5 (Section 4.0)	Agricultural Land Use Inventory Cadastral Greenways and Parks Plans Integrated Stormwater Management Plans Official Community Plans Road Network Mapping Watercourse Classification Mapping

HABITAT RESERVOIRS AND REFUGES MAP *(FIGURE 15)*



Habitat refuges and reservoirs *

- Major reservoir (> 200 ha)
- Reservoir (30 - 200 ha)
- Major refuge (20 - 30 ha)
- Refuge (2 - 20 ha)

Table 3 CONNECTIVITY MAP *(FIGURE 17)*

Description	Connectivity describes the degree to which ecosystems are linked together. This map identifies connectivity between habitat corridors and high value habitat reservoirs and refuges. Habitat connectivity was measured by evaluating the amount of high quality habitat within 500 metres of each habitat pixel. Connectivity is important for regional biodiversity because it facilitates the movement of species for breeding, feeding, and dispersal.
Relevance to municipality	• This map helps identify areas within a municipality that contribute to regional connectivity. What may appear to be insignificant habitat within a municipality may stand out as significant when viewed from a connectivity perspective at the regional level. • This data should help municipalities to identify priority areas for acquisition, enhancement, or restoration (if supplemented with local and site level information). • Areas that currently provide connectivity should be protected. • Gaps in connectivity should be considered for restoration and enhancement projects. • Connectivity corridors should be as wide as possible to support greater biodiversity.
Data limitations	Habitat corridors should be ground-truthed to determine if they are spatially and structurally sufficient for a diversity of wildlife or if enhancement is required.
***Adding value to municipal information** *See Table 5 (Section 4.0)	Agricultural Land Use Inventory Air Photos Greenways and Parks Plans Integrated Stormwater Management Plans Official Community Plans Road Network Mapping Watercourse Classification Mapping

HABITAT CONNECTIVITY MAP *(FIGURE 17)*

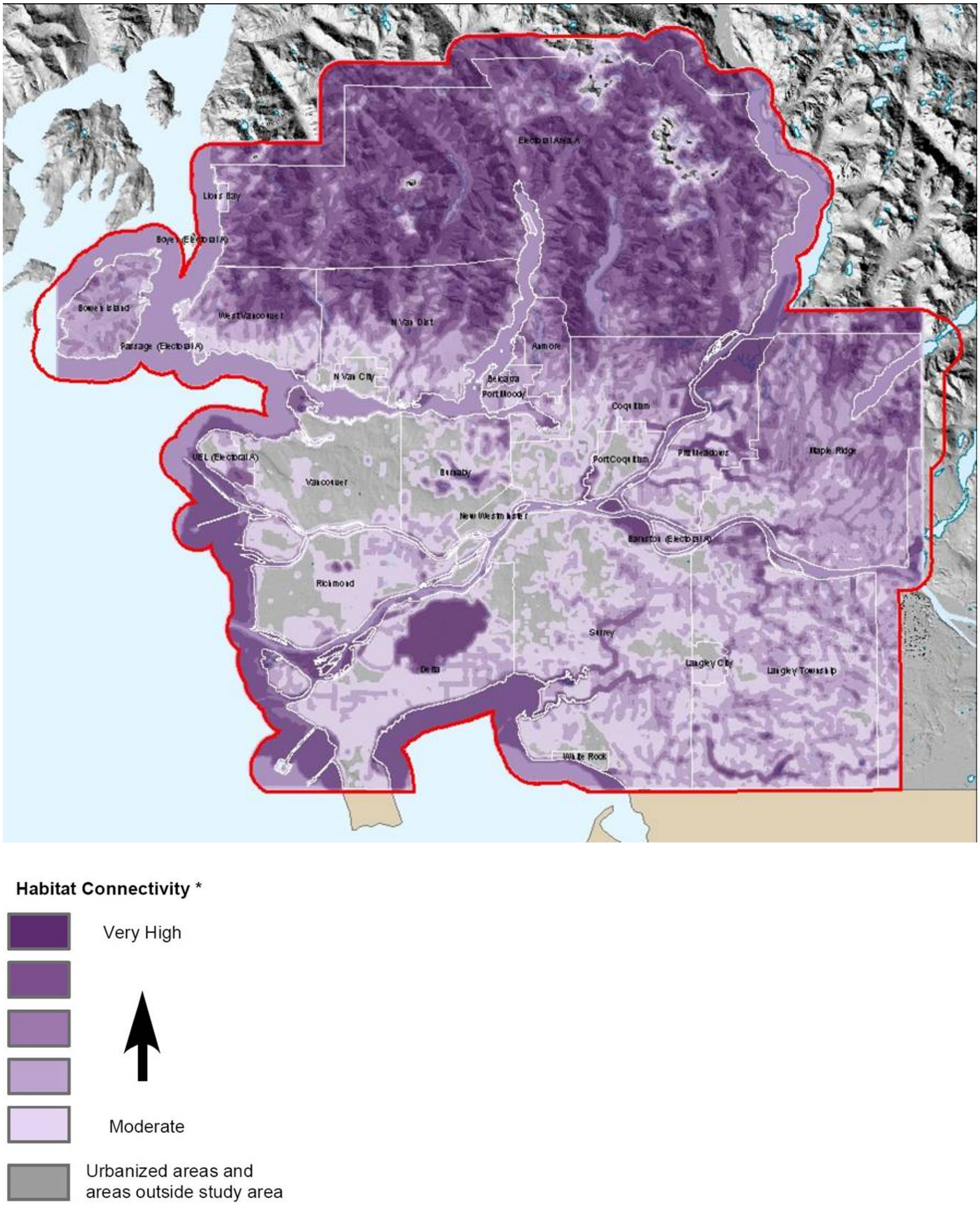
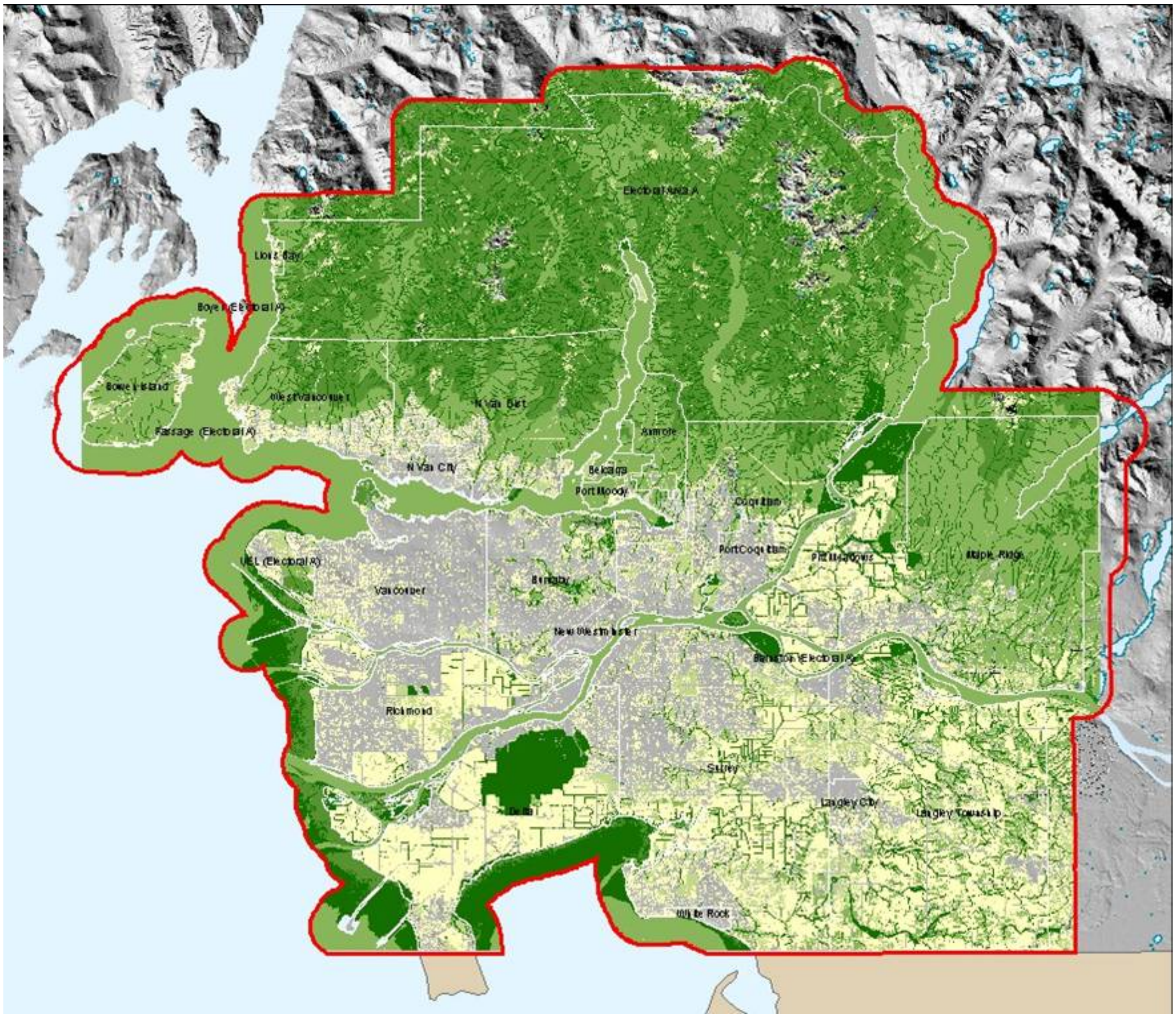
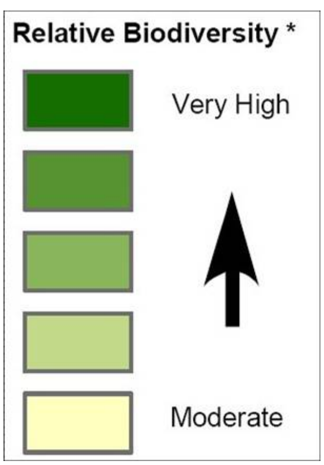


Table 4 RELATIVE BIODIVERSITY MAP *(FIGURE 18)*

Description	This map combines the habitat type quality/value ratings and the habitat refuges and reservoirs coverage. Relative biodiversity was ranked using the following criteria: • Size of contiguous habitat based on the threshold sizes of habitat reservoirs and refuges identified in the BCS (larger patches of habitat received a higher relative biodiversity value than smaller patches) • Rating of the relative value of different habitats based on the professional judgement of the Biodiversity Strategy Steering Committee through a 'pairwise comparison' (see 2006 Axys report for more detail) Habitat was ranked in the following order (from highest to lowest biodiversity value): 1. wetland, old forest, intertidal areas 2. lakes and rivers 3. young forest 4. old field habitat 5. agricultural forest 6. shrub habitat 7. agricultural lands and rural residential grass areas 8. open space 9. urban vegetated areas
Relevance to municipality	• Municipalities can use this information to identify municipally and regionally significant areas of high relative biodiversity in the community. • The mapping can be used to prioritize areas of high biodiversity where more detailed field study or mapping can be conducted. • Areas of high relative biodiversity should be considered for protection. • Gaps in between areas of high biodiversity should be restored and protected in order to provide connections between areas of high biodiversity. • Areas of lower biodiversity should be considered for restoration and enhancement opportunities.
Data limitations	There may be instances where the relative value of a habitat type is over or under stated due to the need to create 'rules' to rank habitat (i.e. there may be exceptions to the rules that are not captured). Local knowledge should be incorporated to verify the relative biodiversity ranking.
***Adding value to municipal information** *See Table 5 (Section 4.0)	Cadastral Environmentally Sensitive Areas Mapping Greenways and Parks Plans Municipally Owned Land Official Community Plan

RELATIVE BIODIVERSITY MAP *(FIGURE 18)*





4.0 Planning for Biodiversity

4.1 Introduction

This section describes some of the ways that municipalities can combine the BCS mapping with existing municipal data to add value to existing municipal information and plan for biodiversity conservation.

Key goals to keep in mind when planning for biodiversity are:

- Maintain and increase native species biodiversity
- Protect and restore habitat reservoirs and patches
- Link habitat reservoirs with conservation corridors
- Improve habitat quality and complexity for wildlife
- Promote native vegetation and control of non-native species

These goals were derived from the Still Creek Watershed Biodiversity Conservation Case Study (Axys, 2005). Still Creek, a highly urbanized watershed in Burnaby, was selected by the BCS partners as a case study to illustrate how the BCS mapping could be used to inform Integrated Stormwater Management Plans (ISMPs). This is a useful study for municipalities to refer to when planning for biodiversity, because it explains in great detail how municipal information and BCS data were used to identify goals, strategies, and actions related to biodiversity conservation, enhancement, and restoration.

4.2 Adding Value to Municipal Information

As mentioned previously, there is a great deal of complex information included in the BCS data. In order to simplify this information, an additional table (Table 5) has been created to show how municipal sources of information link to the 'Key Maps' identified in Tables 1 to 4. Suggestions about how the BCS data can add value to existing municipal information are provided.

Since each municipality will have access to different types of local data, the examples below may or may not apply to a particular municipality. However, it should give a sense of how the BCS data can be incorporated into existing municipal information and assist in local biodiversity conservation planning. Only those key maps that have particular relevance to the municipal data identified below are described. However, all of the key maps are likely to be of value when planning for biodiversity.

Table 5 ADDING VALUE TO MUNICIPAL INFORMATION

Municipal Data	BCS Key Map	Value added through BCS map
Agricultural Land Use Inventory	Habitat Types	Use to identify which habitat types fall predominantly with the Agricultural Land Reserve (ALR). Consider landowner incentive programs to help preserve habitat types that are found mainly in the ALR (e.g. wetlands).
	Reservoirs and Refuges	Use to identify opportunities to support agricultural production while maintaining the biological diversity of reservoirs and refuges in the ALR.
	Connectivity	Use to identify and protect vegetated buffers along the rural urban boundary as well as connections across the agricultural landscape. These connections are likely to be very important for wildlife moving through the region. Landowner stewardship should be encouraged in areas of high connectivity.
Air Photos	Connectivity	Use to confirm connectivity. Municipal air photos are likely to be more accurate than the regional mapping because they will reflect recent changes in the landscape and provide a finer scale of resolution. For example, fragmentation due to roads may not appear in the regional mapping, but will be visible on air photos.
Cadastral	Reservoirs and Refuges	Use to identify whether reservoirs or refuges fall within one or more properties. Use this information to identify the relative risk to biodiversity (e.g. numerous landowners may mean higher risk of habitat fragmentation).
	Relative Biodiversity	Use to identify individual properties with high relative biodiversity. Target these properties for future municipal acquisition.
Environmentally Sensitive Area (ESA) Mapping	Habitat Types	Use to assign habitat types to ESA areas.
	Relative biodiversity	Use to assign relative biodiversity rank to ESAs.
Greenways and Parks Plans	Reservoirs and Refuges	Use to identify whether these areas are protected by parks. If not protected, consider acquiring these areas as part of the parks network.
	Connectivity	Use to identify areas where habitat connectivity overlaps with current or future greenway connections. Optimize human and wildlife benefits by providing greenways and parks in locations where connectivity already exists. Use to identify greenways and parks that do not provide good habitat connectivity (e.g. lack of trees) and consider opportunities for habitat restoration in these areas.
	Relative Biodiversity	Use to identify and protect areas within parks and greenways with high relative biodiversity. Consider limiting human access to these areas.

Integrated Stormwater Management Plans	Habitat Types	Use to identify and protect habitat types that make a significant contribution to stormwater management (e.g. wetlands).
	Reservoirs and Refuges	Use to identify and protect habitat reservoirs or refuges that also provide stormwater management benefits.
	Connectivity	Use to identify areas where connectivity contributes to stormwater management (e.g. rows of trees on hillsides). Use to identify gaps in habitat connectivity. Identify opportunities to improve both stormwater management and connectivity through habitat restoration.
Municipally Owned Land	Habitat Types	Use to identify the type of habitats represented on municipally owned lands. Use to prioritize protection of these lands (i.e. protect the rarest habitats). Develop best management practices for municipally owned land to protect and enhance habitat.
	Relative Biodiversity	Use to identify, prioritize, and protect areas of high relative biodiversity on municipally owned land. Examine opportunities to enhance land having lower relative biodiversity values.
Official Community Plan (OCP)	Reservoirs and Refuges	Use in conjunction with Parks mapping to identify important habitat areas that could be acquired as parkland in the future.
	Connectivity	Use in conjunction with Road Network Mapping to minimize loss of connectivity. Use in conjunction with Greenways mapping to identify opportunities to provide greenway connections that protect or enhance habitat connectivity.
	Relative Biodiversity	Use in conjunction with ESA mapping to designate Environmentally Sensitive Areas in OCPs.
Road Network Mapping	Reservoirs and Refuges	Use to reduce reservoir and refuge fragmentation due to roads. Reservoirs and refuges should be left intact wherever possible.
	Connectivity	Use to reduce habitat fragmentation due to roads. Consider installing wildlife tunnels in areas where major roads cross habitat connections.
Watercourse Classification Mapping	Reservoirs and Refuges	Use to link riparian areas to reservoirs and refuges.
	Connectivity	Use to establish or protect connections between riparian corridors and upland corridors.

5.0 Conclusion

Biodiversity conservation at the municipal level provides local, regional, provincial, and global benefits. Local as well as migratory species depend on the habitat in our region for survival. They require linkages between habitats so that they can move to other areas when resources become scarce. This is similar to the way our society functions in the region. Municipalities within the region operate within a web of many interrelated services such as roads, hydro, water, and gas. Our communities are linked to a network of ‘lifelines’ or services that contribute to our well-being. Without these connections, our municipalities would operate in isolation from each other and we would require sufficient resources within our municipal boundaries to support our local population. The needs of wildlife are not much different. If wildlife habitat becomes too fragmented they lose access to the networks they depend upon to survive. Those networks include habitat reservoirs and refuges, and wildlife corridors that allow wildlife to move from one area to another. By considering the needs of wildlife in the community planning process, municipalities can contribute to the overall livability of their community for both people and wildlife.

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