OTTAWA VALLEY
Natural Area Conservation Plan II (NACP)
Québec and Ontario Regions

Primary Authors:
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Brenda Van Sleeuwen, Nature Conservancy of Canada, Conservation Biologist – Eastern Ontario

Approval Step	Date
RVP Authorization	12 June 2013
President's Approval	13 November 2013
Regional Board Approval	19 November 2013
Conservation Committee Recommendation	2 December 2013
National Board Approval	6 December 2013

Conservation Committee Recommendation to the National Board of Directors:
That, pursuant to the Conservation Policy Framework adopted on September 29, 2006, the National Board of Directors approve the Ottawa Valley Natural Area Conservation Plan per clause 2.1 and further approve Conservation Projects in accordance with clause 2.2 a, subject to completion of satisfactory annual reports per clause 2.6 a.

Ottawa Valley
Natural Area Conservation Plan II
Executive Summary

Vision Statement

The Ottawa Valley Natural Area (NA) is conserved as an area of remarkable natural habitats sustaining secure populations of plants and animals and supported by a proud and engaged local community. The Nature Conservancy of Canada plays a lead role in the conservation of the NA.

Goals

1.	To conserve rare ecosystems and representative communities by enlarging and consolidating core conservation areas with emphasis on alvars, sand dunes, bogs, fens and grassland bird communities.
2.	To ensure functional ecological linkages between core conservation areas, focusing on two areas (a) on the north shore between Sheenboro and Gatineau Park and (b) between Alfred Bog and the City of Ottawa.
3.	To contribute to the maintenance and recovery of viable populations of globally, nationally and provincially rare species with an emphasis on Grassland Birds, alvar species, turtles, forest birds and the Western Chorus Frog (*Pseudacris triseriata*).
4.	To support partners and enhance partnerships by providing science, conservation planning and funding support to facilitate protection and management of core conservation lands.
5.	To develop opportunities and provide support to engage local community participation in conservation.

Conservation Context

The Ottawa Valley NA is within the Mixed Woods Plain Ecozone and straddles the Québec-Ontario border. The NA is quite large, covering 9,827 km^2 (2,484,233 acres [ac]; 982,756 hectares [ha]). This NA encompasses a number of physiographic regions and encompasses the cities of Ottawa and Gatineau.

The Ottawa Valley represents a remarkable interface between ecoregions, where the Great Lakes, the Boreal Forest and the St. Lawrence Lowlands come together with biotic influences of the northern Appalachians and the Allegany Plateau. The Conservation Data Centres in Québec (Centre de données sur la patrimoine naturel du Québec [CDPNQ]) and Ontario (Natural Heritage Information Centre [NHIC])

currently track approximately 189 and 112 significant species respectively. Of these, 64 are listed as federal species at risk (SAR) by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) and 28 are globally rare species (i.e., ranked G1-G3 by NatureServe) Approximately 8.5% of the lands in the NA are included in protected area/conservation designations. The largest conservation landowner in the NA is the National Capital Commission (5.16%). The Conservancy owns and manages 22 properties in the area (19 properties in Québec and 3 properties in Ontario) totalling 0.43% of the NA, and has transferred or leased other properties (e.g., Burnt Lands Alvar, Alfred Bog) to partners such as Ontario Parks and the Rideau Valley Conservation Foundation. Today, land use within the NA varies from urban to suburban residential development, agricultural and industrial lands, park and conservation lands, and recreational and tourism uses.

The second-generation Natural Area Conservation Plan will provide the strategic plan for the Conservancy to protect and maintain an additional 1,235 ac (500 ha) focused on core areas for rare and unique systems, including karsts, sand dunes, alvars, forests (in Québec), and high quality habitat for Grassland Birds. The focus of this plan will be to work with partners to address the biological connections in the NA.In addition, the Conservancy will work with partners to improve conservation information and planning across the landscape and to develop stewardship plans for existing conservation lands where such documents do not currently exist.

Biodiversity Targets

Target	Viability
Forest Matrix	**Fair**
Wetland Complexes	**Fair**
Rivers and Riparian Habitats	**Fair**
Alvars, Limestone and Karst Ecosystems	**Good**
Dunes and Sand Barrens	**Fair**
Grassland Birds	**Fair**
Overall Target Viability	**Fair**

Threats

The overall threat status for the Ottawa Valley NA is **medium**, the same as for the first five-year plan covering the area north of the river.

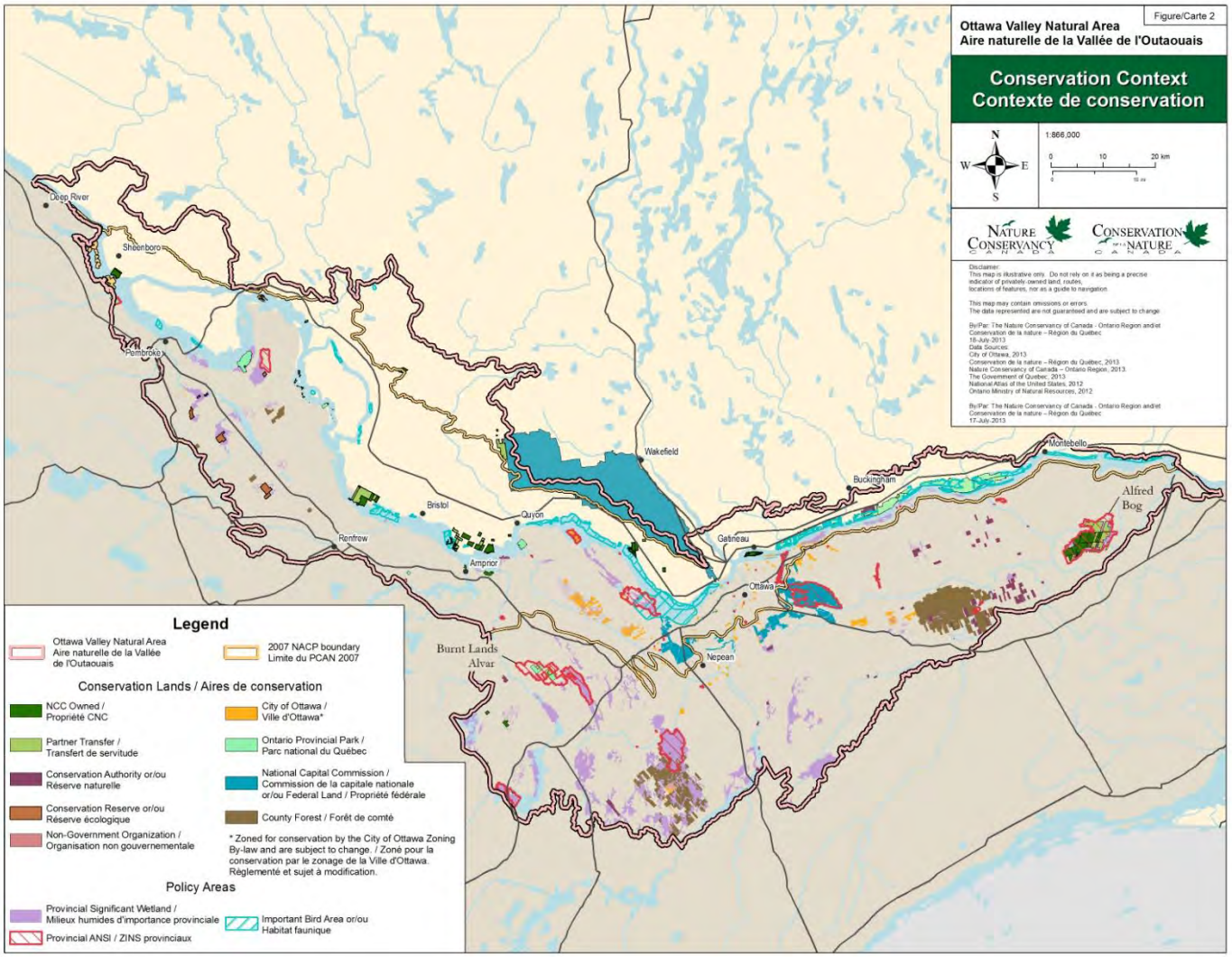
Threat	Magnitude
1.1.1 Suburban expansions and associated commercial development	**Medium**
8.1.2 Invasive non-native aquatic species	**Medium**
3.2.1 Expansion of aggregate and stone extraction	**Medium**
2.1.1 Intensification of agriculture	**Medium**
6.1.1 Motorized recreational vehicles (All-terrain Vehicle [ATV], boating)	**Medium**
1.1.2 Increasing demand for second homes	**Medium**
8.1.1 Invasive non-native terrestrial species	**Medium**
7.2.1 Dam management on the Ottawa River and its tributaries	**Medium**
9.3.1 Agricultural effluent and fertilizer run-off	**Medium**
Overall Threat Status for the Natural Area	**Medium**

Conservation Actions

1.1.1 Secure a minimum of 1,235 ac (500 ha) of priority lands by 2018. Securement work will emphasise under-represented, high-risk, and unique systems; • Alvars • Karst systems • Ancient sand dunes • Large bog and fen systems east of Ottawa, including connectivity • Wetland Complexes supporting SAR • Grassland bird communities • Remaining large forest blocks.
1.1.2 Assist partner land organizations (including the City of Ottawa, Conservation Authorities, Land Trusts, the National Capital Commission, and provincial agencies) in identifying and protecting priority lands on an ongoing basis. Convene a workshop or round-table by 2014 to help identify collaborative opportunities.
1.3.1. Prepare Annual Progress Reports [APR] throughout planning process and third-generation NACP by 2018.
2.1.1 Prepare interim stewardship statements [ISS] within one year and property management plans (PMPs) following the Conservancy's approved Stewardship Performance Standards for secured properties, and conduct stewardship actions on acquired properties as required by PMPs.
2.1.2 *Complete baseline documentation reports for the purposes of monitoring restrictions for all properties secured under conservation easement, following the Conservancy's approved Stewardship Performance Standards for easement properties, and monitor all easement properties annually as required.*
2.1.3 Maintain relationships with partners of transferred lands as specified in land-holding (or equivalent) agreements and on an ongoing basis engage owners of other existing protected areas to provide assistance in the development and implementation of management plans and/ or stewardship actions.
2.1.4 By 2018, organize two bioblitzes in karst, dunes, sand barrens, or bog and fen systems.
2.1.5 By 2018, initiate a minimum of four research projects in collaboration with a partner to address knowledge gaps and/ or threats to a biodiversity target(s), with a focus on karst, alvars, and Grassland Birds). A minimum of one research project to be focused on addressing knowledge gaps for dunes and sand barren ecosystems.
2.1.6 By 2014, map all riparian habitats within the NA with the aid of partners, where possible.
2.1.7 Continually contribute to and guide implementation of a regional recreational park in Bristol.
2.1.8 Research, prioritise, and map karst systems in the Ottawa Valley NA by 2018 with the aid of partners, where possible.
2.3.1 Identify and maintain priority grassland bird habitats in the NA by 2018.
2.3.2 Collaborate with farmers on best management practices in the NA by 2018.

3.1.1 Annually collaborate with provincial conservation data centres (NHIC in Ontario, CDPNQ in Québec) and local partners to update historical species records in the NA, with over 50% of historical SAR records on the Conservancy or partner-protected lands resurveyed. Regularly exchange data on rare species, plant communities and natural areas with conservation data centres to maintain the currency of information for planning purposes.
3.2.1 Participate in the recovery planning process for a minimum of two SAR and lead in the implementation of at least three priority recovery actions for these two species as outlined in the recovery plans in the NA by 2018, with a focus on sand dune, alvar, bog and fen, turtle, Western Chorus Frog, and grassland bird species.
4.3.1 *Starting in 2014, the Conservancy will communicate at least twice annually to highlight conservation gains and stewardship issues to the community, donors and financial partners through private or public events, press releases or other media vehicles.*
4.3.2. *Continue to maintain and update private land database to track landowner contact on an ongoing basis.*
4.3.3 Sponsor an annual meeting in the Ottawa Valley with partners to identify priorities, coordinate conservation actions and highlight conservation successes.
5.2.1 By 2018, where appropriate, the Conservancy will inform local municipalities and other parties of the NACP priorities and implementation strategies for the NA.
7.2.1 By 2015 develop a strategic funding partnership with the City of Ottawa, the National Capital Commission, Ontario Ministry of Natural Resources, Ministère des Ressources Naturelles (MRN), Ducks Unlimited, and other partners focused on long-term funding strategies for addressing landscape connectivity goals in the NA.
7.2.2 Continually provide input, support, and mentoring in the creation of an Ottawa Valley Land Trust with the goal of seeing a new organization formed by 2018.
7.2.3 Engage local land stewards or stewardship committee for the Conservancy properties by 2018.
7.3.1 Establish one bi-regional campaign to raise $4,774,183 to implement all actions within the NACP by 2018.

Maps


Figure/Carte 2
Ottawa Valley Natural Area
Aire naturelle de la Vallée de l'Outaouais
Conservation Context
Contexte de conservation
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0 10 20 km
Nature Conservancy Canada
Conservation de la nature Canada
Disclaimer:
This map is illustrative only. Do not rely on it as being a precise indicator of privately-owned land, routes, locations of features, nor as a guide to navigation.
This map may contain omissions or errors.
The data represented are not guaranteed and are subject to change.
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18-July-2013
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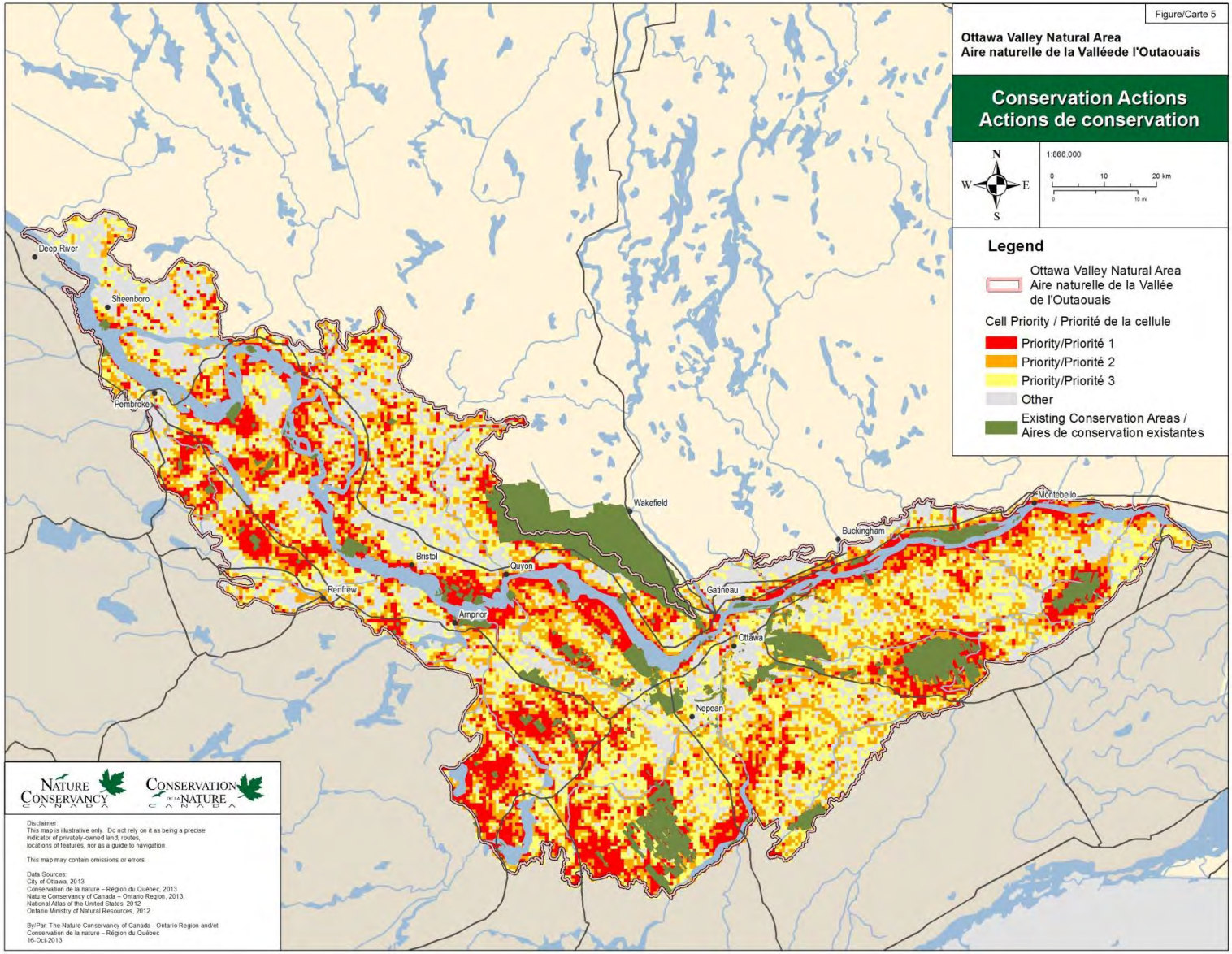
17-July-2013
Deep River
Sheenboro
Pembroke
Wakefield
Buckingham
Montebello
Alfred Bog
Bristol
Quyon
Renfrew
Arnprior
Gatineau
Ottawa
Nepean
Burnt Lands Alvar
Legend
Ottawa Valley Natural Area
Aire naturelle de la Vallée de l'Outaouais
2007 NACP boundary
Limite du PCAN 2007
Conservation Lands / Aires de conservation
NCC Owned / Propriété CNC
City of Ottawa / Ville d'Ottawa*
Partner Transfer / Transfert de servitude
Ontario Provincial Park / Parc national du Québec
Conservation Authority or/ou Réserve naturelle
National Capital Commission / Commission de la capitale nationale or/ou Federal Land / Propriété fédérale
Conservation Reserve or/ou Réserve écologique
County Forest / Forêt de comté
Non-Government Organization / Organisation non gouvernementale
* Zoned for conservation by the City of Ottawa Zoning By-law and are subject to change. / Zoné pour la conservation par le zonage de la Ville d'Ottawa. Réglementé et sujet à modification.
Policy Areas
Provincial Significant Wetland / Milieux humides d'importance provinciale
Important Bird Area or/ou Habitat faunique
Provincial ANSI / ZINS provinciaux


Figure/Carte 5
Ottawa Valley Natural Area
Aire naturelle de la Valléede l'Outaouais
Conservation Actions
Actions de conservation
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Ottawa Valley Natural Area
Aire naturelle de la Vallée de l'Outaouais
Cell Priority / Priorité de la cellule
Priority/Priorité 1
Priority/Priorité 2
Priority/Priorité 3
Other
Existing Conservation Areas / Aires de conservation existantes
Deep River
Sheenboro
Pembroke
Renfrew
Bristol
Quyon
Wakefield
Gatineau
Buckingham
Montebello
Arnprior
Ottawa
Nepean
Nature Conservancy Canada
Conservation de la nature Canada
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16-Oct-2013

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Natural Area Conservation Plan II
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PROJECT TEAM AND KEY PARTNERS

Name	Organization	Role	Contact Information
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Gary White	Nature Conservancy of Canada – Ontario	GIS Analysis & Cartography	
Louise Gratton	Consultant for Nature Conservancy of Canada – Québec	Conservation Planning	
Tanya Pulfer	Nature Conservancy of Canada – Ontario	Conservation Planning	
Brenda Van Sleeuwen	Nature Conservancy of Canada – Ontario	Science and Stewardship	
Hugh Bennett	Nature Conservancy of Canada – Ontario	Fundraising	

* Project lead

ACKNOWLEDGEMENTS

Funding for this NACP was provided by the City of Ottawa, Fondation de la faune du Québec, the North American Wetlands Conservation Act (NAWCA), and the Conservancy.

Many partners contributed knowledge and through reviews improved the NACP. We would like to thank the following people for their time and contributions.

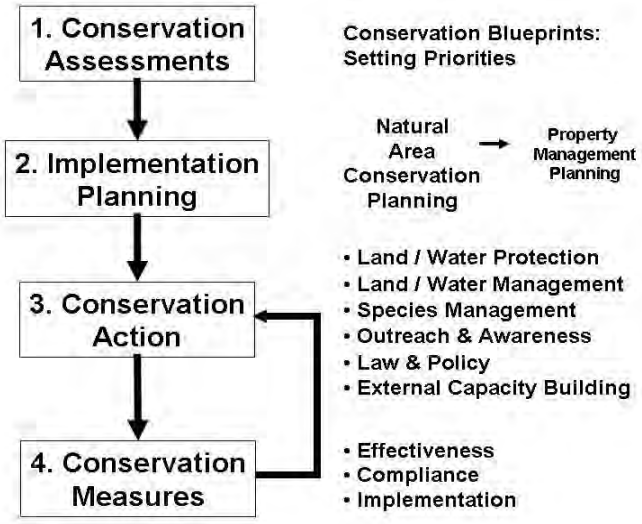
Name	Organization	Role
Boyer, Jennifer	City of Ottawa	Natural Systems Planner
Nick Stow	City of Ottawa	Senior Planner
MacPherson, Amy	City of Ottawa	Natural Systems Planner
Coulson, Daryl	Ontario Ministry of Natural Resources	District Ecologist, Pembroke
Crossman, David	Ontario Ministry of Natural Resources	GIS Technician, Kemptville
Desjardins, Gérard	Club des Ornithologues de l'Outaouais	President
Dreessen, Erwin	Ottawa Greenspace Alliance	Co-Chair
Jones, Lyman	South Nation Conservation	GIS Specialist
McRae, Kenneth W.	Ottawa Greenspace Alliance	Volunteer
Morissette, Pierre	Retired University Laval Professor	Scientific Advisory Committee (SAN) member
O'Grady, Dennis	South Nation Conservation	General Manager
Paré, Jean	Journalist and Author	Regional Board and SAN member
Piché, Vincent	Centre de données sur le patrimoine naturel du Québec	Coordinator
Pratte, Nathalie	President of "Groupe Conseil Envirostratégies"	Regional Board president and SAN member
Sabourin, André	Flora Québec	Botanist
Thompson, Shaun	Ontario Ministry of Natural Resources	District Ecologist, Kemptville
Katic, Eva	National Capital Commission	Natural Resource Manager, Greenbelt
St-Hilaire, Daniel	Consultant	Wildlife Technician
Titman, Rodger	Retired McGill University Professor	Regional Board and SAN member
Toussaint, Daniel	Ministry of Natural Resources of Québec	Biologist
Touzin, Linda	Ontario Ministry of Natural Resources	District Forester, Kemptville

CONSERVATION PLANNING AT THE NATURE CONSERVANCY OF CANADA

Planning is the foundation of all conservation actions at the Conservancy. Effective planning allows the organization to target resources to the places where they are most needed. This allows us to have the greatest conservation impact and assures our supporters that we are making the best use of their resources.

The Conservancy plans at different geographical scales, ranging in size from ecoregions to properties. While each of these plans has a different purpose, they are inherently linked and nested within one another. ***Conservation Blueprints*** (or ***Ecoregional Assessments***) identify the NAs where we work, and ***NACPs*** identify strategic actions necessary to conserve the biodiversity targets found within the Natural Area. We develop property management plans **(*PMP*)** for key places that identify property-specific actions that need to be done. These three planning processes interrelate to form the Conservancy's Conservation Framework.

The Nature Conservancy of Canada's Conservation Framework



Natural Area Conservation Plans

The Conservancy focuses its conservation actions within NAs. NAs are key places we must conserve to maintain Canada's biodiversity. They are identified through Conservation Blueprints based on their biodiversity values, level of threat and opportunities for conservation action. NACPs provide a process to integrate the regional conservation context of Conservation Blueprints with local knowledge and planning information. It is intended that the plans be updated and reviewed on an annual basis to reflect and adapt to new information. NA boundaries are defined based on the biodiversity targets identified for conservation action, the scope of the threats these targets face and subsequently where direct conservation action will largely be targeted. NAs may vary substantially in size, e.g., the size of a

NA in southern Ontario may be different than in coastal BC. In many instances, there may be distinct "focal areas" identified within a NA where conservation actions are focused.

Planning Context

This document represents the second NACP written for the Ottawa Valley NA. A NA, as the term is used by the Conservancy (Nature Conservancy of Canada 2008[a]), refers to a physical and biological unit where similar species or habitats are contained in as near a natural state as possible. The first NACP for the Ottawa Valley covered the period 2008-2013 for the north side (Québec Region) of the NA. This is the first time this plan will be implemented on the south side (Ontario Region) as well. This bi-regional NACP will better represent the ecological systems including the targets, threats, and actions in the NA.

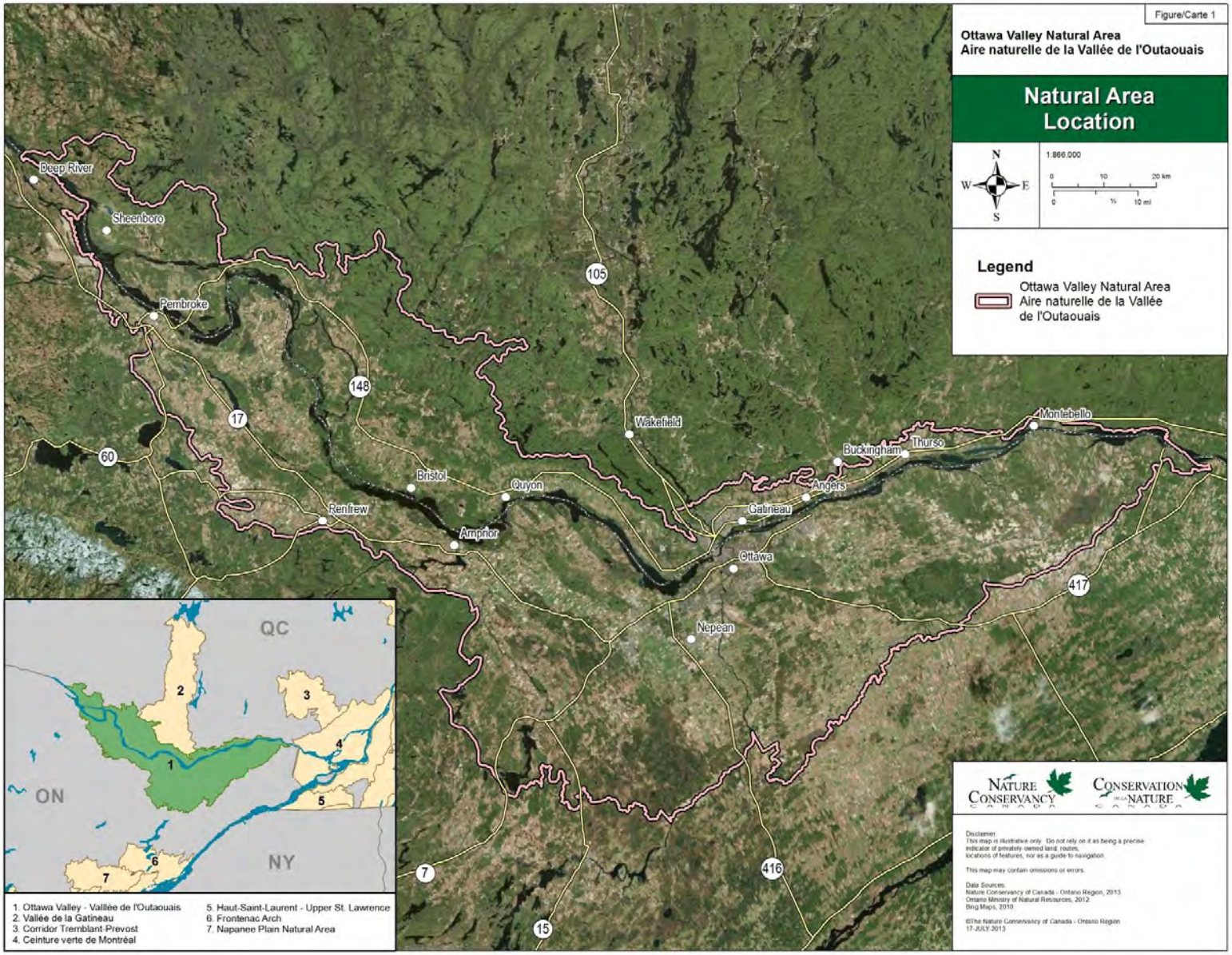
1. CONSERVATION CONTEXT

A. NATURAL AREA SCOPE

i. Location and Size

The Ottawa Valley NA is part of the Mixed Woods Plains Ecozone (Environmental Conservation Task Force 1981) and straddles the southern portion of the Québec–Ontario border. Encompassing most of the lowlands along the Ottawa River, the NA spans an area from just south of Deep River where the river leaves the confines of the Canadian Shield to the Chute-à-Blondeau just below the town of Hawkesbury, extending approximately 250 km. The two major cities within the NA are Gatineau and Ottawa. The total area of the NA is 2,428,434 acres (ac) (982,756 hectares [ha)] (**Figure 1**).

On the north side of the Ottawa River the NA is part of the Pontiac administrative region and spreads between the municipalities of Sheenboro to the west and Grenville-sur-la-Rouge to the east. On the south side of the Ottawa River, the NA includes all or portions of five upper-tier municipal districts: the County of Pembroke, the City of Ottawa, the United Counties of Prescott and Russell, the United Counties of Stormont, Dundas and Glengarry, and the United Counties of Leeds and Grenville.


Figure/Carte 1
Ottawa Valley Natural Area
Aire naturelle de la Vallée de l'Outaouais
Natural Area Location
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Ottawa Valley Natural Area
Aire naturelle de la Vallée de l'Outaouais
Deep River
Sheenboro
Pembroke
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Wakefield
Montebello
Buckingham
Thurso
Bristol
Quyon
Angers
Renfrew
Gatineau
Arnprior
Ottawa
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Nepean
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1. Ottawa Valley - Vallée de l'Outaouais
2. Vallée de la Gatineau
3. Corridor Tremblant-Prevost
4. Ceinture verte de Montréal
5. Haut-Saint-Laurent - Upper St. Lawrence
6. Frontenac Arch
7. Napanee Plain Natural Area
Nature Conservancy Canada
Conservation de la nature Canada
Disclaimer
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Data Sources:
Nature Conservancy of Canada - Ontario Region, 2013
Ontario Ministry of Natural Resources, 2012
Bing Maps, 2010
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17 JULY 2013

ii. Boundary Justification

The initial boundary of the Ottawa Valley NA was based on the outer limits of two physiographic units of the St. Lawrence Lowlands on the Québec side (Grand-Calumet and Allumettes Islands Plain [B0301] and the Gatineau Clay Lowlands [B0302] [Li and Ducruc 1999]), a large portion of the Renfrew Ecodistrict (6E-16), and the narrowest band of riverine lowlands east of Ottawa in Ontario such as the Rockland Marsh. In this second iteration, while the west-to-east extent of the NA has remained the same, the boundary has changed significantly. To include the entire City of Ottawa, a much larger portion of the Kemptville Plain (Ecodistrict 6E-12) and areas of the Smith's Falls Limestone Plain (6E-11) were added. The NA now captures the lowland clay plain to the southwest, which features old river meanders, sand plains, and escarpments of ancient Lake Champlain. These features, which are as much a part of the Ottawa Valley as the Ottawa River itself, include important areas of biodiversity such as Mer Bleue, Alfred Bog, the Wolf Grove Wetlands Complex and the Marlborough Forest.

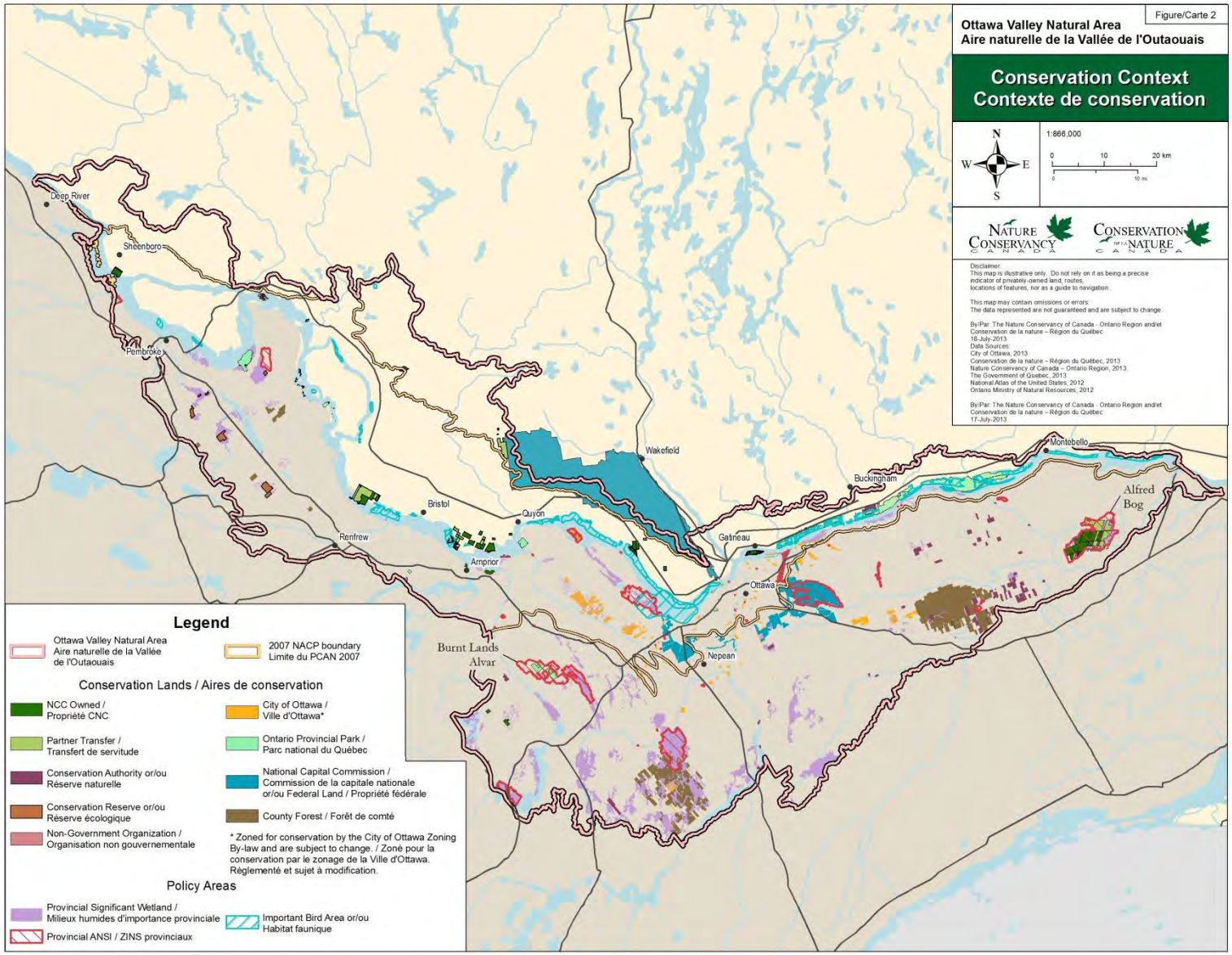
On the Québec side, the physiographic units' limits were changed during the implementation of the first plan to capture the entire Ottawa River watershed between Sheenboro and Grenville. This change addressed conservation concerns that the ranges of turtle SAR populations in the NA extended upstream of tributaries and their protection was essential to the viability of this conservation target (Gratton 2009). The limits of the NA are therefore a combination of ecodistrict and city limits in Ontario and watershed boundaries in Québec. These changes have more than doubled the size of the NA, from 4,793 km^2 to 9,828 km^2 (**Figure 1**).

iii. Ecological Significance

The Ottawa Valley represents a remarkable interface between ecoregions, where the Great Lakes, the Boreal Forest and the St. Lawrence Lowlands come together with biotic influences of the northern Appalachians and the Allegany Plateau. The setting is all the more dramatic as the NA lies in a great rift valley, the Ottawa graben, lying between the Laurentian and Algonquin regions of the Canadian Shield and formed when the Earth's crust moved downward about 1 km between two major fault zones known as the Mattawa and Petawawa faults (Kumarapelli and Saull 1966, Kumarapelli 1981). The graben formed a broad basin where the Champlain Sea left deposits of clay and sand 10,000 years ago. Rocky escarpments and valleylands spreading over several kilometres mark more or less distinctly a topographic boundary with the plain. Thus the relief takes the form of a gently undulating plain interrupted by several hills. The average altitude is 115 m, and only a few peaks along the Canadian Shield reach 260 m. The overall gradient is very small and on average, less than 30 m across the NA (Saucier *et al.* 1998).

This great rift valley is home to a high diversity of ecosystems, including unique forest systems, Alvars, Limestone and Karst Ecosystems, sand dunes and barrens, and extensive wetlands including bogs and fens. These systems, in turn, support a rich array of species. An impressive number of animal species use

the Ottawa River watershed's habitats during part or all of their life cycle. No fewer than 471 species of vertebrates are accounted for, including 56 mammals, 308 birds (including at least 181 nesting species), 18 amphibians, 16 reptiles and 81 fishes (Mercier and Hamel 2004, City of Ottawa 2013). The NA has also been identified as a key area of biodiversity significance in both the Great Lakes and the St. Lawrence Lowlands Conservation Blueprints (Henson and Brodribb 2005, Phair *et al.* 2005, Gratton 2010). Several natural heritage designations are found within the NA, including Life Science Areas of Natural and Scientific Interest (ANSI), Earth Science ANSIs, Provincially Significant Wetlands [PSW] (Ontario), and Provincial Parks (**Figure 2**).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Legend
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Aire naturelle de la Vallée de l'Outaouais
2007 NACP boundary
Limite du PCAN 2007
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Policy Areas
Provincial Significant Wetland / Milieux humides d'importance provinciale
Important Bird Area or/ou Habitat faunique
Provincial ANSI / ZINS provinciaux

B. ECOLOGICAL CONTEXT

i. Ecological Systems and Vegetation Communities

The climate of the Ottawa Valley is classified as humid continental according to the Koppen classification with temperature extremes between -37 ^{o}C and 38^{o}C (Government of Canada 2013[a]). The average January temperature is -10.5°C and the average July temperature is 21°C. Most winter precipitation, approximately 200 cm per year, falls in the form of snow. Average rainfall and total annual precipitation is approximately 730 mm and 914 mm per year, respectively. The Ottawa Plain experiences approximately 190 to 195 growing days per year with about 2,000 to 3,000 growing degree-days (Schut and Wilson 1987).

On the north side of the Ottawa River the two physiographic regions are the Grand-Calumet and Allumettes Islands Plain (B0301) and the Gatineau Clay Lowlands (B0302) (Li and Ducruc 1999). The Ottawa Valley Clay Plains, the Petawawa Sand Plain, the Muskrat Lake Ridges, the Prescott & Russell Sand Plains, the North Gower Drumlin Field, and the Smith Falls Limestone Plain are found on the south side of the Ottawa River (Chapman and Putnam 1984, Eastern Ontario Forest Resources Stewardship Council 1992).

Land tenure significantly influences land use. The Ottawa Valley NA provides good conditions for agriculture with its relatively flat topography and rich soils. According to a GIS-based assessment, 44% of the NA is currently under agriculture; however, given data limitations, this percentage may be an underestimate.

Forest Matrix

The Ottawa Valley NA is included in the bioclimatic domain of the Sugar Maple-Hickory forest (Bérard and Coté 1995). The potential vegetation of mesic sites consists of Sugar Maple-Hickory forest, Sugar Maple-Basswood forest, Sugar Maple-Beech forest or Sugar Maple-Red Oak forest, according to soil origin and thickness. The Sugar Maple-Hickory forest grows on the richest soils, composed principally of clay deposits frequently covered by alluvial sands and interspersed in several places with moraine deposits. Even though it is dominated by Sugar Maple (*Acer saccharum*), this forest ecosystem is highly diversified. It contains forest species of high economic value, such as American Beech (*Fagus grandifolia*), Butternut (*Juglans cinerea*), Bitternut Hickory (*Carya cordiformis*), Northern Red Oak (*Quercus rubra*), American Basswood (*Tilia americana*), White Ash (*Fraxinus americana*), and Eastern Hop-hornbeam (*Ostrya virginiana*). Some areas of the valley have very dry sites, which explains the predominance of oak and pine forests (Gagnon and Bouchard 1981). Stands of Eastern White Pine (*Pinus strobus*) or Red Pine (*Pinus resinosa*) colonize upper slopes and dry sites. Poorly drained sites at the bottom of slopes are characterized by the presence of Black Ash (*Fraxinus nigra*) forests; organic soils are occupied by Northern White Cedar (*Thuja occidentalis*) or Red Maple (*Acer rubrum*) stands; and floodplains are dominated by Silver Maple (*Acer saccharinum*) forests.

Approximately 35% of the NA is forested. In Québec, beyond the 42 Exceptional Forest Ecosystems[1] [EFEs] identified in the NA, the majority of the remaining large forested areas are found upriver from the City of Gatineau, specifically in physiographic unit B0301. Downstream, isolated within the agricultural matrix, there remains only a single forest fragment along the Petite-Nation River, north of Plaisance Provincial Park, connecting the forests of the valley, and the large forested expanses found further north.

In eastern Ontario, it is estimated that 70–80% of the original forest cover was lost by the late 1800s and today mostly small forest fragments that remain on areas of arable soil (Schoch and Rowsell 2013). Remaining large forest blocks are mostly limited to wetland areas, such as Mer Bleue, and rocky outcrops; however, a number of significant forests are found in the NA, including the Marlborough Forest, Cumberland Forest, LaRose Forest, and the Torbolton Woods.

Nested within these large forests are large- and small-patch habitat types (Anderson and Bernstein 2003) that often result in response to unique or specific terrain. White Oak (*Quercus alba*) is found almost exclusively on rocky escarpments in Québec. This tree is rapidly disappearing from the forest composition of slopes with northern exposures at the edge of the Laurentian foothills. White Oak is a species identified in three EFEs and is considered an umbrella species. White Oak is also considered regionally significant in the City of Ottawa, with fewer than 10 natural occurrences documented since 1969 (City of Ottawa 2005).

Granite Ridges and Escarpments

Within the forest matrices are limestone coniferous forests, which are considered rare. This ecosystem is generally found on thin surficial deposits intermixed with rocky outcrops. There are three types of limestone coniferous forests: dry cedar forests, Eastern White Pine forests, and fir forests where Northern White Cedar and Eastern White Pine are co-dominants. These communities sometimes occupy the periphery of alvars, sharing the same rocky substrate. Unique vegetation is associated with these, including several species considered threatened or vulnerable.

Rocky escarpments are found primarily at the Ottawa Valley's western limit, where the NA meets the Canadian Shield. They are also present on Grand Calumet Island in the area around Mount Corriveau, and within City of Ottawa limits (Parliament Hill area and eastward through Orléans and Cumberland) (City of Ottawa 2005). Their heights vary between 100 m and 200 m and at several locations along the

[1] Exceptional Forest Ecosystems (EFEs) in Québec : Québec's Natural Resources and Wildlife Ministry (MRN) has inventoried 42 EFEs in the NA, of which the majority (34) are located on privately-owned land. There are three types of EFEs in Québec: rare forest, old-growth forest and refuge forest (MRN 2007). A rare forest exhibits a specific set of ecological conditions or represents a forest type that has been largely destroyed on the landscape. An old-growth forest is a forest where the dominant trees are past their age of maturity. A forest is recognized as a refuge forest when it contains at least three species that are threatened or vulnerable, or likely to be designated as such.

foothills of the Laurentians they can become very abrupt, especially on the Eardley Escarpment in the Pointe-aux-Chênes region and in the Municipality of Sheenboro. Species typical of this ecosystem take advantage of the warmer, drier micro-climate of rocks with southern exposure and the damper fallen rock talus at their bases. There are three EFEs on the south side of the NA, consisting of rare forests and refuge forests for threatened or vulnerable species.

Wetland Complexes

The banks of the Ottawa River, up to approximately 1 km inland, contain some of the most significant Wetland Complexes in Québec and Ontario (Ducks Unlimited 2007). Wetlands occupy approximately 12% (269,833 ac [109,198 ha]) of the NA. Wetlands can be divided into four main categories: bogs, fens, swamps, and marshes. Bogs and fens are of great ecological value but they are relatively rare features on the southern Ontario landscape and are usually small and isolated. Two large bog systems and one large and one notable small fen occur on the south side of the Ottawa River: Alfred Bog (10,378 ac [4,200 ha]), Mer Bleue (8,261 ac [3,343 ha]), Richmond Fen (10,107 ac [4,090 ha]), and a small isolated fen at the core of Leitrim Wetland (605.4 ac [245 ha]. There are a number of smaller bog and fen systems in the NA.

The Ottawa River riverine Wetland Complexes are greatly influenced by the presence of dams, principally those at Carillon and Chutes-des-Chats in Québec, but they remain highly diverse, composed of 10,280 ac (4,160 ha) of shallow waters, 5,814 ac (2,353 ha) of marshes, 3,324 ac (1,345 ha) of swamps and 2,315 ac (937 ha) of aquatic beds. The construction of dams and the filling of reservoirs (e.g., Lac des Chats) have altered the natural water regime, affecting riparian forests and modifying the duration of drawdown and flooding. These conditions are important to certain rare plants; however, the majority of these species are present today in calm bays that are less affected by erosion caused by fluctuating water levels (Nantel *et al.* 1998).

Rivers and Riparian Habitats

The Ottawa River is part of the St. Lawrence and Great Lakes Watershed and is the largest tributary of the St. Lawrence River. It is also the second-largest river in eastern Canada. Apart from the Ottawa River and its channels, the hydrographic network is not well developed and lakes are rare in the NA. However, a few rivers flow down from the Laurentians and cross the NA before reaching the Ottawa River. The Ottawa River has many tributaries, but the major tributaries have been identified as the Bonnechere, Coulonge, Dumoine, Gatineau, Kipawa, du Lièvre, Madawaska, Mattawa, Mississippi, Montreal, Rivière du Nord, Noire, Petawawa, Rideau, Rouge, Petite-Nation and South Nation rivers (Ottawa Riverkeeper 2006). River and shoreline environments are extremely dynamic systems subject to fluctuating water levels, ice scour, varying degrees of wetness and movement of plant and animal species. In addition to supporting some of the rare vegetation communities described below, the shorelines of the Ottawa River also support shoreline prairies, a community of conservation concern tracked by the NHIC in Ontario. Examples of shoreline prairies can be found near Fitzroy Provincial Park. These communities support a number of prairie species, for example Big Bluestem (*Andropogon gerardii*), Little Bluestem

(*Scizachyrium scoparium*), Prairie Cordgrass (*Spartina pectinata*), Yellow Indiangrass (*Sorghastrum nutans*) and Slender Fimbry (*Fimbristylis autumnalis*).

Alvars and Limestone Ecosystems

Within the Ottawa Valley NA there are a number of limestone-based systems, including globally rare alvars. On the north side of the Ottawa River between Grand Calumet Island and the City of Gatineau there are a number of riverside alvars in the floodplain. On the south side of the Ottawa River there are sparse examples of alvars, considered to be plateau or inland alvars (Paul M. Catling, Research Scientist, Agriculture and Agri-Food Canada, pers. comm. 2013). Surveys of these areas have revealed many interesting and unique species such as Western Hairy Rockcress (*Arabis hirsuta* var. *pycnocarpa*), Mottled Duskywing (*Erynnis martialis*) and Prairie Meadow Katydid (*Conocephalus saltans*).

The unique character of these ecosystems makes them of particular interest from a scientific and educational perspective. The flora of alvars experience extremely difficult conditions: flooding in spring, heat and drought in summer, and thin soil. Highly specialized species have adapted to these harsh conditions, and their distribution is therefore usually limited. In Québec, a third of the alvars include old-growth EFEs, half are rare EFEs and all of the alvars in the Ottawa Valley are considered refuge EFEs for threatened or vulnerable species. In addition, of the 22 alvars in Québec, 11 of the 12 that possess the best quality ranking for their flora are located in the Ottawa Valley NA (Cayouette *et al.* 2010).

Karst Ecosystems

Karst systems are a relatively newly defined ecosystem (Watson *et al.* 1997). Karst systems can be both surface and subsurface areas that are generally found on soluble rocks, especially limestone, marble or dolomite (Watson *et al.* 1997). Examples of karst features include caves, sinkholes, enclosed depressions, dry valleys, gorges, natural bridges, cliffs, caverns, forests and large springs (Watson *et al.* 1997). These ecosystems offer a range of extreme environmental conditions that make them rather fragile (Watson *et al.* 1997). Karst formations, such as cave systems, are prevalent in the NA and include the Plantagenet Caves, Cumberland Caves and Cardinal Creek Karst. Other potential karst features have been identified in the NA by Brunton and Dodge (2008).

Dunes and Sand Barrens

Dunes and Sand Barrens are a very rare ecosystem in North America (Catling *et al.* 2008). These dry habitats are home to flora and fauna species that are specially adapted to extreme heat and drought (Catling *et al.* 2008). There are two prominent areas of sand deposits in the NA south of the river and six areas north of the river.

North of the river, six areas of sandy marine deposits have been identified, including those located on Allumettes Island, where the sandy substrate has been partly reshaped by the wind, forming dunes that are now relatively stabilized. Rare vascular plants are associated with these areas, including Canada Frostweed (*Helianthemum canadense*), Sand-heather (*Hudsonia tomentosa*), Whorled Yellow Loosestrife (*Lysimachia quadrifolia*), and Eastern Jointweed (*Polygonella articulata*). Sand dunes and

sand pits are not only of interest with regards to flora, but those located near wetlands are also good egg-laying sites for turtles. Dunes and Sand Barrens are mostly stabilized, but wind erosion is still an active process locally, often enhanced by human disturbance.

The Petawawa-Pontiac Sand Plain was laid down as a delta from the enormous outflow of the Algonquin Sea into the top end of the Champlain Sea via the Petawawa Valley around 10,000 to 11,000 years before present (ybp) (Place 2002). This area supports Wood Turtle (*Glyptemys insculpta*) and Jack Pine (*Pinus banksiana*) forests that hold Ontario's only population of Kirtland's Warbler (*Setophaga kirtlandii*) (Ottawa Riverkeeper 2006). Constance Bay, in northwestern Ottawa, originally called Sand Bay, is a significant area of sand plain and stabilized dunes. These have been disturbed but some remnants remain intact. Dunes and sand barrens are also found at Slack Road (owned by the National Capital Commission), Crystal Rock in Ottawa (Catling *et al.* 2008) and areas within the United Counties of Prescott & Russell, where the surficial geology is dominated by sand and clay, such as the LaRose Forest, which is underlain by the Prescott-Russell Sand Plains (**Figure 3.5**). Collectively, these sand dune and sand plain systems support components of flora and fauna not found elsewhere in the NA including the Ghost Tiger Beetle (*Cicindela lepida*), Big Sand Tiger Beetle (*Cicindela formosa*), Ant Lion (*Myrmeleo sp.*), Umbel-like Sedge (*Carex tonsa var. rugosperma*), and Sand Mushroom (*Tricholoma populinum*) (Catling *et al.* 2008).

Grassland Habitats

Many grassland bird species that used to depend on large expanses of natural grassland now exist in small prairie fragments or cultural fields in the agricultural landscape. In the NA most of the habitats used by Grassland Birds are marginal agriculture lands, low-intensity croplands, and fallow fields. The importance of these grassland-surrogate systems to Grassland Birds is often undervalued in conservation. Experts suggest that land-use intensity is more important to many Grassland Birds than the type or modification of grasslands in the area (Askins *et al*. 2007). The NA has a high diversity of Grassland Birds, and a strong agricultural presence. The Pontiac area is particularly important for the maintenance of many grassland bird species (Benoît Jobin, Environment Canada, pers. comm. 2013).

Connectivity

Fragmentation of habitats is a major threat to the conservation of biological diversity (Fahrig 1997). Connected habitat patches are a key part of a natural heritage system. Connectivity in the context of a natural heritage system includes wildlife corridors, stepping stones, and habitat patches (Worboys *et al.* 2010). Connectivity can improve the health of wildlife populations and enhance the quality of the environment for local communities. Connectivity also supports resilient ecosystems that are adaptable to climate change (Worboys *et al.* 2010). Connectivity conservation in the Ottawa Valley will focus on large-scale connectivity of natural or semi-natural interconnected lands.

ii. Dominant Ecological Processes

Forest Dynamics

Long-term maintenance of forest systems is dependent on periodic disturbances (Perry 1994). Disturbance events may range in scale and frequency from almost continuous (single tree-fall gap replacement) to large, regional-scale disturbances such as ice storms, floods, fires, and insect outbreaks with an annual probability of 1% or less (Lorimer and Frelich 1994, Larson *et al.* 1999; Riley and Mohr 1994, Van Dyke 1999, Anderson 2001, Anderson and Bernstein 2003; Chapeski 2004, Emanuel and Swaty 2005, Neily *et al*. 2007, Lorimer 1977; Bormann and Likens 1979; Runkle 1981; Canham and Loucks 1984; Canham and Marks 1985; Foster *et al.* 1998).

Table 1.1 summarizes the scale of natural disturbance types that occur in the NA. Although this table encompasses an area larger than the NA, it also represents the disturbance regimes within the NA. According to Bergeron *et al.* (1988) and Lorimer and Frelich (1994), before European colonization, natural disturbances in the forests of the temperate zone were generally infrequent and low. The natural forest dynamic was mainly characterized by the formation of small gaps in the forest canopy caused by the death of one or a few old individuals, or by uprooting or wounds to major branches of one or several trees caused by wind or by a pathogen (Runkle 1985). Other studies of historical and pre-historical extents of disturbance within natural northeastern forest types suggest that as much as 15-25% of presettlement forests may have been in early-successional stages from hurricane and other wind events, fire, and other natural disturbance (Lorimer 1977, Canham and Loucks 1984, Foster and Boose 1992 and Anderson 2001).

Table 1.1 Comparison of characteristics among infrequent catastrophic disturbances in the Northern Appalachians (adapted from Anderson and Bernstein 2003).

Disturbance characteristic	Tornado	Hurricane	Downbursts	Large Fires	Insect Outbreak	Ice Storm	Flood
Duration	Minutes	Hours	Minutes	Weeks /months	Months	Days	Week /months
Return interval in years	100-300	60-200	?	400-6000	2-10	1-10	1-100
Maximum size of severe patches (acres)	5000	803	3,500	Hundreds	Thousands	Thousands	Thousands
Size of total event in acres	100 to 25,000	10,000 to 5,000,000	1,000,000	12,400K-24 M.	250,000 to 200 M	10,000 to 2 M	10,000 to 124,000

In hardwood forests south of the Ottawa River, natural gap dynamics that enable forest regeneration have become less active, because the largest trees were harvested during forestry operations. Although most natural disturbances leave the herbaceous and litter layers relatively intact, the process of full

recolonization of the understory on anthropogenically disturbed lands may be on the order of hundreds to thousands of years (Duffy and Meier 1992, Motzkin *et al.* 1996). Thus, good examples of natural forest disturbance and recovery may no longer exist except in virgin or old forests (Bergeron *et al.*1988).

Wind Events

Wind events can be either large, infrequent events (such as hurricanes or tornadoes) or small, frequent events (such as downbursts), leaving behind heterogeneous environments (White and Jentsch 2001). The severity, frequency, and periodicity of a wind event influence the composition and structure of a forest (Uriarte *et al.* 2009). Some species may become rare in the absence of severe storms. In 2006 a severe windstorm occurred in the Ottawa Valley that changed harvest and silviculture plans outlined in the Forest Management Plan for the area (KBM Forestry Consultants Inc 2008). This single wind event set back Eastern White Pine restoration efforts in the area, since the blowdown occurred in areas where restoration was already underway, and has changed conditions making them unsuitable for Eastern White Pine planting (KBM Forestry Consultants Inc. 2008).

Insect Outbreaks

Insect outbreaks increase fuel loads of forests by increasing the amount of downed woody debris, thus increasing the likelihood of fire (The Nature Conservancy [TNC] and Nature Conservancy of Canada 2002). Occurrences of Eastern Tent Caterpillar (*Malacosoma americanum*) have been moderate to severe and wide-spread in the NA (Scarr *et al.* 2011). Moderate outbreaks of Bronze Birch Borer (*Agrilus anxius*), the Cedar Leafminer complex (*Argyresthia spp.*) and Fall Webworm Moth (*Hyphantria cunea*) (Scarr *et al.* 2011) have occurred recently in the area. Emerald Ash Borer (*Agrilus planipennis*) has already affected many of the forest stands in the Ottawa area and poses a serious future threat to the remaining forests in eastern Ontario (Douglas Hume, Carleton University biology professor, pers. comm. 2013) and Québec (Meunier pers. comm. 2013). Asian Long-horned Beetle has been re-discovered in the Toronto area in 2013 and has the potential, if it spreads further, to have a serious impact on forests in the Ottawa Valley (McMurtry, Natural Areas Ecologist, Natural Heritage Information Centre, pers. comm. 2013).

Ice Storms

Ice storms can have a significant effect on forests in the NA. The 1998 ice storm was deemed the worst glaze ice storm of the century (Karsh and MacIver 2009). The role these events play in an ecosystem, especially forests, is dependent on a variety of factors, the most important of which is ice load (Van Dyke 1999). Damage to a forest is often patchy and influenced by the effects of wind. In eastern Ontario, damage to forests was assessed following the 1998 ice storm. Conifer species were found to have less damage (i.e., tree mortality and crown damage) than hardwoods, especially Quaking Aspen (*Populus tremuloides*), American Basswood and Paper Birch (*Betula papyrifera*) (Hopkins *et al.* 2003). Additionally, trees of different sizes respond differently to the stress. For example, smaller trees usually bend, but as the diameter of a tree increases so does the likelihood of breakage (Van Dyke 1999).

Fire

Alvars in the area have been shown to benefit from fire. Catling (2009) explored the effects of fire on the Burnt Lands Alvar, located northeast of Almonte, and showed that species diversity doubled and regionally rare species increased after a burn compared to non-burned sites. Similarly, a subsequent study examined arthropod diversity in the same alvar system and found a greater diversity, including more rare species on burned sites than unburned sites, with the exception of spiders. First Nations used fire deliberately to modify the landscape. Ice and snow could be factors at elevation with extremely variable return intervals of 5-50 years. These forests have been subjected to fire suppression (KBM Forestry Consultants Inc 2008). With limited ability, Pitch Pine (*Pinus rigida*) may regenerate without fire (Bernard and Seischab 1996). Drought can also be a major factor affecting this vegetation type (Abrams and Orwig 1995). However, on poor growing sites such as rocky outcrops, these pines tend to persist simply due to lack of competition.

Hydrography

The hydrography of the NA is strongly dominated by the Ottawa River. Through flooding and water-level alterations, the riverine system is a dominant ecological driver in the NA. Ecological drivers for wetland processes are influenced by flooding cycles and can be found at both local and landscape scales (Euliss *et al.* 2008, City of Ottawa 2011). Wetlands are driven by both ground water and precipitation, and their hydrologic function and sedimentation processes are influenced by the land-use practices surrounding them (Pearson 1994).

The flow regime of the Ottawa River has been considerably altered by dams and the conversion of original floodplains to extensive marshes (Ducks Unlimited Canada 2007; Louise Gratton, pers. comm. 2013). Municipal drains represent an additional alteration to the hydrology of the NA. In the Mississippi, Ottawa, Rideau, and South Nation watersheds, there are 1,675 municipal drains (City of Ottawa 2011). In these watersheds, 471 km^2 are tile-drained, 32% of the area is farmed, and 47% is crop land (City of Ottawa 2011).

Alfred Bog, Mer Bleue, and other peatlands that formed in abandoned river channels of the Ottawa River are also significant wetland features in the NA. Any changes in land use practices will have an effect on the function of adjacent wetlands (Hammer 1992). In contrast, bogs and fens are relatively isolated wetland communities. Fens are influenced mainly by ground water and precipitation (Pearson 1994), and bogs are influenced entirely by precipitation. Thus water flow through these wetland types is less likely to be affected by immediately adjacent land use.

Sand Deposits

Within the NA, large-patch communities include floodplains and Dunes and Sand Barrens. During glaciation 8,000 to 12,000 ybp, the Ottawa Valley was covered by the Champlain Sea, a body of saltwater that flowed inland from the Atlantic when the land was depressed by the ice sheet. A series of channels and cut terraces formed that parallel existing river valleys with clay and sometimes a thin cover of sand or more prominent sand bars (Fulton 1987), as can be seen in Constance Bay. The dune

communities and associated relic flora in Constance Bay were documented as early as 1941 (Porsild 1941). These areas of significant sand deposits are now stabilized dunes.

iii. Significant Species[1]

Due to its geographic location, mild climate, and diversity of habitats, the Ottawa Valley is home to a variety of unique and endemic species. In fact, the NA is home to the second greatest number of SAR in the Québec Region after the Montérégie (Tardif *et al.* 2005). The Ontario side is also rich in SAR and is the only known location for some cryptic species in Ontario, if not Canada (e.g., Bogbean Buckmoth [*Hemileuca sp. 1*] and Rapids Clubtail [*Gomphus quadricolor*]). The region's geological history, specifically the Quaternary period when the Algonquin glacial lake provided a link between the Great Lakes/St. Lawrence system and the Ottawa River, is captured in the composition of the Ottawa Valley's flora, which consists of 1) a large number of Great Lakes, prairie, Appalachian and, more rarely, Atlantic coast species; 2) limestone species and species associated with sandy deposits; and, 3) several species in common with the Richelieu Valley, which was also at one time linked to the Great Lakes by the Iroquois glacial lake (Raymond 1950; Landry and Mercier 1992). Several vascular plants reach the northern limit of their distribution in the NA (Nantel *et al.* 1998).

Within the NA, there are 112 species of conservation concern in Ontario (i.e., ranked S1-S3 by the NHIC) and 189 species of concern in Québec (i.e., ranked S1-S3 by CDPNQ), of which 28 are globally rare species (i.e., ranked G1-G3 by NatureServe), 64 listed as at-risk by COSEWIC, 56 listed as at-risk provincially in Ontario and 138 listed as at-risk provincially in Québec. **Appendix Three** lists species of conservation concern in the NA.

The NA is of primary importance to about 300 species of birds that use the Atlantic migratory route, including more than 300,000 Canada Geese (*Branta canadensis*) that stop over in the spring between Plaisance and Gatineau (Ducks Unlimited 2007) and 10,000-20,000 Greater Snow Geese (*Chen caerulescens atlanticus*) that stop over in agricultural fields near Casselman, Ontario (Pittaway 1992). In addition, the NA includes numerous waterfowl concentration areas (ACOA) covering more than 29,652 ac (12,000 ha) (Ducks Unlimited 2007), one of the principle reasons the Ottawa Valley was recognized by the Eastern Habitat Joint Venture in the North American Waterfowl Management Plan. The Lac Deschênes Important Bird Area (IBA), under proposal for considerable expansion, is located along the south side of the Ottawa River, west of the City of Ottawa between the Deschênes Rapids and Innis Point. This IBA serves as an important stopover for various birds migrating south from northern Québec and Ontario as it is one of the largest bodies of water in the area (IBA Canada 2013).

A number of priority bird species identified in Bird Conservation Region (BCR) 13 of the North American Bird Conservation Initiative also occur in the NA, many of these grassland and wetland birds, such as

[1] This section is intended as a brief overview of the Natural Area. This is not intended to be a detailed account of species presence and habitats in the Natural Area. We leave that to more area- or species-specific detailed reports.

Short-eared Owl (*Asio flammeus*), Loggerhead Shrike (*Lanius ludovicianus*), Bobolink (*Dolichonyx oryzivorus*), Eastern Meadowlark (*Sturnella magna*), Least Bittern (*Ixobrychus exilis*) and Sedge Wren (*Cistothorus platensis*) (Rosenberg 2000). The Pontiac region is a particularly important area for the maintenance of the Grasshopper Sparrow (*Ammodramus savannarum*) in Québec, along with other bird species, because of its great number of potential grassland sites (Benoît Jobin, Environment Canada, pers. comm. 2013). The presence of Loggerhead Shrike is also significant in the NA. The last breeding pairs were seen in the Smiths Falls and Renfrew areas in 2008 and many potential sites are still present in Québec. Many federally designated habitats for the Least Bittern, a wetland species, have been identified along the Ottawa River east of Gatineau. Protection of these habitats is crucial to the viability of this species in the NA.

Herpetofauna are very rich in the NA. The abundant wetlands, which provide vital habitat for many of these species, contribute in large part to this biodiversity. Seven species of salamanders and 11 species of frogs and toads, including the Western Chorus Frog (Desroches and Rodrigue 2004; Oldham and Weller 2000) have been documented in the area. Eight turtle species are present in the NA, including several species that are at-risk. In Québec, the NA supports both the largest number of populations and probably the largest turtle populations in the province of Québec (Desroches and Picard 2005). Eight snake species are found in the NA including Milksnake (*Lampropeltis triangulum*) and Eastern Ribbonsnake (*Thamnophis sauritus*, also known as Northern Ribbonsnake, which refers specifically to *Thamnophis sauritus septentrionalis*).

The Forest Matrix is home to several wide-ranging mammals that have been recorded in the area including Fisher (*Martes pennanti*), Bobcat (*Lynx rufus*), Canada Lynx (*Lynx canadensis*), Moose (*Alces americanus*), Eastern Wolf (*Canis lupus lycaon*) and Coyote (*Canis latrans*). The forests provide corridors that link these animals between their summer ranges in the Laurentians and their winter ranges in the Ottawa Valley. Protecting sizeable quality habitats and expanding corridors across the river is vital to maintaining meta-populations on the landscape (Fahrig and Merriam 1994).

Native fish communities are diverse. The section of the Ottawa River and its tributaries that falls within the NA is very important to some 60 fishes, including several of interest for sport fishing: Yellow Perch (*Perca flavescens*), Walleye (*Sander vitreus*), Northern Pike (*Esox lucius*), Smallmouth Bass (*Micropterus dolomieu*) and Largemouth Bass (*Micropterus salmoides*). The NA also supports populations of SAR such as Lake Sturgeon (*Acipenser fulvescens*), Channel Darter (*Percina copelandi*) and American Eel (*Anguilla rostrata*). The NA has a great diversity of indigenous freshwater mussels, numbering at least 15 species, making it one of the richest regions for bivalves in the country (Martel 2013, Ottawa Riverkeeper 2006). Among the 11 species of freshwater mussels indigenous to the Ottawa River and its tributaries, the Hickorynut (*Obovaria olivaria*) is considered endangered in Ontario and Canada.

There is considerable natural heritage information available for this NA, but it has not been inventoried in its entirety. However, several large unique communities, including wetlands, sand dunes and barrens, and alvars, have undergone flora and fauna inventories. Protected areas within the Ottawa Valley have

received focused inventory and research, including Gatineau Park, Burnt Lands Alvar (a Conservancy-led project transferred to Ontario Parks), Torbolton Forest (Constance Bay Sand Hills ANSI) (City of Ottawa), National Capital Commission Greenbelt properties, Québec's Ministry of Natural Resources properties, as well as Nature Conservancy of Canada properties and other City of Ottawa lands.

iv. Protected Areas and Conservation Lands

A number of conservation organizations are collaborating in the Ottawa Valley NA with a shared vision of habitat connectivity and protected conservation values. Principle partners include the Ontario Ministry of Natural Resources, the Ministère des Ressources Naturelles, City of Ottawa, Rideau Valley Conservation Authority, South Nation Conservation Authority, Mississippi Valley Conservation Authority, Ottawa Riverkeeper, Mississippi-Madawaska Land Trust, Rideau Waterway Land Trust, National Capital Commission, Algonquin to Adirondack Collaborative and Ducks Unlimited.

The Conservancy has been working in the NA since 2002, concentrating its efforts to the west of the City of Gatineau in Bristol, Clarendon, Breckenridge, Kettle Island, and Sheenboro. These areas are rich in biodiversity and possess great conservation value at the landscape level, making most of them significant biodiversity hotspots in Québec. Notable accomplishments across the NA include developing strong partnerships with local organizations, stewardship committees and neighbours, leading and participating in scientific projects to help acquire knowledge on SAR, and implementing stewardship and monitoring activities.

Using data from Saint Lawrence Lowlands and Champlain Lake ecoregional planning (Plan de conservation de la Vallée du Saint-Laurent et du lac Champlain [SLLCV]; Gratton 2010) and from the Great Lakes Conservation Blueprint for Biodiversity (Henson and Brodribb 2005), we have compiled a portrait of land use. Land in the NA is mostly privately owned, as shown in **Table 2.1.**

Table 2.1: Land ownership in the Ottawa Valley NA

Physiographical/Ecological Unit	Private	Public
B0301 (Grand-Calumet and Allumettes Islands Plain)	91.1%	8.9%
B0302 (Gatineau Clay Lowlands)	78.6%	21.4%
6E-11 (Smiths Falls)	99.5%	0.5%
6E-12 (Kemptville)	98.0%	2.0%
6E-16 (Renfrew)	98.5%	1.5%
Total	94.8%	5.2%

Approximately 8.5% of the NA is under conservation ownership[1] (see **Table 2.2, Figure 2**). The Conservancy currently owns and manages roughly 9,649 ac (3,905 ha) of land in the NA and has conserved an additional 8,250 ac (3,339 ha) in partnership with various partners, making the Conservancy the third-largest conservation landowner in the NA.

Table 2.2: Summary of Protected Areas and Conservation Lands

Protected Area	Area (ha)	Area (ac)	% NA (total)	% NA (land)
National Capital Commission/Federal Lands	46,982	116,095	4.78	5.16
City of Ottawa	12,296	30,384	1.25	1.35
Nature Conservancy of Canada (owned and managed)	3,905	9,649	0.40	0.43
Transfers to partners ** Note: Nature Conservancy of Canada has aided in the purchase of lands that have been transferred to partners*	3,339	8,250	0.34	0.37
Provincial Park - Parc national du Québec - Ontario Parks	7,535	18,619	0.77	0.83
Conservation Areas	2,309	5,706	0.23	0.25
Other Land Trusts - Rideau Valley Conservation Foundation - Ontario Nature - Réserve naturelle reconnue - Mississippi-Madawaska Land Trust	377	932	0.03	0.04
Provincial Conservation Reserve	734	1813	0.07	0.08
Réserve écologique	94	231	0.01	0.01
Total	**77,572**	**191,684**	**7.89**	**8.52**

C. SOCIO-ECONOMICS

The Ottawa Valley has a long history of human use. The first traces of human presence date back over 6,000 years to a population of skilled artisans and traders who fabricated objects from copper during the Laurentian Archaic period. Around the 16th century, the Algonquin communities would replace them; these were the first to make extensive use of the natural resources of the region for hunting, fishing and gathering (Gourlay 1896; Ontario Ministry of Aboriginal Affairs 2013). First European contact and settlement occurred by the beginning of the 17th century when fur trade had become a major industry in the Ottawa Valley, with the Ottawa River providing a natural artery for commerce, trade and cultural exchange (Ottawa Valley Cultural Map 2013). The fur-trade industry would flourish over the next two centuries until its collapse early in the 19th century. The 19th and 20th centuries were marked by a boom

[1] Note: conservation lands often show up as privately owned in municipal tax base layers used to calculate the amount of private ownership within the NA

in the timber industry and the Ottawa Valley became world-renowned for its giant pines (Lee 2006; Ottawa Valley Cultural Map 2013). Waves of immigrants settled the area during this time, which gave rise to the cities and towns we see on the landscape in present day.

Today, land uses vary from agriculture and other resource-based industries (including forestry and mineral aggregates), urban and suburban development, government and technology, parks and conservation lands, and tourism and recreation.

The political divisions within this NA include the Pontiac; les Collines-de-l'Outaouais; Prescott Russell; Ottawa; Lanark; Stormont, Dundas and Glengarry; Leeds and Grenville; and Renfrew. A number of major urban centres are found within the NA, including the cities of Ottawa, Gatineau, Arnprior, and towns of Renfrew and Mississippi Mills. Census data for these areas show a population increase from 2006 to 2011 in all areas, with the exception of the Pontiac: Pontiac MRC (Municipalité régionale de comté) (-1.6%), Collines-de-l'Outaouais MRC (10.4%), Prescott Russell (6.5%), Lanark (3.0%), Stormont, Dundas and Glengarry (0.7%), Leeds and Grenville (0.1%), Renfrew (3.9%), City of Ottawa (8.8%), Gatineau (9.6%), Arnprior (13.4%), Town of Renfrew (4.7%), and Mississippi Mills (5.5%) (Statistics Canada 2012).

Agriculture is an important economic activity in the NA. The farms in the region are larger in area than the Québec average due to extensive cattle-raising operations (MRN 2006). In Québec, the amount of land in agricultural operation from 2001 and 2006 increased by 1.3%, with an increase in the area under cultivation (acreage seeded) of 4.5% (Statistics Canada 2012). Data specific to the NA are not available, but similar variations have been observed in terms of acreage and the increase in cultivated land is likely lower (C. Gagné, pers. obs.). Other important economic activities in the area include forestry and other natural-resource based industries. Forestry has been on the decline in the NA for many years and, while there are still two pulp and paper mills active in the region, forestry is no longer a large economic driver.

2. BIODIVERSITY TARGETS AND THREATS

A. Biodiversity Targets

Biodiversity targets are the native biological entities (i.e., ecological systems, communities and/or species[1]) that the NACP is aiming to conserve. The planning team selected biodiversity targets at a coarse enough scale to encompass the most significant elements of conservation concern that could be addressed at the NA scale. NACP targets encompass all species of conservation concern occurring in the NA (including Conservation Blueprint/Ecoregional Assessment primary and secondary targets and G1-G3G4 species) and are representative of the biodiversity of the NA.

For this second five-year planning period, biodiversity targets identified in the first five-year plan for the NA were re-evaluated and new targets were considered by the project team based on past experiences, partnerships, and increased knowledge. Through this process the project team decided to maintain most of the previous targets, with a few modifications – namely reducing the number of targets and nesting many of the former individual targets. The former targets of Western Chorus Frog and Rocky Escarpments were nested under Wetland Complexes and Forest Matrix, respectively. Alvars was modified to Alvars, Limestone and Karst Ecosystems.

As a result, biodiversity targets include five ecological systems and one species guild, as well as two ecological systems and eleven species or species guilds as nested targets:

- **Forest Matrix** – nested targets: American Ginseng (*Panax quinquefolius*), Ram's-head Lady's-slipper (*Cypripedium arietinum*), SAR Forest Birds, Ancient Sand Features, Granite Ridges and Escarpments, EFEs
- **Wetland Complexes** – nested targets: Western Chorus Frog, Turtles
- **Rivers and Riparian Habitats** – nested targets: Fish Nursery Habitat, Common Map Turtle (*Graptemys geographica*), Common Musk Turtle (*Sternotherus odoratus*), Shoreline Prairie Communities
- **Alvars, Limestone and Karst Ecosystems –** nested targets: Bats, Rare Plants
- **Dunes and Sand Barrens –** nested targets: Sand-Barren-Dependent Vascular and Non-Vascular Plants, Kirtland's Warbler, Sand-Barren Invertebrates
- **Grassland Birds–** nested targets: Milksnake

Targets are mapped in **Figures 3.1 – 3.6**.

[1] ***Species***: Types of species targets may include:

- Globally imperilled and endangered native species (e.g., G1 to G3)
- Species of concern due to vulnerability, declining trends, disjunct distributions or endemism
- Focal species, including keystone species, wide-ranging regional species and umbrella species

A detailed viability assessment was conducted for the target's size, condition and landscape context, for each biodiversity target, using the Conservation Action Planning (CAP) workbook (Low 2003), and based on background target information collected for the NA, a review of literature, and expert opinion (**Table 3.1**). The viability of the biodiversity targets can be ranked as 'poor', 'fair', 'good' or 'very good' (adapted from Low 2003). The current overall biodiversity target viability for the Ottawa Valley NA is 'fair', lower than the overall rank in the first five-year planning period. This change in viability is attributed to an increase in information and a greater understanding of the NA, coupled with habitat loss.

Two targets – Wetland Complexes and Alvars, Limestone and Karst Ecosystems – received 'good' viability ranks, meaning that they are within an acceptable range of ecological variation, although they may require some human intervention for maintenance. Three targets – Forest Matrix, Rivers and Riparian Habitats, and Grassland Birds –received a rank of 'fair', meaning that the target is at or below the desired ecological threshold, but recoverable. The Dunes and Sand Barrens target lacks information to discern viability and received a rank of unknown. Though there has been some work on this ecosystem (e.g., Catling *et al.* 2008), knowledge of the ecosystem for the entire NA is lacking.

It is recognized that the viability of the conservation targets is not uniform in the NA. In general the viability of all targets is higher in the central and northern regions of the NA. A description of the targets and their viability follows in **Table 3.1**.

Table 3.1 Biodiversity Target Viability for the Ottawa Valley NA

Biodiversity Target	Nested Targets	Viability			
		Landscape Context	Condition	Size	Viability Rank
1. Forest Matrix (FM)	American Ginseng, Ram's-head Lady's-slipper, Species at Risk Forest Birds, Ancient Sand Features Granite Ridges and Escarpments, EFEs	Fair	Fair	Fair	**Fair**
2. Wetland Complexes (WC)	Western Chorus Frog, Turtles	Fair	Good	Fair	**Fair**
3. Rivers and Riparian Habitats (RRH)	Fish Nursery Habitat, Common Map Turtle, Common Musk Turtle, Shoreline Prairie Communities	Fair	Fair	Fair	**Fair**
4. Alvars, Limestone and Karst Ecosystems (ALKE)	Bats, Rare Plants	Good	Very good	Good	**Good**
5. Dunes and Sand Barrens (DSB)	Sand-Barren-Dependent Plants, Kirtland's Warbler, Sand-Barren Invertebrates	Fair	Fair	Fair	**Fair**
6. Grassland Birds (GB)		Fair	Poor	Fair	**Fair**
Overall Biodiversity Target Viability for the Natural Area					**Fair**

Very Good	**Optimal Health**: The biodiversity target is functioning at an ecologically desirable status, and requires little management.
Good	**Minimum Health**: The biodiversity target is functioning within its range of acceptable variation; it may require some management.
Fair	**Likely Degradation**: The biodiversity target lies outside of its range of acceptable variation and requires management. If unchecked, the biodiversity target will be vulnerable to serious degradation.
Poor	**Imminent Loss**: Allowing the biodiversity target to remain in this condition for an extended period will make restoration or preventing extirpation practically impossible.
Unknown	**Research Need**: The biodiversity target is known to occur, but information on this viability criterion is currently is unknown.
NA	**Not Applicable**: This criterion is not significant for assessing the health of this target.

BIODIVERSITY TARGETS

Biodiversity Target: **Forest Matrix (FM)**

Nested Targets: American Ginseng, Ram's-head Lady's-slipper, SAR Forest Birds, Ancient Sand Features, Granite Ridges and Escarpments, EFEs.

Target Definition: Forest fragments of local and regional ecological importance for the NA's biodiversity, including EFEs and populations of SAR.

Habitat/ Species Type: Forest – Temperate

Ecological Justification:
The Forest Matrix provides essential linkages between the Laurentians and the St. Lawrence. This community supports several SAR and wide-ranging mammals.

Landscape Context Viability: Fair
Imbedded in an agricultural matrix, forests are often associated with Wetland Complexes. Near the cities of Ottawa and Gatineau, the few remaining significant forest fragments are surrounded by or at the edge of suburban development (**Figure 3.1**). Ecological processes, such as fire, have been severely reduced in the NA. Natural forest pests are unremarkable; however, invasive forest pests, such as Emerald Ash Borer, are on the rise, thus changing the composition and structure of the forest (DeSantis *et al.* 2013).

Condition Viability: Fair
There are very few undisturbed forests in the NA. Old-growth forests, defined as forest stands 90 years or older, are generally rare (Shaun Thompson, District Ecologist, Ontario Ministry of Natural Resources, pers. comm. 2013) and are estimated at 5% of the total NA (thus 20% of the Forest Matrix). Forty-seven percent of the Forest Matrix is considered interior forest. While plantations and hedgerows do exist in the NA, they were not included in these calculations. Valley habitat has been degraded by forestry activities since the early days of colonisation and agricultural expansion, though it remains in relatively good condition for the NA (Schoch and Rowsell 2013).

Historical and ongoing land uses have altered forest dynamics so critically that researchers question the forests' ability to maintain or restore natural processes in the future (Doyon and Bouffard 2009). The forest understorey, mostly near urban areas, has been severely altered by non-native invasive species such as Buckthorn (*Rhamnus cathartica*, commonly known as Common Buckthorn) and Glossy False Buckthorn (*Frangula alnus*) (Gagnon 1980). Other invasive species, such as Garlic Mustard (*Alliaria petiolata*) and European Swallow-wort (*Cynanchum rossicum*, commonly known in Canada as Dog-

Strangling Vine) are increasingly observed (Brenda Van Sleeuwen, Nature Conservancy of Canada, pers. comm. 2013). Nevertheless, a good diversity of rare and native species remains.

Size Viability: Fair

Forest Matrix occupies 35% of the NA, which exceeds the 30% recommendation outlined by Environment Canada (2004). There are no available data to assess how this compares to historical forest extents in the NA. Large blocks of more than 2,471 ac (1,000 ha) are found mostly west of the City of Gatineau in Québec. Plantations and hedgerows do exist in the NA, although they were not included in these calculations.

Overall Viability Rank: Fair


Figure/Carte 3.1
Ottawa Valley Natural Area
Aire naturelle de la Vallée de l'Outaouais
Forest Matrix
Matrice forestière
N
W
E
S
1:866,000
0 10 20 km
0 10 mi
Legend
Ottawa Valley Natural Area / Aire naturelle de la Vallée de l'Outaouais
Target / Cible
Forest / Forêt
Nested Target / Cible secondaire
Flora / Flore
Hydrology / Hydrologie
Watercourse / Cours d'eau
Waterbody / Plan d'eau
Road Network / Réseau routier
Highway / Autoroute
Deep River
Chalk River
Pembroke
Wakefield
Buckingham
Montebello
Thurso
Bristol
Quyon
Renfrew
Arnprior
Aylmer
Gatineau
Ottawa
Nepean
Nature Conservancy Canada
Conservation de la nature Canada
Disclaimer:
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This map may contain omissions or errors.
Data Sources:
Centre de données sur le patrimoine naturel du Québec, 2013
Conservation de la nature – Région du Québec, 2013
Nature Conservancy of Canada - Ontario Region, 2013
Natural Heritage Information Centre, 2013
The Government of Quebec, 2013
National Atlas of the United States, 2012
Ontario Ministry of Natural Resources, 2012
By/Par: The Nature Conservancy of Canada - Ontario Region and/et Conservation de la nature – Région du Québec
17 July 2013

Biodiversity Target: **Wetland Complexes (WC)**

Nested Targets: Western Chorus Frog, Turtles, Least Bittern

Target Definition: This target includes wetlands of all types and numerous SAR nested within.

Habitat/ Species Type: Wetlands – Bogs, Marshes, Swamps, Fens, Peatland; Wetlands – Permanent Freshwater Pools

Ecological Justification:
This is a matrix system that supports globally rare species. Many of the wetlands vary in size and type (including fen, bog, marsh and swamp). Remaining large bogs and fens represent important biodiversity hotspots; wetlands play an important role in the hydrological and chemical cycles of a hydrographic basin, and also maintain diversified food chains. These systems are important to many species at some point in their life-cycle. Wetlands also provide important ecological functions such as water purification and flood attenuation. According to Ducks Unlimited (2007), wetlands in the Ottawa Valley are amongst the most important in Québec.

Landscape Context Viability: Fair
The northern portion of the NA has swamp and marsh wetland communities, with extensive riverine wetlands contiguous to agriculture lands to the north east (Louise Gratton pers. comm. 2013). In the northwest portion of the NA, wetlands are part of the Forest Matrix. South of the river, all four types of wetlands are present (swamp, marsh, bog and fen) within a mosaic of forests, urban areas and agricultural lands. Although some connectivity exists, the wetland structure has been altered mainly from agriculture and urban development (Ducks Unlimited 2010).

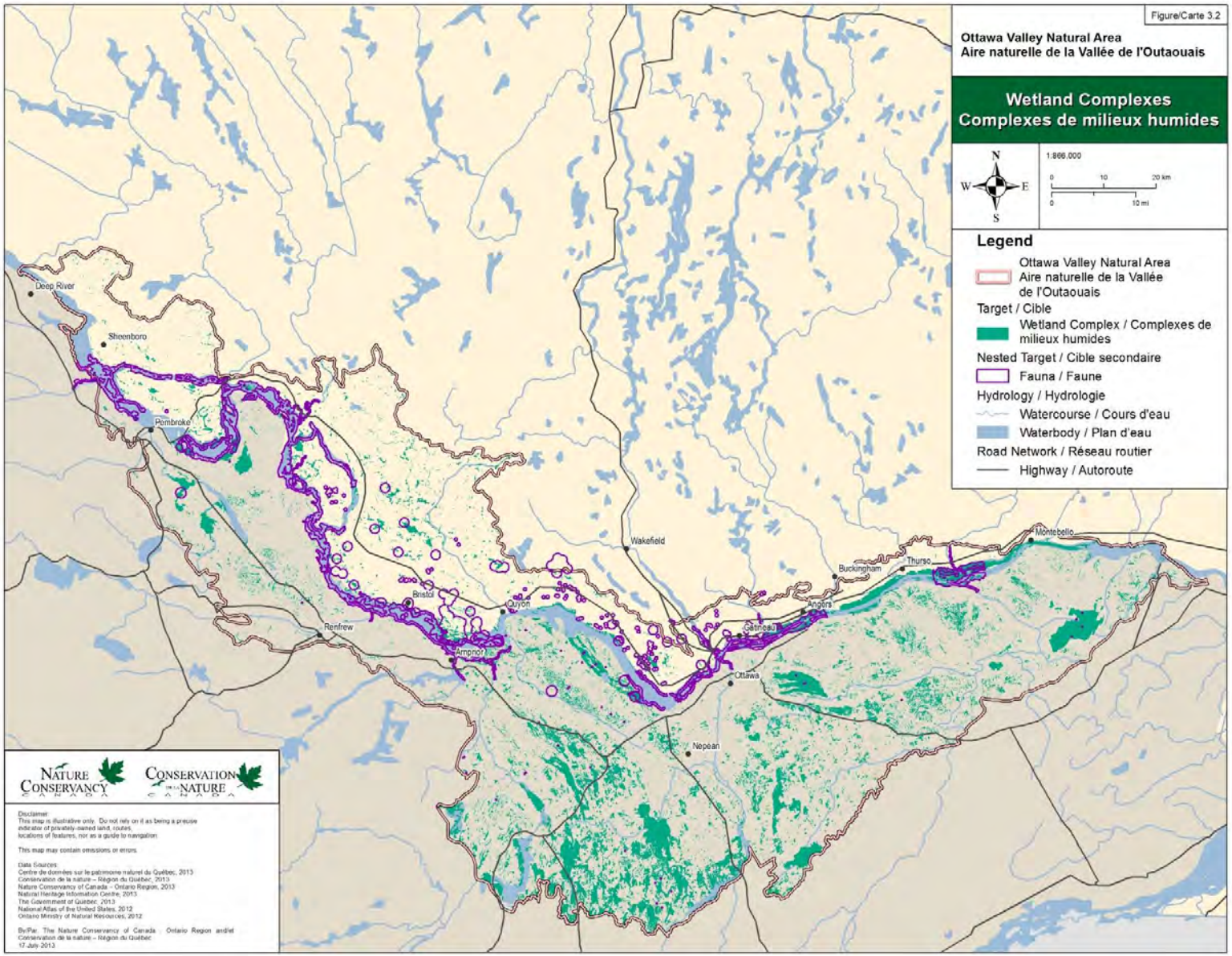
Condition Viability: Good
As mentioned above, construction of dams and reservoirs in the NA has altered the hydrologic regime of the river and riverine wetlands but the wetted areas still provide sufficient habitat for the Ottawa Valley to be renowned for its biodiversity (Ottawa River Heritage Designation Project [ORHDC] 2005). South of the Ottawa River, Ontario shows many wetlands ranging in size, connectivity and shape (**Figure 3.2**). Wetland conversions were mainly attributed to agriculture, reforestation, built-up areas, extraction (mining and aggregates) and recreation. Interestingly, Ottawa showed the greatest amount of wetlands that were converted to forest plantations in the province (Ducks Unlimited 2010). Within the NA exotic plants are present but do not seem to have significantly affected plant communities.

Size Viability: Fair
Wetlands occupy 11% of the NA. Riparian and inland wetlands represent 42,500 ac (17,000 ha) on the north side of the Ottawa River (Québec) and approximately 2.4 million ac (90,900 ha) on the Ontario side. Several wetlands are more than 494 ac (200 ha) in area. Pre-settlement extent of wetlands in

counties south of the river represented between 20-60% of land cover (Ducks Unlimited 2007). In 2002, most counties in Québec had less than 20% and as little as 5% of historic wetlands remaining (Ducks Unlimited 2007). Ducks Unlimited (2010) conducted an analysis comparing wetland changes on the Ontario side from presettlement (1800) to 2002. This analysis showed that the area has sustained an approximate 70% loss of wetlands, ranging from 40% loss in Grenville to a 90% loss in the United Counties of Prescott & Russell[1]. Based on Environment Canada's (2004) How Much Habitat is Enough, this indicates a size ranking of fair.

Overall Viability Rank: Good

[1] Note: Data are only for Southern Ontario and thus do not include Pembroke and Renfrew Counties.


Figure/Carte 3.2
Ottawa Valley Natural Area
Aire naturelle de la Vallée de l'Outaouais
Wetland Complexes
Complexes de milieux humides
N
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0 10 mi
Legend
Ottawa Valley Natural Area
Aire naturelle de la Vallée de l'Outaouais
Target / Cible
Wetland Complex / Complexes de milieux humides
Nested Target / Cible secondaire
Fauna / Faune
Hydrology / Hydrologie
Watercourse / Cours d'eau
Waterbody / Plan d'eau
Road Network / Réseau routier
Highway / Autoroute
Deep River
Sheenboro
Pembroke
Wakefield
Montebello
Buckingham
Thurso
Bristol
Quyon
Angers
Gatineau
Renfrew
Arnprior
Ottawa
Nepean
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Conservation de la nature – Région du Québec, 2013
Nature Conservancy of Canada – Ontario Region, 2013
Natural Heritage Information Centre, 2013
The Government of Quebec: 2013
National Atlas of the United States, 2012
Ontario Ministry of Natural Resources, 2012
By/Par: The Nature Conservancy of Canada – Ontario Region and/et Conservation de la nature – Région du Québec
17 July 2013

Biodiversity Target: **Rivers and Riparian Habitats (RRH)**

Nested Target: Fish Nursery Habitat; Common Map Turtle, Common Musk Turtle, Shoreline Prairie Communities

Target Definition: This ecosystem includes the fluvial system of the Ottawa River, its tributaries, shorelines, and islands (**Figure 3.3**).

Habitat/ Species Type: Rivers, Streams, Creeks – Permanent; Riparian Areas

Ecological Justification:
The Ottawa River system is a critical habitat for numerous fishes, reptiles and birds in several aspects of their life cycle (Ottawa Riverkeeper 2006). Shorelines and riparian habitats along the river and its tributaries create natural corridors between the Canadian Shield and the St. Lawrence Lowlands and provide connectivity between large protected areas (e.g., Gatineau Park and Réserve faunique de La Vérendrye) and the Ottawa River (Louise Gratton pers. comm. 2013). Riparian zones are also important to the health of the river system, buffering the channel of the river from developed areas or agricultural lands, filtering runoff, and preventing erosion (Agriculture and Agri-Food Canada 2011).

Landscape Context Viability: Fair
The landscape context of the Ottawa River system is variable and ever-changing. Agricultural lands alternate with urban and suburban areas, and the river's environment becomes more forested upstream from the Gatineau/Ottawa region. Most of the river's numerous lowland tributaries are surrounded by agriculture along their entire course; whereas, headwaters of tributaries that are born in the Canadian Shield flow through a more natural landscape. Dams on the river and on several of its tributaries are an impediment to aquatic connectivity, affecting fish and turtle movements. Poor water-quality ratings occur mainly in agricultural areas; however, settlement areas are anticipated to increase, thus increasing pressure on the watershed (RVCA 2013).

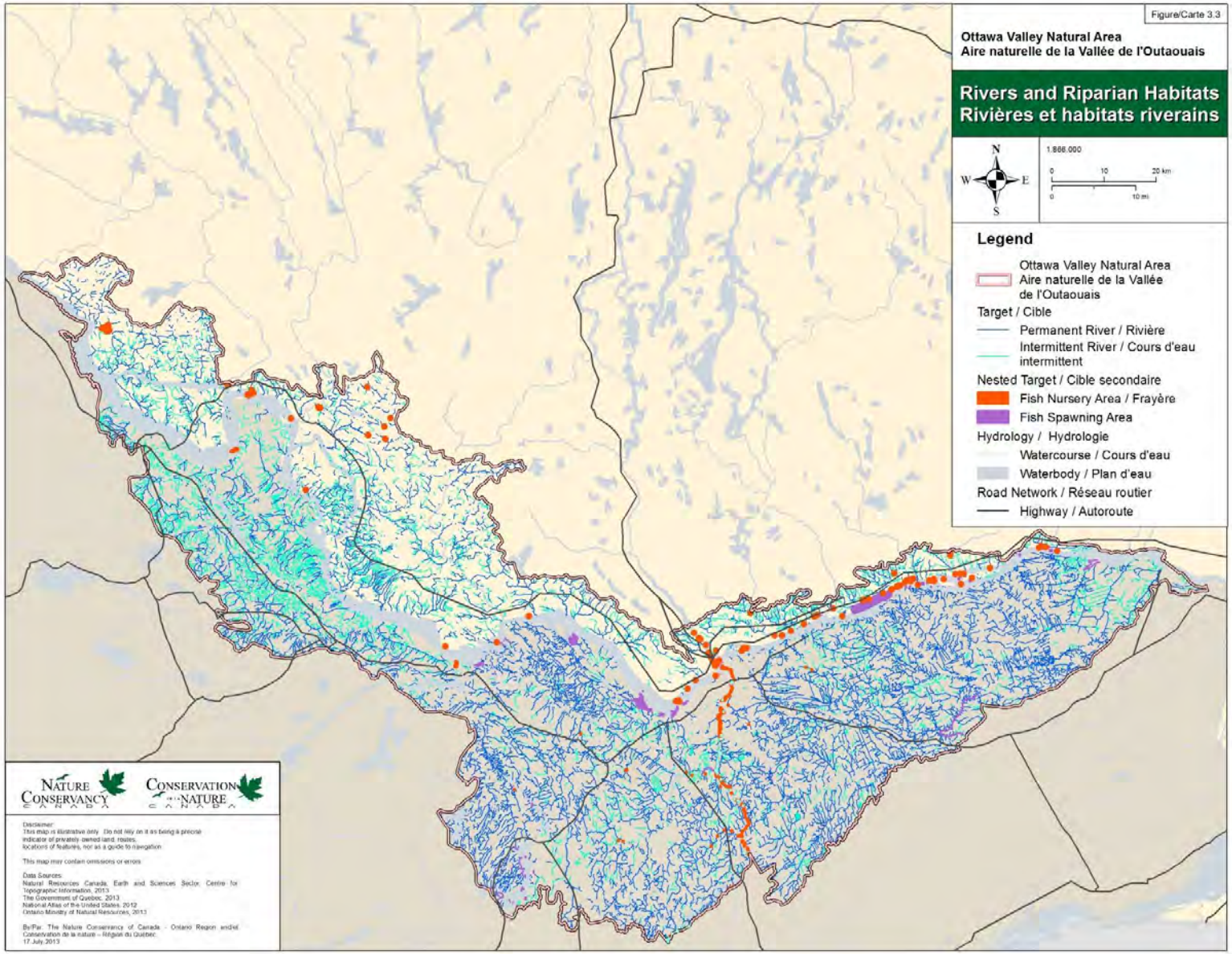
Condition Viability: Fair
Originally, the Ottawa River consisted of mighty rapids alternating with wider, slower moving sections and lakes. Some, but not all of the rapids have been tamed by hydroelectric dams (ORHDC 2005). Over the years, riparian habitats were naturally restored but shorelines are now increasingly occupied by cottages and homes. However, numerous islands have been formed from sandbars, several of which have remained relatively untouched and provide excellent examples of riparian ecosystems (ORHDC 2005). The watersheds surrounding the Ottawa River have ratings of good to poor water quality (MVCA 2013, RVCA 2013). Results of tests show elevated levels of nitrogen and phosphorus, which can be associated with high concentrations of *Escherichia coli* and metals such as aluminum, copper and iron (RVCA 2013). Riparian areas generally have poor natural vegetation cover along the Ottawa River (MVC 2013). Riparian quality generally increases in the tributaries but there are many areas that have lower

than the recommended amount of natural vegetation in this zone (MVC 2013, RVCA 2013). Invasive plant species are consistently found along the shorelines, though aquatic invasive species, including Common Carp (*Cyprinus carpio*) and Zebra Mussel (*Dreissena polymorpha*), have greater effects on the river system (Ottawa Riverkeeper 2006).

Size Viability: Unknown

An assessment of the extent of undisturbed riparian habitats along the Ottawa River and its main tributaries is not available. However, in general, riparian areas in the NA vary in composition, ranging from agriculture lands, forested areas, urban areas, and some hardened shorelines. Further, some areas have been left as a natural flow, whereas others have been altered with drainage ditches or covered in tiles.

Overall Viability Rank: Fair


Figure/Carte 3.3
Ottawa Valley Natural Area
Aire naturelle de la Vallée de l'Outaouais
Rivers and Riparian Habitats
Rivières et habitats riverains
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20 km
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10 mi
Legend
Ottawa Valley Natural Area
Aire naturelle de la Vallée de l'Outaouais
Target / Cible
Permanent River / Rivière
Intermittent River / Cours d'eau intermittent
Nested Target / Cible secondaire
Fish Nursery Area / Frayère
Fish Spawning Area
Hydrology / Hydrologie
Watercourse / Cours d'eau
Waterbody / Plan d'eau
Road Network / Réseau routier
Highway / Autoroute
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The Government of Quebec, 2013
National Atlas of the United States, 2012
Ontario Ministry of Natural Resources, 2013
By/Par: The Nature Conservancy of Canada - Ontario Region and/et Conservation de la nature – Région du Québec
17 July 2013

Biodiversity Target: **Alvars, Limestone and Karst Ecosystems (ALKE)**

Nested targets: Bats and Rare Plants

Target Definition: This target includes all natural habitats associated with limestone and includes flats, outcrops, and karsts. Alvars are areas of limestone bedrock outcrops. Soils are discontinuous or absent in some areas forming thin layers that support distinct vegetative communities such as grasslands and that are characterized by rare and endemic species (Catling and Brownell 1995; Catling *et al.* 1975). Alvars are characterized by droughts, flooding, shallow soils, open areas, and unique habitat provisions. Karst represents a distinctive landscape that was shaped by flowing water on carbonate bedrock and is found throughout Canada in all geological regions except on the Canadian Shield (Ford 2012).

Habitat/ Species Type: Inland Rocky Areas

Ecological Justification:
Within the Ottawa Valley NA there are a number of limestone-based systems, including globally rare alvars (**Figure 3.4**). These exceptional limestone systems are confined to regions that experienced the last Wisconsinian glaciations and, in Canada, are distributed in the Great Lakes region, mainly around Lake Ontario and Lake Huron, along the Ottawa River and, sporadically, in the outer suburbs of Montreal (Cayouette *et al.* 2001).

Landscape Context Viability: Good
The Ottawa Valley north of the Ottawa River contains over half of the alvars found in Québec, most of these being riverine alvars (Cayouette *et al.* 2001). South of the Ottawa River, inland alvars are more isolated (e.g., Burnt Land Alvar). The extent of limestone plains in the NA occurs in patches but provides good cover in Ecodistrict 6E-11, B0301 and B0302. Following ranking standards developed by TNC and used in the International Alvar Initiative (IAI) (Reschke *et al.* 1999), landscape viability is good within the NA and many of the alvars are surrounded by natural features. Approximately 23.9% of the NA remains in natural cover (other than forest). Disturbances are generally attributed to urban development and lack of natural ecological processes such as natural fires (Reschke *et al.* 1999). Few alvars are protected in the NA.

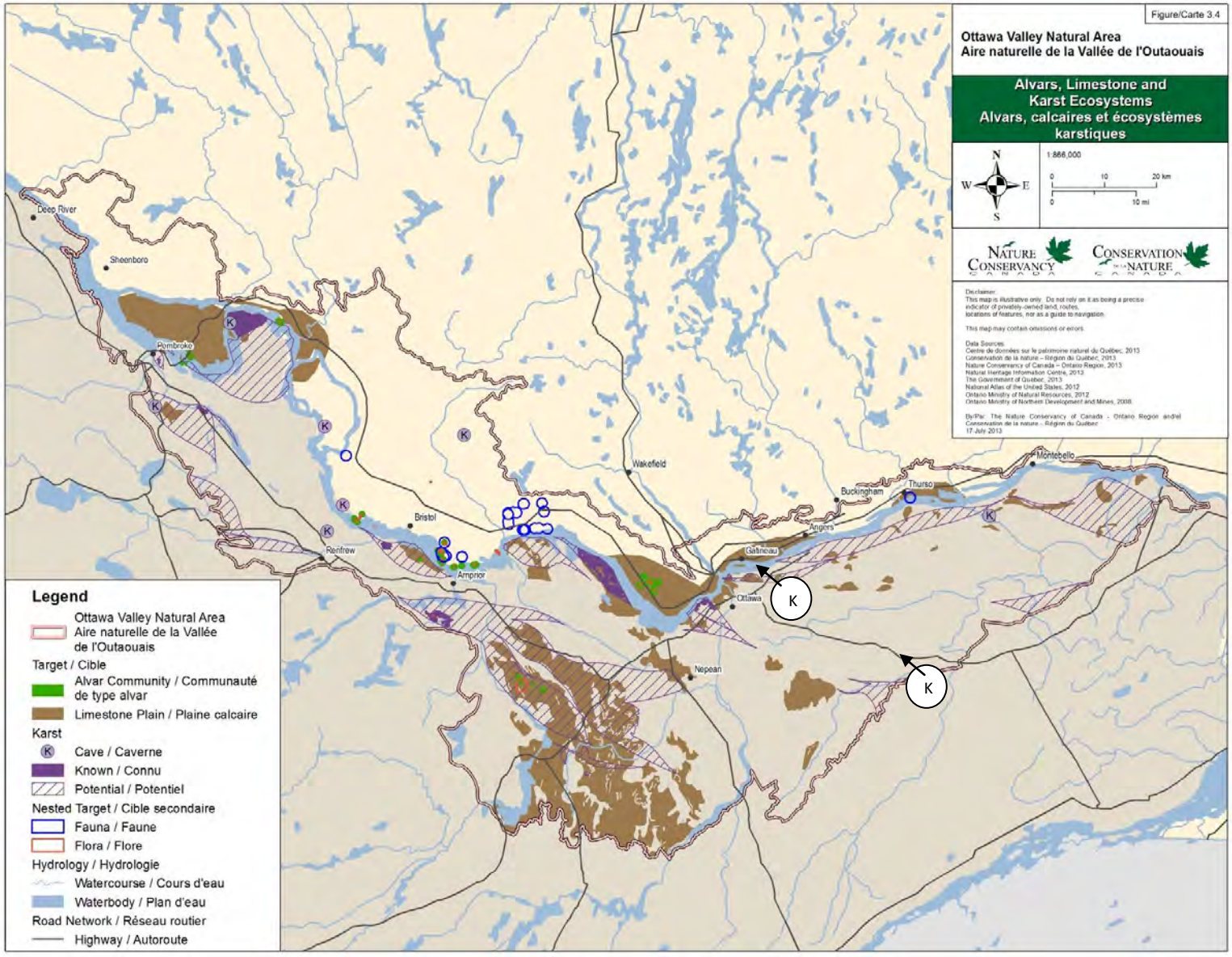
Condition Viability: Very good
While there are some examples of disturbed sites (e.g., from aggregate extraction operations) (Catling pers. comm. 2013), the majority of alvars in the NA have minimal human disturbance with no more than trace amounts of invasive or non-native species. This target includes 11 of the 12 alvars with the best floristic diversity in Québec (Cayoutte *et al.* 2001).

Size Viability: Good

Alvar patch sizes in the NA range in size and shape, but are smaller than those near the Great Lakes (Cayouette *et al.* 2001, Brownell and Riley 2000). The total extent of alvars in the NA is roughly 840 ac (340 ha) which makes up roughly 0.03% of the land base. Since alvar inventories have only started in 1997 in Québec, historic distribution is not available (Cayouette *et al.* 2010).

Overall Viability Rank: Good[1]

[1] Viability assessments were done only for alvars, since limestone and karst ecosystems are not very well documented.


Figure/Carte 3.4
Ottawa Valley Natural Area
Aire naturelle de la Vallée de l'Outaouais
Alvars, Limestone and Karst Ecosystems
Alvars, calcaires et écosystèmes karstiques
1:866,000
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0 10 mi
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Natural Heritage Information Centre, 2013
The Government of Quebec, 2013
National Atlas of the United States, 2012
Ontario Ministry of Natural Resources, 2012
Ontario Ministry of Northern Development and Mines, 2008
By/Par: The Nature Conservancy of Canada - Ontario Region and/et Conservation de la nature – Région du Québec
17 July 2013
Deep River
Sheenboro
Pembroke
Renfrew
Bristol
Arnprior
Wakefield
Buckingham
Thurso
Montebello
Angers
Gatineau
Ottawa
Nepean
K
Legend
Ottawa Valley Natural Area
Aire naturelle de la Vallée de l'Outaouais
Target / Cible
Alvar Community / Communauté de type alvar
Limestone Plain / Plaine calcaire
Karst
Cave / Caverne
Known / Connu
Potential / Potentiel
Nested Target / Cible secondaire
Fauna / Faune
Flora / Flore
Hydrology / Hydrologie
Watercourse / Cours d'eau
Waterbody / Plan d'eau
Road Network / Réseau routier
Highway / Autoroute

Biodiversity Target: **Dunes and Sand Barrens (DSB)**

Nested Target: Sand Barren-dependent Vascular and Non-vascular Plants, Kirtland's Warbler, Sand Barren Invertebrates

Target Definition: This target includes marine sand deposits in the form of hills or ridges (i.e., dunes) and tablelands (i.e., barrens) formed during the outflow of the Algonquin Sea to the Champlain Sea (Place 2002). These features are found on both sides of the Ottawa River at sites such as Constance Bay, Slack Road, Crystal Rock, the Petawawa-Pontiac Sand Plain (also designated an EFE) and around the Allumettes Islands (**Figure 3.5**). These dry habitats support rare flora and fauna, including Canada Frostweed (*Helianthemum canadense*), Wood Turtle, Kirtland's Warbler and Ghost Tiger Beetle.

Habitat/ Species Type: Desert/Arid – Temperate

Ecological Justification:
Dunes and Sandy Barrens include globally rare, endemic and disjunct communities. They support several SAR and rare vegetation.

Landscape Context Viability: Fair

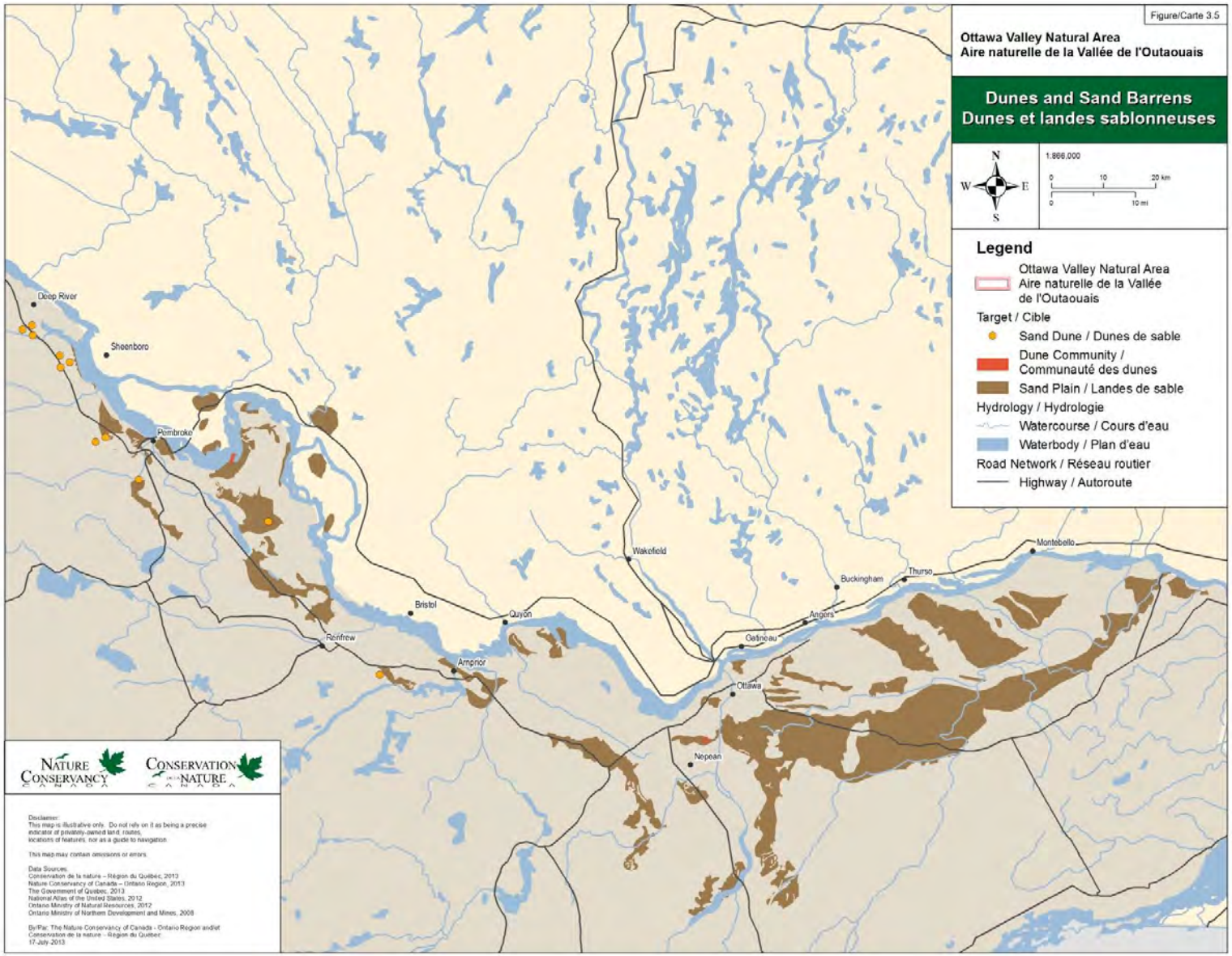
This target is often located near agricultural land or forest plantations. Declines in natural processes, such as fire, have allowed for succession to occur in some of these ecosystems. Between 1950 and 1970, an initiative was undertaken in Ontario to convert open lands (sometimes referred to as wastelands) to forests by planting them with pine species (Catling and Kostiuk 2010). Today there are few remnants of Dunes and Sand Barrens in the NA (Catling *et al.* 2008). Some studies have been conducted on the state of a few known dune systems (e.g., Catling *et al.* 2008, Catling and Kostiuk 2010, Poslid 1941).

Condition Viability: Fair

Many of the Dunes and Sand Barrens in the NA have been converted to conifer plantations (Catling pers. comm. 2013). Recent rediscovery of rare species on dune systems leads to consideration that ecosystem viability can be conserved despite reduction in size (Catling pers. comm. 2013). Recent efforts to restore the Constance Bay dune system show the successes of stewardship for this system (Catling pers. comm. 2013). Invasive species, such as Awnless Brome (*Bromus inermis*), Scotch Pine (*Pinus sylvestris*) and Glossy False Buckthorn, have reduced open sand habitats (Catling *et al.* 2008). Further research is needed to improve knowledge of the ecology of this target and its associated species.

Size Viability: Fair
It is estimated that only one percent of dunes remain (Catling *et al.* 2008). While there have been some surveys done and knowledge gained (Bakowsky pers. comm. 2013), exact size and ecosystem dynamics remain unknown within the NA.

Overall Viability Rank: Fair


Figure/Carte 3.5
Ottawa Valley Natural Area
Aire naturelle de la Vallée de l'Outaouais
Dunes and Sand Barrens
Dunes et landes sablonneuses
N
W
E
S
1:866,000
0 10 20 km
0 10 mi
Legend
Ottawa Valley Natural Area
Aire naturelle de la Vallée de l'Outaouais
Target / Cible
Sand Dune / Dunes de sable
Dune Community / Communauté des dunes
Sand Plain / Landes de sable
Hydrology / Hydrologie
Watercourse / Cours d'eau
Waterbody / Plan d'eau
Road Network / Réseau routier
Highway / Autoroute
Deep River
Sheenboro
Pembroke
Wakefield
Montebello
Buckingham
Thurso
Bristol
Quyon
Angers
Renfrew
Gatineau
Arnprior
Ottawa
Nepean
Nature Conservancy Canada
Conservation de la nature Canada
Disclaimer:
This map is illustrative only. Do not rely on it as being a precise indicator of privately-owned land, routes, locations of features, nor as a guide to navigation.
This map may contain omissions or errors.
Data Sources:
Conservation de la nature – Région du Québec, 2013
Nature Conservancy of Canada – Ontario Region, 2013
The Government of Québec, 2013
National Atlas of the United States, 2012
Ontario Ministry of Natural Resources, 2012
Ontario Ministry of Northern Development and Mines, 2008
By/Par: The Nature Conservancy of Canada - Ontario Region and/et Conservation de la nature - Région du Québec
17-July-2013

Biodiversity Target: **Grassland Birds (GB)**

Target Definition: The Grassland Bird target encompasses a guild of bird species that are native to the NA and are associated with grassland and agricultural habitats. Of the 22 species included in this guild, 12 species that occur or historically occurred in the NA are considered priority species in Bird Conservation Region 13 (BCR 13) of the North American Bird Conservation Initiative[1] (NABCI).

Habitat/ Species Type: Bird

Ecological Justification:
Grassland Birds in North America are experiencing the most significant declines of any group of birds on the continent (Vickery *et al.* 1999). According to the State of Canada's Birds, which represents 40 years of data, Grassland Birds in the Lower Great Lakes – St. Lawrence Region have declined by 70%, with many listed as a SAR in Canada (NABCI 2012). The significant downward trends observed in Grassland Birds are due to loss and fragmentation of native habitat (Herkert 1994), more intensive agricultural practices and possibly the use of agricultural pesticides. Native grassland habitats are one of the most threatened ecosystems in North America (Federal, Provincial and Territorial Governments of Canada 2010). Human-modified agricultural grasslands (or *surrogate* grasslands) have replaced many native grassland habitats, and today they are evidently the most important habitat for Grassland Birds (EC 2013). With more pastures being converted to croplands, earlier cutting of hayfields, and natural succession on abandoned grasslands, we are even seeing the degradation of surrogate habitats (McCracken 2005; Vickery *et al.* 1999).

Landscape Context Viability: Fair
Within the Ottawa Valley NA, 51.2% of land use is agricultural. Agricultural land use in the NA is largely favorable for Grassland Birds, with only 17.6% of agricultural land in cropland. While suitable habitats are available, the landscape is highly fragmented and large extensive grassland habitats that would support an assemblage of species (>50 ha) are rare (**Figure 3.6**).

Condition Viability: Poor
Grassland habitat in the area is mainly agricultural lands used to grow hay or as pasture for livestock. The majority of grasslands in Ontario and Québec have been greatly reduced with estimates of only 3% of the original grasslands still remaining (Bakowsky 1993). With a loss of natural habitat many birds have adjusted to using active farmlands (e.g., Bobolink and Eastern Meadowlark) (Solymár 2005). However, other birds require more specialized habitat. Henslow's Sparrow (*Ammodramus henslowii*)

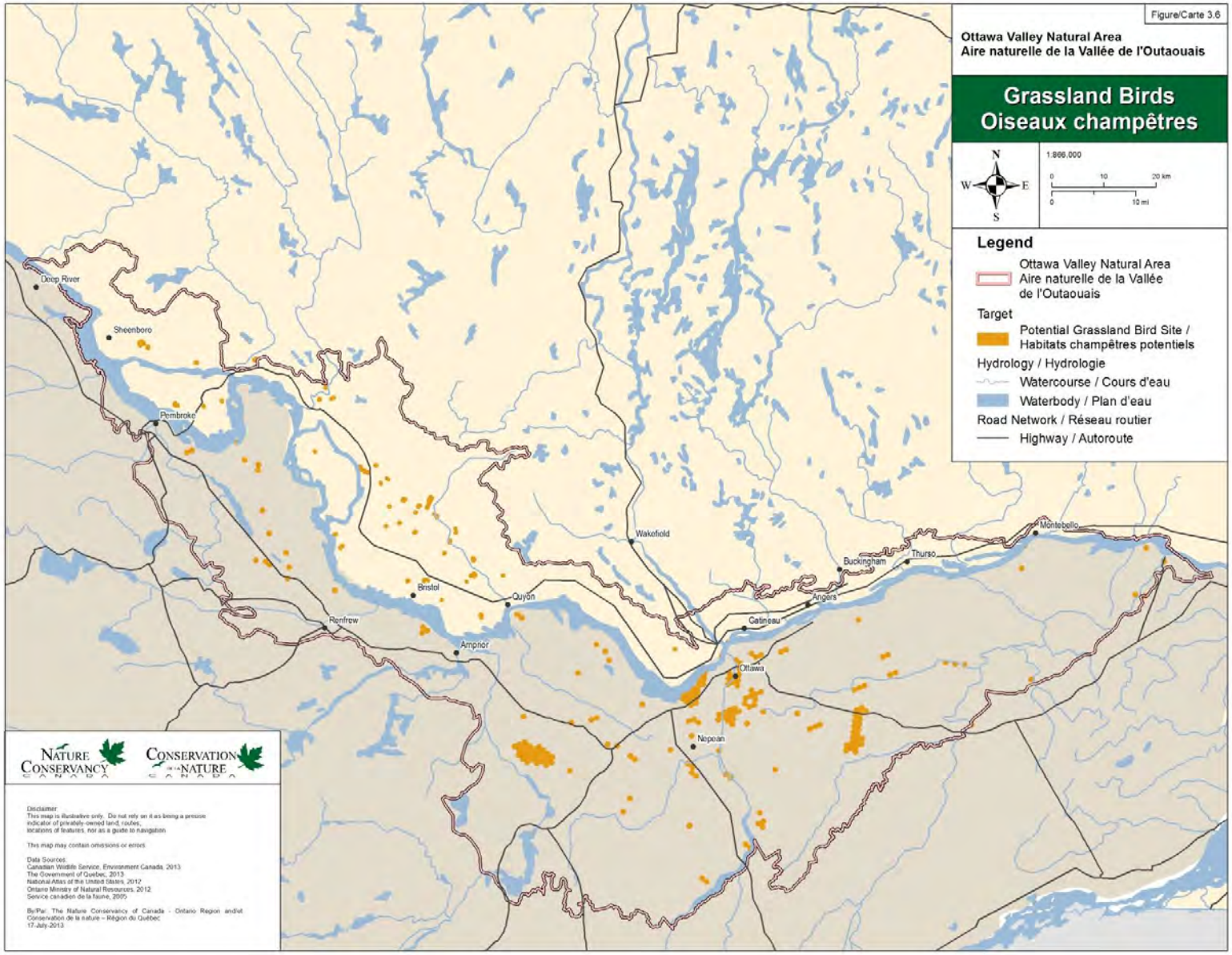
[1] American Kestrel (*Falco sparverius*), Barn Owl (*Tyto alba*), Bobolink, Eastern Kingbird (*Tyrannus tyrannus*), Eastern Meadowlark, Grasshopper Sparrow, Henslow's Sparrow, Loggerhead Shrike, Northern Harrier (*Circus cyaneus*), Savannah Sparrow (*Passerculus sandwichensis*), Short-eared Owl and Vesper Sparrow (*Pooecetes gramineus*).

requires a minimum of 100 ac (41 ha) of continuous grasslands (i.e., grassland or fallow field, not active agricultural lands). Habitat such as this is rare to sparse in the NA (Herkert *et al.* 1996; Davis 2004; Vos and Ribic 2011; Walk and Warner 1999).

Size Viability: Fair

Breeding bird surveys in Canada have monitored annual percent changes in bird species since 1970. Within BCR 13, four species have shown significant declines from 1999-2009. The group trend for the grassland bird guild in BCR 13 is -3.1%, indicating that the annual population trend is declining at a significant rate (EC 2010). Priority bird species are breeding in the NA, with the exception of Henslow's Sparrow, which bred in the area historically (i.e., have not bred within the last 20 years within the NA).

Overall Viability Rank: Fair


Figure/Carte 3.6
Ottawa Valley Natural Area
Aire naturelle de la Vallée de l'Outaouais
Grassland Birds
Oiseaux champêtres
N
W
E
S
1:866,000
0 10 20 km
0 10 mi
Legend
Ottawa Valley Natural Area
Aire naturelle de la Vallée de l'Outaouais
Target
Potential Grassland Bird Site / Habitats champêtres potentiels
Hydrology / Hydrologie
Watercourse / Cours d'eau
Waterbody / Plan d'eau
Road Network / Réseau routier
Highway / Autoroute
Deep River
Sheenboro
Pembroke
Renfrew
Bristol
Quyon
Wakefield
Buckingham
Thurso
Montebello
Angers
Gatineau
Ottawa
Ampnor
Nepean
Nature Conservancy Canada
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Disclaimer
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Data Sources:
Canadian Wildlife Service, Environment Canada, 2013
The Government of Québec, 2013
National Atlas of the United States, 2012
Ontario Ministry of Natural Resources, 2012
Service canadien de la faune, 2005
By/Par: The Nature Conservancy of Canada - Ontario Region and/et Conservation de la nature – Région du Québec
17-July-2013

THREATS

1. Current Threats

Threats are the proximate activities or processes that have caused, are causing or may cause the destruction, degradation and/or impairment of one or more of the identified biodiversity targets. Threats affect the target's viability and/or key ecological attributes.

Threats to the biodiversity targets were identified by the Ottawa Valley NA project team, using past studies, local expert knowledge and a review of the literature. The list of threats is seen as comprehensive for the NA's biodiversity targets. These threats were ranked based on their scope, scale and irreversibility of damage to targets over a 10-year period using the Conservation Action Planning Workbook (Low 2003), and were categorized using established international taxonomy (IUCN-CMP 2006[a]), with local descriptions. **Table 4.1** provides a summary of the threats identified in the Ottawa Valley NA.

The overall threat status for the Ottawa Valley NA is **medium**, the same as for the first five-year plan covering the area north of the river. The geographic extent of each identified threat is indicated, where known, in **Figures 4.1 – 4.4**. Two changes in threat status are noted: 5.3.1. Logging and Timber Harvest (from medium to low) and 9.1.1 Household sewage and urban waste water (from medium to low). The first has been lowered due to a move towards sustainable harvest and forest certification by timber companies in the Ottawa valley. The second has decreased due to increased knowledge of the threat in the NA. The overall threat status for the Wetland Complexes and Rivers and Riparian Habitats targets was manually adjusted from the high ranking calculated by the CAP handbook to medium. These adjustments were made based on a decision reached by consensus by the NACP team rooted in knowledge and expertise of the NA. The overall threat rank for these targets was inflated due to a high or very high irreversibility score, which resulted in medium or high ranks for particular threats whose scope and severity were low/medium.

Table 4.1: Summary of Threats to the Ottawa Valley NA Biodiversity Targets

Biodiversity Targets→ Threats	1. Forest Matrix	2. Wetland Complexes	3. Rivers and Riparian Habitats	4. Alvars, Limestone and Karst Ecosystems	5. Dunes and Sandy Barrens	6. Grassland Birds	Overall threat magnitude
1.1.1 Suburban expansions and associated commercial development	Medium	Medium	Medium	Medium	Medium	Medium	Medium
8.1.2 Invasive non-native aquatic species	-	High	Medium	-	-	-	Medium
3.2.1 Expansion of aggregate and stone extraction	Low	-	-	High	-	-	Medium
2.1.1 Intensification of agriculture	Medium	Medium	Medium	-	-	Medium	Medium
6.1.1 Motorized recreational vehicles (ATV, boating)	Low	Medium	Medium	Low	Medium	Low	Medium
1.1.2 Increasing demand for second homes	Low	Low	Medium	Medium	Medium	-	Medium
8.1.1 Invasive non-native terrestrial species	Medium	-	-	Medium	Low	-	Medium
7.2.1 Dam management on the Ottawa River and its tributaries	-	Medium	Medium	-	-	-	Medium
9.3.1 Agricultural effluent and fertilizer run-off	-	Medium	Medium	-	-	-	Medium

Biodiversity Targets→ Threats	1. Forest Matrix	2. Wetland Complexes	3. Rivers and Riparian Habitats	4. Alvars, Limestone and Karst Ecosystems	5. Dunes and Sandy Barrens	6. Grassland Birds	Overall threat magnitude
8.2.1 Problematic native species	Low	Low	-	Low	Medium	Low	Low
5.3.1 Logging and wood harvesting	Medium	Low	Low	Low	-	-	Low
4.1.1 New roads, upgrades and increased usage of roads and railroads	Low	Medium	-	-	-	Low	Low
9.2.1 Paper and pulp factories	-	Low	Medium	-	-	-	Low
8.1.3 Invasive non-native forest pests	Medium	-	-	-	-	-	Low
4.2.1 Construction and operation of utility and service lines	Low	Low	Low	-	-	Low	Low
5.2.1 Gathering terrestrial plants	Low	Low	-	-	-	-	Low
3.2.2 Peat extraction	-	Low	-	-	-	-	Low
6.1.2 Spelunking	-	-	-	Low	-	-	Low
9.1.1 Household sewage and urban waste water	-	-	Low	-	-	-	Low
Overall Threat Status for Targets and Project	Medium	Medium	Medium	Medium	Medium	Medium	Medium

In order of threat ranking:

1.1.1 Suburban expansions and associated commercial development: Medium
Population growth in the Gatineau-Ottawa urban community reached 9.1% between 2006 and 2011, reaching 9.6% on the Québec side (Statistics Canada 2013). While some suburban municipalities are experiencing a drop in populations, such as Bristol (-6.8%), Ile-du-Grand-Calumet (-6.9%), Sheenboro (-22.2%), others are experiencing a slow increase, such as Shawville (4.9%) and Renfrew (4.7%) (Statistics Canada 2012). A 30% rise in Ottawa's population is forecasted by 2031. Since the average number of individuals per household is slowly declining, the number of households is projected to increase by approximately 145, 000 homes in this time period (City of Ottawa 2013[a]). Two other trends leading to an increase in the number of and demand for households in the Ottawa area is a tendency for baby-boomers to move out of their parents' home and establish their own dwelling and an aging population requiring more senior housing (City of Ottawa 2013[a]).

Land classified as agricultural (green zone) around Gatineau could lessen potential effects, though there is a tendency to reclassify agricultural land. The majority of the land in the Ottawa Valley (about 80%) has its uses restricted by the *Loi sur la protection du territoire agricole* (Québec's law protecting agricultural land), which encourages maintaining a territorial base for the practice of agriculture, and encourages the development of agricultural activities and businesses in agricultural zones (Commission de Protection du Territoire Agricole du Québec [CPTAQ] 2007). Despite these constraints, many real-estate developers obtain de-zoning permits. Urban sprawl is increasing and is fragmenting the NA east to west. This threat involves draining and filling of wetlands, clearing of forests and increased stress on the Ottawa River due to an increased demand for water. An almost total loss of ecological function and ecosystem value accompanies urbanisation, including a loss of connectivity. The Templeton alvar is already wedged in between a quarry, the Gatineau water filtration plant, and the adjacent road, while part of the Aylmer alvar is already being used to store building material (Cayouette *et al.* 2001).

Expanding residential development in Gatineau threatens the majority of the breeding sites for the Western Chorus Frog in this municipality. Between 2004 and 2009, 39% of the breeding sites have disappeared in this area (Équipe de rétablissement de la rainette faux-grillon de l'Ouest du Québec 2010), and zoning permits development for 90% of the sites located within the boundaries of Gatineau (Bernard 2009).

8.1.2 Invasive non-native aquatic species: Medium
Wetlands and the Ottawa River are colonized by invasive aquatic and riparian plants such as Purple Loosestrife (*Lythrum salicaria*), Common Frogbit (*Hydrocharis morsus-ranae*), Common Reed (*Phragmites australis*), European Water-milfoil (*Myriophyllum spicatum*), and Flowering Rush (*Butomus umbellatus*). Boats, roads, and birds are the major vectors of propagation. Water Chestnut (*Trapa natans*) is a very invasive exotic, and its recent discovery near Voyageur Provincial Park in Ontario puts all waterways in the NA at risk of invasion (Ottawa Riverkeeper 2006).

Invasive animals within the NA include Zebra Mussel, Rusty Crayfish (*Orconectes rusticus*), and Common Carp species. Zebra Mussel was first detected in the Great Lakes system in 1988. In 1993 it was discovered in the Rideau Canal system, which is one of the main tributaries to the Ottawa River (O'Neill and Dextrase 1994). Zebra Mussels affect the river system by filtering plankton from the water, competing with native mussels, and by encrusting the riverbed and other surfaces (ORHDC 2005).

3.2.1 Expansion of aggregate and stone extraction: Medium

With population growth, the need for aggregate and stone increases. This has been documented in the *State of the Aggregate Resource in Ontario* study (Government of Ontario 2010), which estimates that, given current extraction rates, only 20 years of aggregate is available in existing operations for Ontario. This leads to assumptions that the NA may have an increased demand for new aggregate operations. In Bristol, two quarries are located within large forest blocks that harbour several SAR. The number of sand quarries is not known. In Ontario, there is already aggregate extraction at the Braeside Alvar (Catling pers. comm. 2013) (**Figure 4.1**).

2.1.1 Intensification of agriculture: Medium

In the Ottawa Valley, most of the inland marshes have disappeared, and these are particularly vulnerable to drainage for agriculture. The number of people working in agriculture has fallen considerably over the past 10 years in the Outaouais administrative region (MRN 2006), but the land used for this purpose remains dominant in the valley. A sharp increase in the percentage of the land occupied by agriculture in the years to come can hardly be imagined since the best lands in the valley have already been put into agriculture. Agriculture covers 51.2% of the NA of which 17.6% is known to host large-scale crop activities (Jobin 2003). However, the conversion of perennial crops and pastures to annual crop will have a major effect on the biological diversity associated with pastures and forage. This is quite possible since soil quality and market conditions are favourable to cash crops (Benoît Jobin, Environment Canada, pers. comm. 2003; MRN 2006).

The transformation of natural habitats into agricultural land remains, nonetheless, very harmful to biodiversity and a problem associated with the conservation of unfragmented forests. In addition, the CPTAQ can be constraining when land is acquired for purposes of conservation, since the organization regulates dividing up of land.

Agricultural production is currently done extensively on large lands with a low animal density (UPA 2007), while cultivated lands are mostly perennial crops with a crop rotation of 6 to 10 years, sometimes up to 16 years (Biron 2010). Some future trends have been identified for the Ottawa Valley area, in both Québec and Ontario, towards consolidation of smaller farms and greener agriculture. Trends indicate that annual and new cultures (e.g., corn, soy, millet, sorghum, Sudan grass) will increase and livestock breeding will intensify to improve financial profitability (Biron 2010). These trends should appear slowly over time because of difficulties in accessing rolling hills with machinery, the high cost of land, and the

accessibility to already large areas of land for culture and production. Land conversion to agriculture still continues within the NA.

One-quarter of the alvars are already affected by farming or its proximity (Cayouette *et al.* 2001). Natural pastures and fallow lands are important to maintain populations of old-field and pasture species and their conversion into large-scale cash crop destroys the quality of these habitats for grasslands birds. To increase the arable area, wetlands are drained and leveled. This practice is very harmful to vernal pools used by Western Chorus Frog and other amphibians. As well, degradation of River Redhorse (*Moxostoma carinatum*) habitat is caused by agricultural and industrial activities that lead to soil erosion and sedimentation (Government of Canada 2013).

Through grazing and trampling, cattle are responsible for loss of rare plants in alvars (Nature Conservancy of Canada 2008), and it is well documented that they can seriously affect nesting success of Grassland Birds (Schaer 2013).

6.1.1 Motorized recreational vehicles (ATV, boating): Medium

The quantity and quality of natural resources present in the valley make this area highly attractive for recreational activities (MRN 2006). Among these activities, the most popular are cycling and mountain-biking, riding of all-terrain vehicles (ATVs), boating on the Ottawa River and its tributaries, and canoeing. The Ottawa River is the second-largest recreational corridor in Québec after the St. Lawrence River (Mercier and Hamel 2004). The increase in motorboat traffic on the river is particularly harmful in shallow water, which is used by fish, birds and turtles. The wakes caused by speedboats accentuate erosion of the river banks and affect nesting on the shores.

The use of off-road vehicles (ORV) and all-terrain vehicles (ATV) is increasing in the NA. These activities are often on informal trails or through open areas (MRN 2006). ATVs and ORVs are used for travel, hunting and recreational activities such as “bogging”. Particular concern has been expressed in some of the fen areas in the NA, including Richmond Fen (Tanya Pulfer, Nature Conservancy of Canada, pers. comm. 2013). Recreational vehicles, such as ATVs, snow machines, dirt bikes, jeeps, and other four-wheel-drive vehicles can result in damage to vegetation through direct contact (trampling), destruction of nests (bird and turtles), soil disturbance, or increased habitat fragmentation resulting from the creation of trails (MRN 2006). The use of these vehicles on properties can introduce non-native species, disturb breeding and nesting wildlife and cause soil erosion. Off-road vehicle use is increasing in the NA and the number of official trails does not represent the level of the activity since it often occurs on informal trails (MRN 2006). The repeated passage of ATVs has been observed in one third of alvars, where vegetation has been destroyed by their continuing passage (Cayouette *et al.* 2001). ATV activity also has harmful repercussions for fish habitat when watercourses are crossed (MRN 2006).

1.1.2 Increasing demand for second homes: Medium

The development of cottages is most apparent upriver from Gatineau, on the shores of the Ottawa River, along waterways and river systems in the interior of Ontario, and to a lesser extent in places that have a view of the valley. The strong trend to convert second homes to permanent dwellings upstream of Gatineau is leading to a rise in population. One third of alvars (Cayouette *et al.* 2001) are located in immediate proximity to cottages. The land bordering the Ottawa River is not zoned for agriculture, encouraging the development of cottages and recreation and tourism activities. An indirect consequence of second homes is increased human passage in natural habitats and consequently pressure from recreational activities. Many of these second homes have their own independent well and septic systems.

8.1.1 Invasive non-native terrestrial species: Medium

A natural heritage study for the City of Ottawa (2005) noted that 36% of the over 1500 vascular plant species identified were non-native species considered common in the area. Invasive non-native species particularly affect alvars, rivers, and riparian habitats. Cayouette *et al.* (2010) indicate that in Aylmer's Alvar, introduced plant species comprise 32% of the alvar's species richness. Furthermore, the presence of Common Buckthorn has been observed in two thirds of alvars, and its expansion is accelerating in fallow lands frequented by old field and pasture species. In fact, both Common Buckthorn and Glossy False Buckthorn occur commonly in both natural and urban settings.

7.2.1 Dam management on the Ottawa River and its tributaries: Medium

The flow of the Ottawa River is highly regulated. More than 50 major dams and hydroelectric facilities are located within its watershed (**Figure 4.4**). Dams on the Ottawa River with the greatest effects on biodiversity targets are, from west to east: Bryson, Portage-du-fort, Chute-des-chats, Chaudière-Hull and Carillon. The most recent dam was built in 1963 with the opening of the Carillon hydroelectric facility. The principal negative effects on the NA are flooding of rapids, the alteration of natural sediment mixing, modification of natural flooding regime and the hindrance to the free movement of mussels, fishes and turtles (Ottawa Riverkeeper 2006).

The survival of several SAR and the quality of the Rivers and Riparian Habitats indicate that past management of the water system has not completely destroyed the habitats critical to these species. However, none of the dams built on the river were constructed with a concern for the migration of fish and an operational strategy better adapted to the natural flow according to daily and seasonal variations would improve the quality of the RRH target. Requests to remediate this situation must be addressed to multiple managers: Hydro-Québec, Ontario Power Generation, Ottawa Hydro and Domtar. One positive impact of their involvement in the territory has been the purchase of extensive riparian lands and flooding servitudes (easements) at the time the reservoirs and outlets were created (e.g., Bristol and Clarendon) to avoid constraints on dam operations. These purchases helped preserve long sections of shoreline from human intervention (Ottawa Riverkeeper2006).

9.3.1 Agricultural effluent and fertilizer run-off: Medium

Animal production and agricultural effluents generate manure and liquid manure that the producer uses as fertilizer by spreading it on the land. The result is often a higher content of phosphorus in the runoff, accompanied by herbicides, pesticides and chemical fertilizers. In Ontario and Québec, agricultural effluent and fertilizer run-off pose an issue. Agriculture is responsible for selective sources of pollution at the mouths of the Lièvre, Rouge and Petite-Nation rivers (Mercier and Hamel 2004). Similarly, excessive nutrient loading from agricultural runoff has been noted as a contributor to the poor environmental conditions in the tributaries of the lower reaches of the Lower Rideau River watershed (Robinson Consultants Inc 2005). However, it is worth noting that agricultural producers are taking positive, pro-active steps to reduce this runoff.

8.2.1 Problematic Native Species: Low

Predation on turtle eggs and juveniles of less than two years can also be a problem. The population of some predators, such as the Raccoon (*Procyon lotor*), has strongly increased, resulting in higher mortality rates for many turtle species (Équipe de rétablissement de cinq espèces de tortues du Québec 2005). Since their reintroduction, Wild Turkey (*Meleagris* gallopavo) populations have also risen above historical levels and thus are affecting native vegetation communities, including rare plants within alvars.

On sand plains, both native and non-native pines were historically planted in open areas to stabilize these features. Unfortunately, some of these areas included native dunes and sand barrens (Catling *et al.* 2008). These plantations now threaten the integrity and viability of these systems.

5.3.1 Logging and Wood Harvesting: Low

The effort to increase sustainable logging through forest certification and forest management plans has lowered this threat from medium in the first NACP to low in this NACP. Many of the forest companies in the Ottawa Valley are family-owned, smaller companies who are members of the Ottawa Valley Forest, Inc. whose slogan is “Sustaining our values”.

The workforce in the Pontiac Regional Municipal County [RCM] depends more than 90% on the forest industry and forestry operations are significant and sustained. Logging upriver from Gatineau is done essentially on private land and is promoted through the *Groupement forestier du Pontiac*. In 1999 in the Outaouais administrative region, 28% of the wood harvested came from private forests and this demand was stable between 1999 and 2002 (MRN 2006). Forestry companies are now re-harvesting sites exploited during the last century and in some cases, intensifying forestry management to encourage tree growth. The main threat from this industry is clear-cutting, which considerably modifies the Forest Matrix by fragmenting it and by modifying ecological corridors and community structure. Conifers on limestone are also threatened by this activity since Northern White Cedar and Eastern White Pine are highly sought after for their commercial value. Logging has greatly disturbed the habitat of Canada Frostweed since its rediscovery on Allumettes Island; however, it still persists. On the other hand, selective cuts can encourage the growth of other plant species such as orchids.

4.1.1 New roads, upgrades and increased usage of roads and railroads: Low

Roads have both direct and indirect effects on ecosystems. Firstly, road collisions can be a major source of mortality for amphibians and reptiles moving between wetland and terrestrial habitats, reptiles that use roads as either a basking or nesting platform (Crowley 2007, Desroches and Picard 2007), birds and butterflies that are hit while resting on or flying over the road at low altitudes, and wide-ranging mammals that may use the roads as travel corridors (Chruszcz *et al.* 2003; Clevenger *et al.* 2002). Road kill has been identified as a significant, or even the principal, cause of mortality in adult turtles (Équipe de rétablissement de cinq espèces de tortues du Québec 2005). Females are particularly vulnerable during reproduction, given that they undertake more extensive movements in search of nesting sites and often choose roadsides for laying their eggs (Desroches and Picard 2007). According to a study by Desroches and Picard (2007), the mortality rate is 0.15 turtles/km/year in the Ottawa Valley, and the majority of turtles killed are found less than 300 m from an aquatic habitat. Expansion of the road network and an increase in traffic could lead to increases in mortality rates.

Indirect effects of roads can extend much further than the lands adjacent to the road corridor. Roads can isolate populations of species from one another, impact wildlife corridors, provide incompatible and discontinuous cover for rare native species, and can degrade natural habitats by introducing invasive species and by creating edge effects, pollution and physical disturbance (Crowley 2007). Roads also provide access by humans to sensitive habitats. Current known impacts of roads in the NA include pollution (from road salt and debris) and road mortalities. In the NA the highest density of roads is concentrated around the shoreline of the Ottawa River, corresponding also to the highest density of development **(Figure 4.2)**.

9.2.1 Paper and pulp factories: Low

Although industrial effluent from the nine pulp and paper mills in the watershed (five directly in the NA) has decreased greatly since the 1970s, the mills nevertheless remain significant polluters. These mills dumped 163,000 billion L of effluent into the Ottawa River in 2002 (Ottawa Riverkeeper 2006).

These effluents increase nutrient-loading, reduce the concentration of dissolved oxygen, degrade habitats through sedimentation and debris deposition, and cause acute or chronic toxicity as they bioaccumulate in organisms and bioamplify at higher trophic levels (Ottawa Riverkeeper 2006).

8.1.3 Invasive non-native forest pests: Low

Forest pests have the potential to change the composition and structure of a forest or eliminate particular vegetation communities. Dutch-Elm Disease and Beech Bark Disease are well known pests of temperate deciduous forests in southern Ontario and Québec and result from the combined action of an insect and a pathogenic fungus. Although widespread, the Butternut is at risk of extinction due to the Butternut Canker (*Sirococcus clavigignenti-juglandacearum*). This canker is known to exist throughout Butternut's range in Canada and most of the United States, having been reported in both Québec in 1990 (Innes and Rainville 1996, COSEWIC 2003) and Ontario in 1991 (Davis *et al.* 1992, COSEWIC 2003).

The Ottawa Valley is thought to have some of the least-affected Butternut trees compared to other areas in Ontario (Pulfer pers. comm. 2013).

New threats come from the Emerald Ash Borer, a wood-boring, phloem-feeding insect native to Asia that feeds on and kills healthy ash trees (Anulewicz *et al.* 2008, Canada Food Inspection Agency 2013). Emerald Ash Borer was detected in Canada in 2002 and in the NA in 2008 (Canada Food Inspection Agency 2013). It has been transferred to new areas through the transport of ash wood product and firewood (highway 401 has been shown to be a major vector). In Ontario, the Emerald Ash Borer's preferred host trees are: Green Ash (*Fraxinus pennsylvanica*), followed by White and Black Ash, and to a lesser extent Blue Ash (*Fraxinus quadrangulata*) (McCullough *et al.* 2004, Pureswaran and Poland 2009). Predictions for the future of ash in Ontario are fairly bleak and include the depletion of black ash swamps in the Ottawa Valley.

4.2.1 Construction and operation of utility and service lines: Low

Construction and maintenance of transmission lines might destroy individual plants and animals or might alter their habitat so that it becomes unsuitable for them. For example, trees used by rare birds for nesting might be cut down or soil erosion may degrade rivers and wetlands that provide required habitat (Public Service Commission of Wisconsin 2011). Once in place, transmission lines can create significant threats to wildlife species including bird collision and electrocution. Other related issues include habitat fragmentation and the consequent edge effects, increased access provided to remote lands, and the use of herbicides in the removal of vegetation. On the other hand, corridors created by transmission may serve as refuges for species in urban or agricultural habitats such as the Western Chorus Frog who uses those areas to breed. The current utility lines/corridors within the NA are illustrated in **Figure 4.3**.

5.2.1 Gathering terrestrial plants: Low

Poaching or harvesting of the commercially valuable roots of American Ginseng is the largest threat to wild populations of this species in Canada (COSEWIC 2000). If regeneration is not successful or given sufficient time, entire populations can be eliminated. For this reason, locations of American Ginseng known to the Conservancy are only divulged on a "need-to-know" basis.

Small Wild Leek (*Allium tricoccum*) also suffers from considerable harvesting pressure. The Government of Québec has designated this species as vulnerable and restricts by regulation the quantity that can be harvested for personal use.

All orchids, including rare species that are provincially at risk, such as Showy Orchid (*Galearis spectabilis*), Ram's-head Lady's-slipper and Eastern Prairie Fringed-orchid (*Platanthera leucophaea*), can experience pressure from orchid collectors.

Several other plant species are considered to have high ornamental value and their harvest can be a problem, especially in alvars and rich forests. The Government of Québec prohibits the harvest of seven such species in natural habitats (MDDEP 2007).

3.2.2 Peat extraction: Low

Peat extraction not only has the ability to reduce the size of a wetland (Environmental Commissioner of Ontario 2005), but ecosystem function is rarely re-established in harvested sites. This is largely attributable to a lowered water table and changes in the water balance, particularly with respect to evapotranspiration (Van Seters and Price 2001). Furthermore, the exposed peat is typically unable to regenerate (Van Seters and Price 2001).

Alfred Bog, a known site for peat extraction in the NA and a nationally significant ecological area, is the largest bog community in the NA and one of three remaining raised bog communities in Southern Ontario (Queen's Printer for Ontario 2010). Due to peat extraction and agricultural drainage, the bog today represents approximately 40% of its historical size (Queen's Printer for Ontario 2010; Environmental Commissioner of Ontario 2005). Approximately 90% of the remaining bog has been protected through the collaborative efforts of provincial and municipal governments and various non-government and volunteer organizations including the Conservancy, and much of this land is now part of the Alfred Bog Provincial Park (Queen's Printer for Ontario 2010; Environmental Commissioner of Ontario 2005). Peat extraction is prohibited in the park (Queen's Printer for Ontario 2010). Similarly, peat extraction is prohibited on private lands outside of the park through municipal by-laws and natural heritage area designations in Ontario's official plan (Environmental Commissioner of Ontario 2005); however, local landowners report that illegal harvesting still occurs. Although this is the biggest example of peat extraction in the NA, other bogs and fens may also be impacted by extraction.

6.1.2 Spelunking: Low

A typical cave may be as much as one hundred thousand years old. Delicate interior features such as stalactites may take thousands of years to form. They would not regenerate in our lifetime if destroyed, and in the case of certain rare speleothems (cave formations) they may never regenerate (Cancaver 2010).

Human use for both recreational and scientific activities is a well-known culprit leading to effects that may disrupt ecosystem functioning, including: (a) *cave sediment compaction*, which can reduce cave fauna productivity and soil microhabitats, and may lead to the extinction of small, cryptic species (depending upon the degree of soil compaction and species' sensitivity); (b) *introduction of molds and other micro-organisms*, these organisms may place competitive or predation pressures on cave-dwelling animals; (c) *introduction of lint from clothes*, which can serve as a substrate and food source for molds, fungi and bacteria; (d) *increase in carbon dioxide levels and ambient temperatures*, which can alter cave microclimates making the cave less hospitable to cave-dwelling animals, and; (e) nutrient stress related to cave abandonment by bats (Colorado Plateau Research Station 2013).

Human disturbance has been identified as detrimental to caves containing roosting bat colonies including maternity/nursery colonies and hibernacula. Activities as seemingly benign as briefly entering a roost area, or shining a light can result in permanent bat abandonment, decreased chances for survival, abandonment of the roost site and even death (Colorado Plateau Research Station 2013). This risk is probably increased by the presence of White-nose Syndrome (*Pseudogymnoascus destructans*) in many bat populations.

Effects of spelunking in karst ecosystems in the NA are assumed to be low because of the small number of speleologists, low accessibility of most caves, unknown locations of many caves and the dangerous surroundings, but this need to be assessed.

9.1.1 Household sewage and urban waste water: Low

Urban wastewater has been identified as the main source of surface water pollution in Canada. Wastewater alters water clarity, oxygen content, and turbidity and therefore potentially has a large effect on native aquatic plants and animals by introducing chemicals into the food chain.

There are 93 water-filtration plants (approximately fifteen within the NA) in the watershed. While the quality of the water in the Ottawa River has been recognized as good or satisfactory overall, some bacterial contamination exists. The chief factors are: municipal wastewater, lack of disinfection of certain effluents and the overflowing of sewer networks when the treatment system is overloaded during heavy rain events. Regulation trends lean towards tighter standards. In addition, it is estimated that approximately 25% of the population uses septic tanks and other treatment systems. However, this is a significant improvement compared to ten years ago (Ottawa Riverkeeper 2006).

2. Emerging Threats

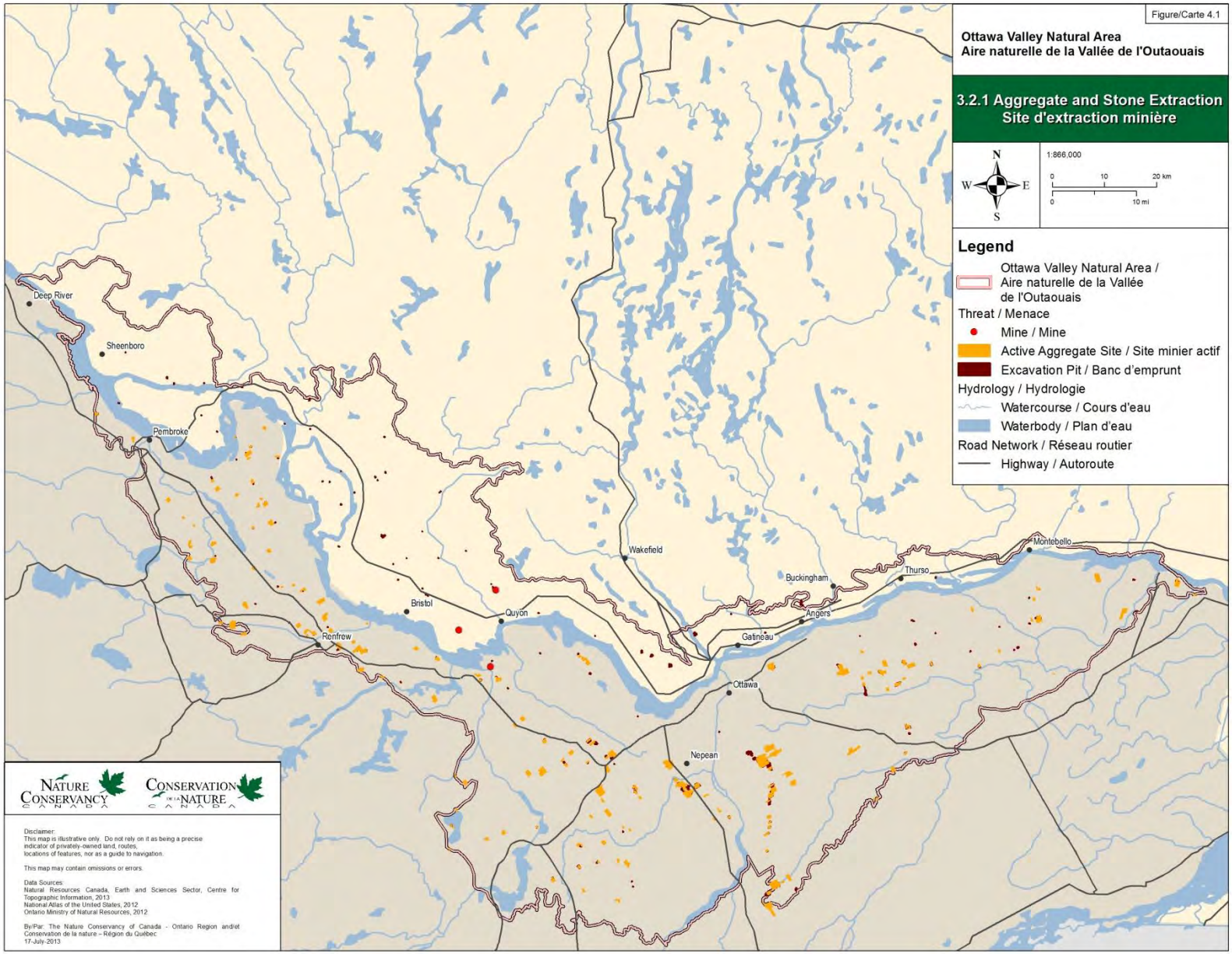
Am important emerging threat is long-term climate change caused by the release of greenhouse gases into the atmosphere by human activities. Global warming and more severe weather events that are outside the historical range of variability will be increasingly important factors to consider in planning for biodiversity conservation in the NA. More specifically droughts, temperature extremes, storms, and flooding could result in major habitat alterations and the extinction of vulnerable species (IUCN 2006). Projections to the year 2050 for the Ottawa region from the Ontario Centre for Climate Impacts and Adaptation Resources (2009) are:

- a 2°C increase in mean summer and a 3°C increase in mean winter temperatures;
- a 10% increase (on annual basis) in precipitation; with uncertain changes in seasonal distribution and more precipitation falling as rain and less as snow;
- more frequent and intense extreme events (e.g., droughts, heavy precipitation, wind, freezing rain);
- shorter winter and longer summer seasons.

It is hard to assess how these climate changes will affect the NA's biodiversity targets and at what rate. Effects on forests are best documented. Warmer winter temperatures will result in changes to the range

and abundance of pests and diseases (Sturrock *et al.* 2011), potentially increasing their rate of influx into the province and enabling extant species to spread to new areas (OMNR 2012). Furthermore, warmer temperatures and changes to water availability may compound plant and tree stress, leaving them more susceptible to invading pests and diseases (Millar *et al.* 2007). It is likely that connectivity for wildlife among core natural areas will be increasingly important as organisms respond to changing environmental conditions.

Ecosystems that rely heavily on seasonal flood regimes to maintain their attributes, such as shoreline alvars and wetlands, may be most at risk in the short term. Increased evapotranspiration coupled with changes in species richness due to disturbances to the timing of life cycle events are thought to be major factors responsible for this sensitivity (Nature Conservancy of Canada 2009).


Figure/Carte 4.1
Ottawa Valley Natural Area
Aire naturelle de la Vallée de l'Outaouais
3.2.1 Aggregate and Stone Extraction
Site d'extraction minière
N
W
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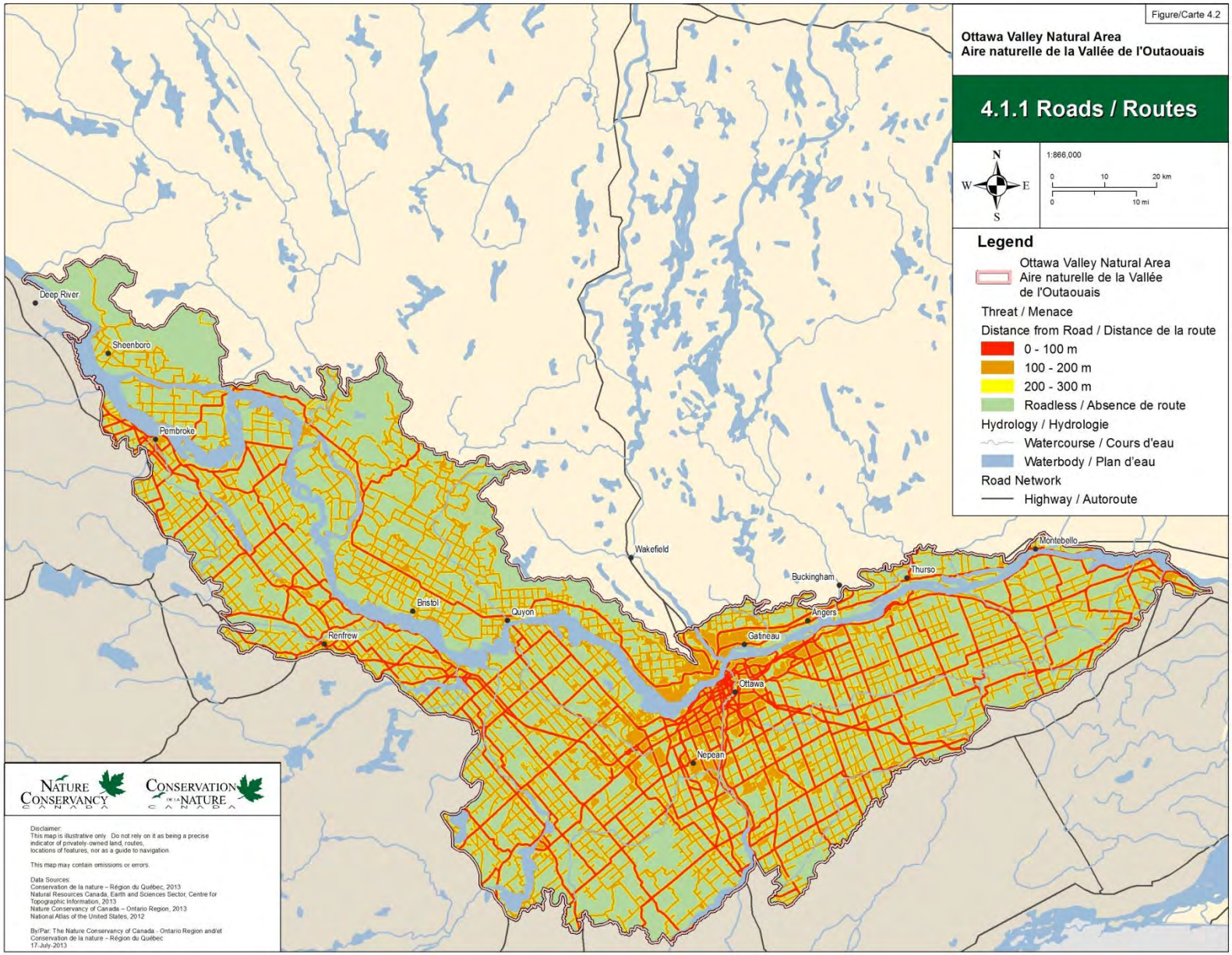
S
1:866,000
0 10 20 km
0 10 mi
Legend
Ottawa Valley Natural Area / Aire naturelle de la Vallée de l'Outaouais
Threat / Menace
Mine / Mine
Active Aggregate Site / Site minier actif
Excavation Pit / Banc d'emprunt
Hydrology / Hydrologie
Watercourse / Cours d'eau
Waterbody / Plan d'eau
Road Network / Réseau routier
Highway / Autoroute
Deep River
Sheenboro
Pembroke
Renfrew
Bristol
Quyon
Wakefield
Buckingham
Thurso
Montebello
Angers
Gatineau
Ottawa
Nepean
Nature Conservancy Canada
Conservation de la nature Canada
Disclaimer:
This map is illustrative only. Do not rely on it as being a precise indicator of privately-owned land, routes, locations of features, nor as a guide to navigation.
This map may contain omissions or errors.
Data Sources:
Natural Resources Canada, Earth and Sciences Sector, Centre for Topographic Information, 2013
National Atlas of the United States, 2012
Ontario Ministry of Natural Resources, 2012
By/Par: The Nature Conservancy of Canada - Ontario Region and/et Conservation de la nature – Région du Québec
17-July-2013


Figure/Carte 4.2
Ottawa Valley Natural Area
Aire naturelle de la Vallée de l'Outaouais
4.1.1 Roads / Routes
N
W
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1:866,000
0 10 20 km
0 10 mi
Legend
Ottawa Valley Natural Area
Aire naturelle de la Vallée de l'Outaouais
Threat / Menace
Distance from Road / Distance de la route
0 - 100 m
100 - 200 m
200 - 300 m
Roadless / Absence de route
Hydrology / Hydrologie
Watercourse / Cours d'eau
Waterbody / Plan d'eau
Road Network
Highway / Autoroute
Deep River
Sheenboro
Pembroke
Wakefield
Buckingham
Montebello
Thurso
Bristol
Quyon
Renfrew
Angers
Gatineau
Ottawa
Nepean
Nature Conservancy Canada
Conservation de la nature Canada
Disclaimer:
This map is illustrative only. Do not rely on it as being a precise indicator of privately-owned land, routes, locations of features, nor as a guide to navigation.
This map may contain omissions or errors.
Data Sources:
Conservation de la nature – Région du Québec, 2013
Natural Resources Canada, Earth and Sciences Sector, Centre for Topographic Information, 2013
Nature Conservancy of Canada – Ontario Region, 2013
National Atlas of the United States, 2012
By/Par: The Nature Conservancy of Canada - Ontario Region and/et Conservation de la nature – Région du Québec
17-July-2013


Figure/Carte 4.3
Ottawa Valley Natural Area
Aire naturelle de la Vallée de l'Outaouais
4.2.1 Utility and Service Lines
Lignes de services
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1:866,000
0 10 20 km
0 10 mi
Legend
Ottawa Valley Natural Area
Aire naturelle de la Vallée de l'Outaouais
Threat / Menace
Power transmission line / Ligne de transport d'énergie
Hydrology / Hydrologie
Watercourse / Cours d'eau
Waterbody / Plan d'eau
Road Network / Réseau routier
Highway / Autoroute
Deep River
Sheenboro
Pembroke
Renfrew
Bristol
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Nature Conservancy Canada
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This map is illustrative only. Do not rely on it as being a precise indicator of privately-owned land, routes, locations of features, nor as a guide to navigation.
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Data Sources:
Natural Resources Canada, Earth and Sciences Sector, Centre for Topographic Information, 2013
National Atlas of the United States, 2012
Ontario Ministry of Natural Resources, 2012
By/Par: The Nature Conservancy of Canada - Ontario Region and/et Conservation de la nature – Région du Québec
17-July-2013


Figure/Carte 4.4
Ottawa Valley Natural Area
Aire naturelle de la Vallée de l'Outaouais
7.2.1 Dam Management
Gestion des barrages
N
W
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1:866,000
0
10
20 km
0
10 mi
Legend
Ottawa Valley Natural Area
Aire naturelle de la Vallée de l'Outaouais
Threat / Menace
Dam / Barrage
Hydrology / Hydrologie
Watercourse / Cours d'eau
Waterbody / Plan d'eau
Road Network / Réseau routier
Highway / Autoroute
Nature Conservancy Canada
Conservation de la nature Canada
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By/Par: The Nature Conservancy of Canada - Ontario Region and/et Conservation de la nature – Région du Québec
17-July-2013

3. CONSERVATION PLAN

A. VISION

The Ottawa Valley NA is conserved as an area of remarkable natural habitats sustaining secure populations of plants and animals and supported by a proud and engaged local community. The Conservancy plays a lead role in the conservation of the NA.

B. GOALS

Conservation Goals		Allied Biodiversity Targets[1]
1.	To conserve rare ecosystems and representative communities by enlarging and consolidating core conservation areas with an emphasis on alvars, sand dunes, bogs, fens and grassland bird communities.	All
2.	To ensure functional ecological linkages between core conservation areas, focusing on two areas: (a)the north shore of the Ottawa River between Sheenboro and Gatineau Park, and; (b) between Alfred Bog and the City of Ottawa.	All
3.	To contribute to the maintenance and recovery of viable populations of globally, nationally, and provincially rare species with an emphasis on Grassland Birds, alvar species, turtles, forest birds and the Western Chorus Frog.	All
4.	To support partners and enhance partnerships by providing science, conservation planning, and funding support to facilitate protection and management of core conservation lands.	All
5.	To develop opportunities and provide support to engage local community participation in conservation.	All

[1]Target abbreviations: Forest Matrix (FM), Wetland Complexes (WC), Rivers and Riparian Habitats (RRH), Alvars, Limestone and Karst Ecosystems (ALKE), Dunes and Sand Barrens (DSB), and Grassland Birds (GB).

C. OPPORTUNITIES

Diverse opportunities exist within the Ottawa Valley to advance conservation efforts, such as partnerships with the Ministry of Natural Resources in Ontario and Québec, Québec's Ministry of Sustainable Development, Environment, Wildlife and Parks (MDDEFP), the City of Ottawa, the National Capital Commission, Conservation Authorities, Ontario Nature, Canadian Parks and Wildlife Service, Eastern Ontario Model Forest and local environment groups.

Both Québec and Ontario

The National Capital Commission is a Crown corporation of the Government of Canada responsible for planning, development, conservation and improvement of Canada's Capital. As part of its mandate the National Capital Commission is responsible for preserving, protecting and ensuring the sustainable use of land and natural resources and coordinates the use of all federal lands in Canada's Capital Region. These lands include parks, monuments, public places, heritage buildings, shorelines and large areas of green space, such as Gatineau Park and the Greenbelt. As one of the largest owners and managers of land in Canada's Capital Region, the National Capital Commission collaborates with the region's municipalities on planning and land stewardship. The National Capital Act seeks to preserve and enhance Canada's Capital as a place of national importance and pride. Some of the lands held by the National Capital Commission are exceptionally important conservation lands within the context of the NA including Gatineau Park, Mer Bleue, Shirley's Bay and Stony Swamp. The National Capital Commission is intensely interested in maintaining and building Ottawa's Greenbelt as open space and a habitat corridor. As part of the Gatineau Park Ecosystem Conservation Plan, the National Capital Commission has identified major potential ecological corridors to link the Park to surrounding natural habitats. The Conservancy is one of the major partners in promoting this action and works with the National Capital Commission to preserve these ecological linkages, primarily between its own properties and the Park.

The Ottawa Riverkeeper has been an important advocate for conservation in the region, and undertakes various actions for protection of the Ottawa River environment. The organization's interventions involve residents, industries, municipalities and governments. Collaboration between Ottawa Riverkeeper and the Conservancy is anticipated in the future.

Canadian Parks and Wilderness Society (CPAWS) has an Ottawa Valley chapter, the Wildlands Leauge, which is dedicated to the protection of biodiversity in the Ottawa Valley. Their mission is to do so through legislation and education. The Conservancy sees many opportunities to benefit from their resources to help promote biological values in this NA.

The Algonquin to Adirondacks Collaborative is an oranization focused on re-establishing connectivity between the Algonquin and Adirondack regions. The Conservancy has participated in the Collaborative with its work in the Frontenac Arch NA. We plan to continue with this partnership, highlighting the conservation needs in the Ottawa Valley NA.

Ducks Unlimited is dedicated to the conservation of wetlands and wetland species throughout Canada. The Conservancy has been working with Ducks Unlimited on the Québec portion of the NA and anticipates further collaboration on the Ontario portion.

Québec

While the Conservancy – Québec Region is active to the west of Gatineau, several partners are undertaking conservation actions to the east of Gatineau. The majority of the land surrounding the wetlands of McLaurin Bay and Plaisance Park are protected by Ducks Unlimited and the MRN to encourage their protection and enhancement and to facilitate public access. As part of the Eastern Habitat Joint Venture, these organizations have also protected a large proportion of the riverine wetlands of the Ottawa River between the cities of Gatineau and Plaisance (e.g., the des Laîches, aux Massettes, des Grenouillettes, Templeton, Thurso and aux Rubaniers marshes and the Trepanier Brook).

Over the past years, the MRN provided funding for the securement of several conservation projects. A financial partnership will be renewed with the MRN and/or MDDEFP to pursue conservation objectives in the NA, particularly with regards to the Bristol and Clarendon focal areas for the creation of a wildlife refuge. The local MRN also provides great support to the Conservancy's science and stewardship activities in the field in the form of technical support, expertise, field equipment and storage.

A regional recreational tourism park, the Pontiac Chat Falls Park, is under development in the Bristol area. The project is lead by several partners (MRC de Pontiac, MRC des Collines-de-l'Outaouais, CLD [Centre local de développement] Pontiac, CLD des Collines-de-l'Outaouais, Bristol Municipality, Pontiac Municipality and Conférence régionales des élus de l'Outaouais) in collaboration with the local community and the main landowners, including the MRN and Hydro Québec. The Conservancy is a member of the technical committee for the Pontiac Chat Falls Park project.

The active participation of the Conservancy on the provincial recovery teams for Québec's turtles and the Western Chorus Frog enables us to effectively address the conservation objectives for these species based on priority actions suggested in the recovery plans. Research projects and stewardship initiatives, conducted mostly in partnership with the Canadian Wildlife Service [CWS], the MRN, the National Capital Commission, and the Fondation de la faune du Québec, help to improve understanding of population dynamics of species at risk and to better document the location of key lands for their protection.

A partnership agreement is in place with the Club des ornithologues de l'Outaouais for the club and its volunteers to conduct bird surveys in the Conservancy's Natural Areas.

Since 2008, the City of Gatineau has offered a funding opportunity for projects that raise awareness and protect the quality of the environment within the boundaries of the city. Kettle Island successfully benefited from this funding source in 2009. The Ottawa New Edinburgh Club is also available to support the Conservancy's stewardship activities around Kettle Island.

Pontiac Environmental Protection is a local group involved in projects related to Pontiac's natural resources management and public awareness. They present opportunities for outreach within the

community. In some areas, the Conservancy has partnered with local stewardship groups, who help with property management, and it has involved the local community in scientific activities such as species monitoring.

Another partner working toward improvement of the environment and conservation of natural resources along with sustainable development is the *Conseil régional de l'environnement et du développement durable de l'Outaouais* (CREDDO). This organization sits on more than thirty committees and participates in consultations with the towns and RCMs.

Ontario

The City of Ottawa currently owns and manages over 8,100 ha of the Marlborough Forest, including substantial portions of the Richmond Fen PSW and ANSI. The City is supporting the Conservancy's conservation planning for the Ottawa Valley as a means of providing parallel information on conservation priorities in the region. The City has a policy of setting aside funds to acquire key conservation parcels and is in the process of determining how best to use those funds in a regional context. The City also supports private landowner stewardship programs, frequently in collaboration with the conservation authorities and other local organizations, through program such as the Ottawa Rural Clean Waters Grants Program and Community Environmental Projects Grants Program.

The Ottawa Field Naturalists Club (OFNC) is the oldest naturalists' club in Canada and is well-established with over 1,000 members. The club promotes "the appreciation, preservation, and conservation of Canada's natural heritage". They sponsor clubs and wildlife programs and have contributed over $125,000 to the Conservancy's acquisition efforts in eastern Ontario over the past five years. OFNC was also a key partner in protecting Alfred Bog.

Ontario Ministry of Natural Resources (OMNR) (including Ontario Parks) and the Conservancy have a long history of partnership and collaboration. The Conservancy acquired 8,070 ac (3,265 ha) of Alfred Bog with the assistance of many partners, and Ontario Parks is currently managing those the Conservancy lands together with Crown lands, notably Westmeath Provincial Park near Pembroke on Lower Allumette Lake, Burnt Lands Provincial Nature Reserve near Almonte, and Voyageur Provincial Park near Hawkesbury. OMNR also manages the Shirley's Bay Crown Game Reserve, the Hawkins Property Conservation Reserve near Cobden, and the Nopiming Crown Forest Game Preserve at Marshall's Bay. OMNR also manages the SAR Farm Incentive Program and Grasslands Habitat Farm Incentive Program in partnership with the Ontario Soil and Crop Improvement Association.

The Conservation Authorities are very active in the Ontario portion of the NA. For example, South Nation Conservation (SNC) was deeply involved in the Alfred Bog acquisition (along with great municipality support from United Counties of Prescott & Russell, and the Townships of Alfred and La Nation). SNC manages seven parks and conservation areas and manages over 19,000 ac (7,689 ha) of

forest lands. Rideau Valley Conservation Authority (RVCA) owns 5,700 ac (2,307 ha) of land and the Mississippi Valley Conservation Authority approximately 1,000 ac (405 ha).

The United Counties of Prescott & Russell (UCPR) own the Larose Forest near Casselman, an 11,000 ac (4,454 ha) managed forest tract with multiple uses. The United Counties was also a close partner on the protection of Alfred Bog and has a long-term interest in assisting with management of the site.

The Mississippi-Madawaska Land Trust Conservancy (MMLTC) was formed in 2003 and currently owns two properties totalling 300 ac (121 ha) and holds a conservation agreement on a 1,250-ac (506 ha) tract. In addition to the watersheds of the Madawaska and Mississippi Rivers the MMLTC also includes Constance Creek and the Carp River as part of its area of interest. Other land trusts that are active in the area include Ontario Nature, the Rideau Valley Conservation Foundation, the Rideau Waterway Land Trust, Ontario Heritage Trust and Réserve Naturelle Reconnue.

Eastern Ontario Model Forest (EOMF) is very active in stewardship and research in the NA (within the bounds of the Eastern Ontario Forest). EOMF and the Conservancy have partnered on many research projects aimed at identifying habitats and ideal conservation areas. There are many opportunities to continue to work with EOMF on these initiatives, as well as working with their members.

Coordination with other Nature Conservancy of Canada's Natural Areas

Opportunities also exist to coordinate the implementation of conservation activities with the Gatineau Valley NA, which shares its south-west boundary with the Ottawa Valley NA. Although funding and partnership opportunities are currently limited in the Gatineau Valley, joint efforts for scientific projects (i.e., knowledge acquisition) are possible and desirable in the short term.

D. ACTIONS

2008-2013 Natural Area Conservation Plan

This is the second NACP that the Conservancy has prepared for this region, though the Ontario Region was not included in the first iteration. The first NACP was initiated in March 2008 and ended in February 2013 (**Table 5.1**). Under the first five-year planning period, the Conservancy secured 4,625 ac (1,872 ha), which represents a 3.2% increase in the area of protected lands in the NA, and was close to the securement target of 6,424 ac (2,600 ha). Highlights of land protection achievements included the securement of a total of 1643 ac (665 ha) in Bristol – along with the Muirhead (522 ac; 211 ha) and Emballages Smurfit-Stone phase 2 (407 ac; 164 ha) projects – and 1293 ac (523 ha) in Clarendon – including the Connelly project (527 ac; 213 ha) – two high biodiversity hotspots in the NA (**Figure 2**).

Table 5.1. 2008-2013 NACP Implementation Summary

Stewardship Action Category	Regional Board Assessment	Implementation Summary
Securement – Land/Water Protection	YELLOW	Many actions and measures of success were met. The majority of securement actions are underway and will be continued in the second iteration of the conservation plan.
Stewardship – Land/Water Management	GREEN	The majority of actions have been completed at the end of the 5 year planning period.
Stewardship- Species Management	GREEN	The majority of actions have been completed at the end of the 5 year planning period.
Communication, Education & Awareness	GREEN	The majority of actions have been completed at the end of the 5 year planning period.
Government Relations, Law & Policy	GREEN	The majority of actions have been completed at the end of the 5 year planning period.
Stewardship - Livelihood, Economic and Other Incentive	GREEN	All actions completed at the end of the 5-year planning period.
Philanthropy, Marketing & Capacity Building	GREEN	The majority of actions have been completed at the end of the 5 year planning period.
Overall Assessment	GREEN	Implementation of the plan went well and the majority of measures of success have been achieved. Although the protection of private sectors is slightly less than expected, the acquisition of knowledge and collaboration with local partners are promising for further action in this NA.

2013-2018 Natural Area Conservation Plan

This section identifies the conservation actions required to conserve the Ottawa Valley's biodiversity targets. It also establishes measures for monitoring the success of these actions. Developing and implementing measures of success allows an adaptive management approach to be applied to the NA. The main difference between this NACP and the last one is the Conservancy's Ontario region involvement in planning and implementing actions on the south side of the Ottawa River.

The second-generation NACP provides a vehicle through which the Conservancy can continue building upon the successes of 2008-2013: land securement, partnership building, especially with local landowners, and gaining knowledge for a better understanding of our targets. Through targeted land securement the Conservancy will protect 1,235 ac (500 ha) of the most unique ecosystems in the NA. This would only be an approximate 0.5% increase in protected area lands but, combined with conservation efforts from the 2008-2012 plan, would bring the Conservancy's contribution to

approximately 6% of all protected lands in the NA and would bring the total of all protected lands in the Ottawa Valley to approximately 9%. The Conservancy will continue to collaborate with established and potential partners, including all levels of government, other non-government organizations, local conservation organizations including land trusts, township or city planners, cottage associations and community groups. Collectively, these groups can contribute effectively to designing and implementing a comprehensive community-based conservation plan aimed at conserving the area's key biodiversity features and functions.

Table 5.2 provides a summary of the 22 conservation actions to be implemented through this NACP. Prioritisation of land for conservation is mapped in **Figure 5**. The methods underlying the parcel-level prioritization are presented in **Appendix Four**.

Conservation actions will focus on core areas for rare and unique systems, including caves and karst, sand dunes, alvars, and grassland bird habitat. The larger issue of securement of principal ecological linkages between cores and stewardship of these priority lands will require a strategic and funding partnership with key players including the City of Ottawa, City of Gatineau, the National Capital Commission, Environment Canada, and municipal and provincial governments. The outcome of those discussions could result in a significant increase in the land protection goals for the NA within the time period of this NACP. If this occurs this will be documented in a future NACP Annual Pr Review. In addition, the Conservancy will work with partners to improve conservation information and planning across the landscape and to develop stewardship plans for existing conservation lands where such documents do not currently exist.

Table 5.2. Conservation Actions and Associated Information for the Ottawa Valley Natural Area

Conservation Actions	Importance/ Associated Goal(s) [1]	Biodiversity Target(s)[2]	Threat(s)	Measure(s) of Success (MOS)/Notes	Organizational Lead (including region)
1. Securement - Land/ Water Protection 1.1 Site/Area Protection					
1.1.1 Secure a minimum of 1, 235 ac (500 ha) of priority lands by 2018. Securement work will emphasise under-represented, high-risk, and unique systems: • *Alvars* • *Karst systems* • *Ancient sand dunes* • *Large bog and fen systems east of Ottawa, including connectivity* • *Wetland Complexes supporting SAR* • *Grassland bird communities* • *Remaining large forest blocks.*	CRITICAL 1, 2, 3	All	All	MOS-I (Implementation Measure of Success): A minimum of 1,235 ac (500 ha) of priority 1 and 2 lands are secured by 2018, representing 0.36% of outstanding Priority 1 and 2 core properties. Note: Securement includes but is not limited to fee-simple acquisitions and donations, servitudes and easements, government transfers, and transfers to other organizations.	**Nature Conservancy of Canada – QC and ON**

[1] ***Critical:*** Conservation actions that, without implementation, would clearly result in the reduction of viability of a biodiversity target or the increase in magnitude of a critical threat within the next 5-10 years. Also includes research information that is needed before key decisions can be made on the management of biodiversity targets.

Necessary: Conservation actions that are needed to maintain or enhance the viability of biodiversity targets or reduce critical threats. Also includes research that will assist in decisions on management of biodiversity targets.

Beneficial: Conservation actions that will assist in maintaining or enhancing viability of biodiversity targets and reducing threats.

[2] Biodiversity Targets: FM: Forest Matrix; WC: Wetland Complexes; RRH: Rivers and Riparian Habitats; ALKE: Alvars, Limestone and Karst Ecosystems; DSB: Dunes and Sand Barrens; GB: Grassland Birds

Conservation Actions	Importance/ Associated Goal(s) [1]	Biodiversity Target(s)[2]	Threat(s)	Measure(s) of Success (MOS)/Notes	Organizational Lead (including region)
1.1.2 Assist partner land organizations (including the City of Ottawa, Conservation Authorities, Land Trusts, the National Capital Commission, and provincial agencies) in identifying and protecting priority lands on an ongoing basis. Convene a workshop or round-table by 2014 to help identify collaborative opportunities.	NECESSARY All	All	All	MOS-I: Through the sharing of knowledge with partners, at least one major partner-led land conservation project protects Priority 1 lands identified in this NACP. Workshop or roundtable held to identify opportunities, actions, strategies and funding.	**Nature Conservancy of Canada - QC and ON**
1.3.1. Prepare Annual Progress Reports [APR] throughout planning process and third-generation NACP by 2018.	NECESSARY All	All	All	MOS-I: Annual progress reports are completed separately by Québec and Ontario Regions, and a combined third-generation NACP is prepared by 2018. GIS and field work are completed and aid in informing the third-generation plan.	**Nature Conservancy of Canada – QC and ON**
2. Stewardship - Land/ Water Management 2.1 Site/Area Management					
2.1.1 Prepare interim stewardship statements [ISS] within one year and PMPs following the Conservancy's approved Stewardship Performance Standards for secured properties, and conduct stewardship actions on acquired properties as required by PMPs.	CRITICAL All	All	All	MOS-I: ISSs and PMPs have been developed for all properties acquired and managed by the Conservancy. Stewardship activities as required by PMPs have been conducted as scheduled in PMPs.	**Nature Conservancy of Canada – QC and ON**

Conservation Actions	Importance/ Associated Goal(s) [1]	Biodiversity Target(s)[2]	Threat(s)	Measure(s) of Success (MOS)/Notes	Organizational Lead (including region)
2.1.2 *Complete baseline documentation reports for the purposes of monitoring restrictions for all properties secured under conservation easement, following the Conservancy's approved Stewardship Performance Standards for easement properties, and monitor all easement properties annually as required.*	CRITICAL All	All	All	MOS-I: A baseline documentation report, signed by the Conservancy and the landowner, is in place at the time of registration for each easement property. All easements are monitored annually following the Conservancy's approved Stewardship Performance Standards and completed monitoring reports are on file in the regional office. MOS-E (Effectiveness Measure of Success): All conservation easements are properly stewarded. Positive relations are maintained with participants of the conservation easement program. These properties contribute to the overall conservation and stewardship objectives in the NA.	**Nature Conservancy of Canada -QC and ON, Partners**

Conservation Actions	Importance/ Associated Goal(s) [1]	Biodiversity Target(s)[2]	Threat(s)	Measure(s) of Success (MOS)/Notes	Organizational Lead (including region)
2.1.3 Maintain relationships with partners of transferred lands as specified in land-holding (or equivalent) agreements and on an ongoing basis engage owners of other existing protected areas to provide assistance in the development and implementation of management plans and/ or stewardship actions.	NECESSARY 1, 2, 3, 4	All	All	MOS-I: Effective communications with partners of transferred lands are maintained. All transferred lands adhere to the terms specified in the landholding agreement. Communication is maintained with partners. With partners, the Conservancy assisted with and supported the development and implementation of management plans and/ or stewardship actions on an ongoing basis. MOS-E: The Conservancy is aware of and encouraged by the conservation and stewardship efforts by partners on transferred lands. Any issues, concerns or problems are dealt with quickly and strategically with the Conservancy's guidance. The Conservancy develops and strengthens relationships with partners. The Conservancy, along with partners, enhances conservation and stewardship of protected areas.	**Nature Conservancy of Canada – QC and ON, Partners**
2.1.4 By 2018, organize two bioblitzes in karst, dunes, sand barrens, or bog and fen systems.	BENEFICIAL 3,4, 5	W, ALKE, DSB	-	MOS-I: The Conservancy has organized two bioblitzes and engaged local experts to conduct inventories of exceptional vegetation communities occurring in the NA for which we have limited information by 2018. MOS-E: The Conservancy has a greater understanding of the composition and ecology of exceptional vegetation communities within the NA. The Conservancy has developed or maintained relationships with local experts.	**Nature Conservancy of Canada – QC and ON**

Conservation Actions	Importance/ Associated Goal(s) [1]	Biodiversity Target(s)[2]	Threat(s)	Measure(s) of Success (MOS)/Notes	Organizational Lead (including region)
2.1.5 By 2018, initiate a minimum of four research projects in collaboration with a partner to address knowledge gaps and/ or threats to a biodiversity target(s), with a focus on karst, alvars, and Grassland Birds). A minimum of one research project to be focused on addressing knowledge gaps for dunes and sand barren ecosystems.	BENEFICIAL 2, 3	All	All	MOS-I: By 2018, a minimum of four research-based projects is conducted in partnership with an academic institution or equivalent organization, focusing on at least one knowledge gap or threat to one of the biodiversity targets. MOS-E: By 2018, research project results inform conservation actions in the NA.	**Nature Conservancy of Canada – QC and ON, Academic Partner**
2.1.6 By 2014, map all riparian habitats within the NA with the aid of partners, where possible.	NECESSARY 2	RRH	1.1.1	MOS-I: By 2014, the Conservancy has mapped the extent of riparian habitat within the NA. MOS-E: The Conservancy has a greater understanding of riparian habitat viability through this mapping exercise.	**Nature Conservancy of Canada –ON Partners**
2.1.7 Continually contribute to and guide implementation of a regional recreational park in Bristol.	NECESSARY 1, 3, 4	All	All	MOS-I: The Conservancy participated in the Pontiac Chats Falls Park implementation and planning process by attending the technical committee's annual meetings.	**Nature Conservancy of Canada -QC , Pontiac Chats Falls Regional Park Project Team**
2.1.8 Research, prioritise, and map karst systems in the Ottawa Valley NA by 2018 with the aid of partners, where possible.	NECESSARY 2	ALKE	-	MOS-I: By 2018, the Conservancy has mapped the extent of karst systems within the NA. MOS-E: The Conservancy has a greater understanding of karst systems viability.	**Nature Conservancy of Canada -QC**

Conservation Actions	Importance/ Associated Goal(s) [1]	Biodiversity Target(s)[2]	Threat(s)	Measure(s) of Success (MOS)/Notes	Organizational Lead (including region)
2. Stewardship - Land/ Water Management 2.3 Habitat and Natural Process Restoration					
2.3.1 Identify and maintain priority grassland bird habitats in the NA by 2018.	NECESSARY 1, 3, 4	**GB**	1.1.1, 1.2, 2.1 et 2.2	MOS-I: By 2018, the Conservancy has collaborated with the Canadian Wildlife Federation [CWF] and expert partners to identify priority grassland bird habitats within the NA. MOS-E: The Conservancy has a greater understanding of grassland bird habitat viability and long-term population trends.	**Nature Conservancy of Canada -QC and ON** **CWF** **Expert partners (CPTAQ, UPA)**
2.3.2 Collaborate with farmers on best management practices in the NA by 2018.	NECESSARY 1, 3, 5	**GB** **WC**	2.1.1 9.3.1	MOS-I: By 2018, the Conservancy has collaborated with local farmers through the distribution of stewardship guides to incorporate best management practices on agricultural lands with regards to Grassland Birds and Western Chorus Frog habitats within the NA. MOS-E: Grassland Birds and Western Chorus Frog habitats are better protected in the long term. The Conservancy has developed or maintained relationships with local landowners.	**Nature Conservancy of Canada -QC and ON** **CWF** **Québec Western Chorus Frog Recovery Team** **City of Ottawa** **Conservation Authorities**

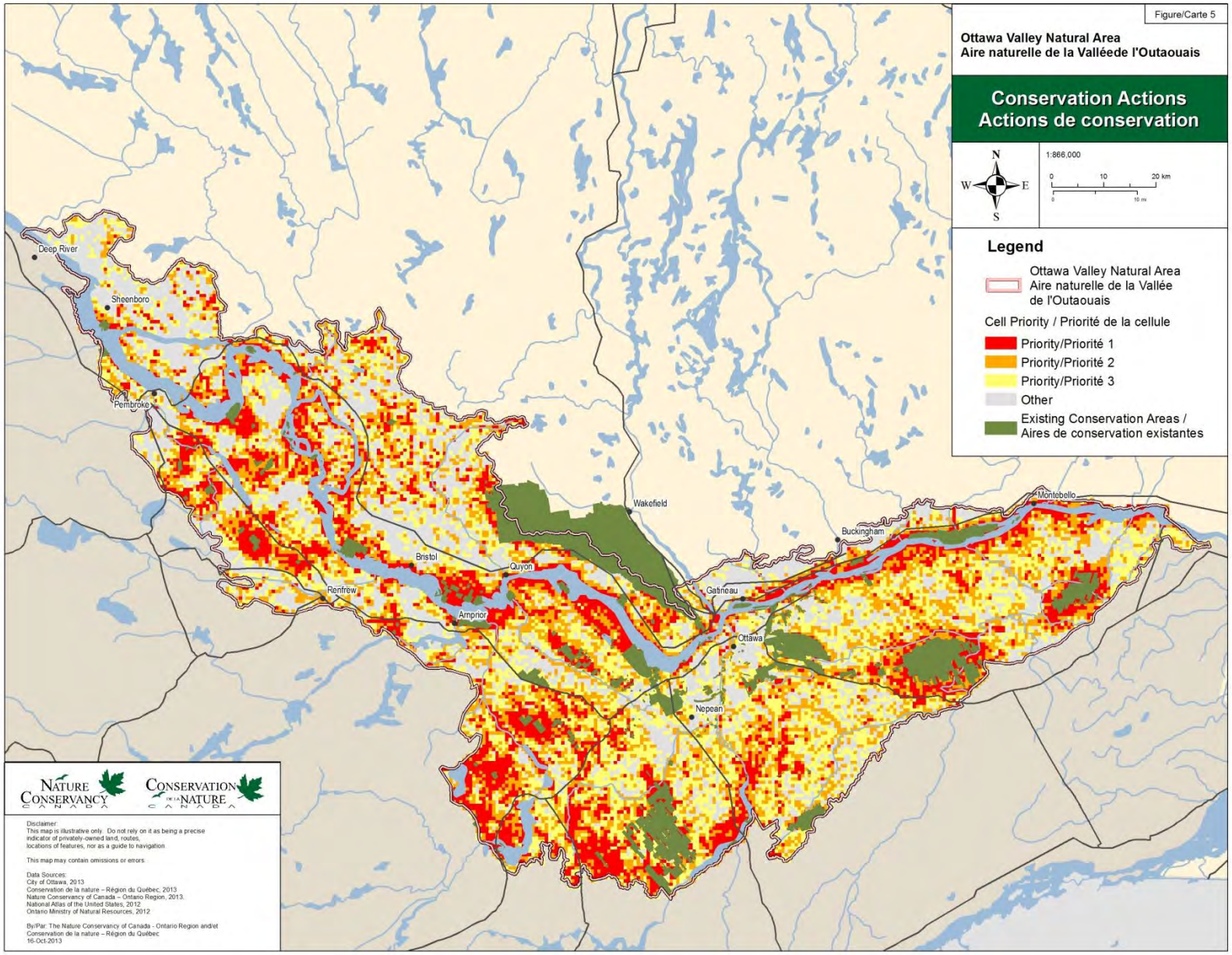
Conservation Actions	Importance/ Associated Goal(s) [1]	Biodiversity Target(s)[2]	Threat(s)	Measure(s) of Success (MOS)/Notes	Organizational Lead (including region)
3. Stewardship - Species Management 3.1 Species Management					
3.1.1 Annually collaborate with provincial conservation data centres (NHIC in Ontario, CDPNQ in Québec) and local partners to update historical species records in the NA, with over 50% of historical SAR records on the Conservancy or partner-protected lands resurveyed. Regularly exchange data on rare species, plant communities and natural areas with conservation data centres to maintain the currency of information for planning purposes.	NECESSARY 1, 2, 3	All	-	MOS–I: Identify and resurvey, in collaboration with the provincial conservation data centres, historical species at risk Element Occurrence (EO) records in the NA.	**Nature Conservancy of Canada – QC and ON, CDC-QC, NHIC – ON, expert partners**
3. Stewardship - Species Management 3.2 Species Recovery					
3.2.1 Participate in the recovery planning process for a minimum of two SAR and lead in the implementation of at least three priority recovery actions for these two species as outlined in the recovery plans in the NA by 2018, with a focus on sand dune, alvar, bog and fen, turtle, Western Chorus Frog, and grassland bird species.	NECESSARY 3	All	1.1.1 1.1.2 3.2.1 4.1.1 5.2.1 8.1.1 8.1.2 8.1.3	MOS-I: The Conservancy has participated in the recovery planning process for at least two relevant species at risk by 2018. The Conservancy has co-led a minimum of three priority recovery actions in the NA (as determined by Recovery Strategies) by 2018.	**Nature Conservancy of Canada – QC and ON**
4. Communications, Education and Awareness 4.3 Awareness and Communications					

Conservation Actions	Importance/ Associated Goal(s) [1]	Biodiversity Target(s)[2]	Threat(s)	Measure(s) of Success (MOS)/Notes	Organizational Lead (including region)
4.3.1 *Starting in 2014, the Conservancy will communicate at least twice annually to highlight conservation gains and stewardship issues to the community, donors and financial partners through private or public events, press releases or other media vehicles.*	NECESSARY 4, 5	All	All	MOS-I: The Conservancy has achieved, at least twice annually beginning in 2014, earned media hits in local and regional press, delivered presentations and/ or held public or targeted events that communicated conservation gains and stewardship issues to the community, donors and financial partners.	**Nature Conservancy of Canada – QC and ON**
4.3.2. *Continue to maintain and update private land database to track landowner contact on an ongoing basis.*	NECESSARY 5	All	All	MOS-I: The Conservancy has, on an ongoing basis, updated its internal landowner database to identify contacts for priority areas. This database has been shared with key partners to coordinate landowner contacts for conservation and stewardship efforts.	**Nature Conservancy of Canada – QC and ON**
4.3.3 Sponsor an annual meeting in the Ottawa Valley with partners to identify priorities, coordinate conservation actions and highlight conservation successes.	NECESSARY All	All	All	MOS-I: Strategic conservation in the Ottawa Valley is achieved through an annual meeting increasing communication, transparency and efficiency with conservation partners.	
5. Government Relations, Law and Policies 5.2 Policies & Regulations					

Conservation Actions	Importance/ Associated Goal(s) [1]	Biodiversity Target(s)[2]	Threat(s)	Measure(s) of Success (MOS)/Notes	Organizational Lead (including region)
5.2.1 By 2018, where appropriate, the Conservancy will inform local municipalities and other parties of the NACP priorities and implementation strategies for the NA.	NECESSARY All	All	All	MOS: Municipalities are informed of NACP and implementation strategies by the Conservancy by 2018. The Conservancy and partners participate in Official Plan (OP) reviews, and updated OPs are informed by biodiversity and conservation information including threats to integrity within the NA. Note: Timing on this action will depend on OP reviews (Ontario) or Development Review (Québec)	**Nature Conservancy of Canada – QC and ON**
7. Philanthropy, Marketing and Capacity Building 7.2 Alliance and Partnership Development					
7.2.1 By 2015 develop a strategic funding partnership with the City of Ottawa, the National Capital Commission, Ontario Ministry of Natural Resources, MRN, Ducks Unlimited, and other partners focused on long-term funding strategies for addressing landscape connectivity goals in the NA.	NECESSARY all	All	All	MOS-I: A strategic funding partnership was established by 2015 with various local partners that focussed on long-term funding strategies for addressing landscape connectivity goals in the NA.	**Nature Conservancy of Canada – QC and ON Partners**
7.2.2 Continually provide input, support, and mentoring in the creation of an Ottawa Valley Land Trust with the goal of seeing a new organization formed by 2018.	BENEFICIAL all	All	All	MOS-I: Through continual efforts aid in the input, promotion and mentoring in creating an Ottawa Valley Land Trust by 2018.	**Nature Conservancy of Canada – QC and ON Partners Volunteers**

Conservation Actions	Importance/ Associated Goal(s) [1]	Biodiversity Target(s)[2]	Threat(s)	Measure(s) of Success (MOS)/Notes	Organizational Lead (including region)
7.2.3 Engage local land stewards or stewardship committee for the Conservancy properties by 2018.	NECESSARY 3,5	All	All	MOS-I: Land steward engaged for each the Conservancy property by 2018. Stewards are aware of and guided by the PMPs.	**Nature Conservancy of Canada – QC and ON** **Expert Volunteers**
7. Philanthropy, Marketing and Capacity Building 7.3 Conservation Finance					
*7.3.1 Establish one bi-regional campaign to raise $**4,774,183** to implement all actions within the NACP by 2018.*	CRITICAL All	All	All	MOS-I: $**4,774,183** was raised through a bi-regional campaign and all actions in the NACP have been implemented.	**Nature Conservancy of Canada – QC and ON**

Target abbreviations: Forest Matrix (FM), Wetland Complexes (WC), Rivers and Riparian Habitats (RRH), Alvars, Limestone and Karst Ecosystems (ALKE), Dunes and Sand Barrens (DSB), and Grassland Birds (GB).


Figure/Carte 5
Ottawa Valley Natural Area
Aire naturelle de la Valléede l'Outaouais
Conservation Actions
Actions de conservation
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20 km
Legend
Ottawa Valley Natural Area
Aire naturelle de la Vallée de l'Outaouais
Cell Priority / Priorité de la cellule
Priority/Priorité 1
Priority/Priorité 2
Priority/Priorité 3
Other
Existing Conservation Areas / Aires de conservation existantes
Deep River
Sheenboro
Pembroke
Wakefield
Montebello
Buckingham
Bristol
Quyon
Renfrew
Gatineau
Arnprior
Ottawa
Nepean
Nature Conservancy Canada
Conservation de la nature Canada
Disclaimer:
This map is illustrative only. Do not rely on it as being a precise indicator of privately-owned land, routes, locations of features, nor as a guide to navigation.
This map may contain omissions or errors.
Data Sources:
City of Ottawa, 2013
Conservation de la nature – Région du Québec, 2013
Nature Conservancy of Canada – Ontario Region, 2013.
National Atlas of the United States, 2012
Ontario Ministry of Natural Resources, 2012
By/Par: The Nature Conservancy of Canada - Ontario Region and/et Conservation de la nature – Région du Québec
16-Oct-2013

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6. APPENDICES

APPENDIX ONE: List of Abbreviations

AC	Acres
ACOA	Aire de concentration des oiseaux aquatiques (Waterfowl concentration Area)
ALKE	Alvars, Limestone and Karst Ecosystems
ANSI	Area of Natural and Scientific Interest
APR	Annual Progress Report
ATV	All-terrain vehicle
BCR	Bird Conservation Region
CAP	Conservation Action Planning
CDC	Conservation Data Centres
CDPNQ	Centre de données sur le patrimoine naturel du Québec
CFIA	Canadian Food Inspection Agency
CLD	Centre local de développement
COSEWIC	Committee on the Status of Endangered Wildlife in Canada
CPAWS	Canadian Parks and Wilderness Society
CPTAQ	Commission de protection du territoire agricole du Québec
CREDDO	Conseil régional de l'environnement et du développement durable de l'Outaouais
CWF	Canadian Wildlife Federation
CWS	Canadian Wildlife Service
DSB	Dunes and Sand Barrens
EFE	Exceptional Forest Ecosystem
EO	Element Occurrence
EOMF	Eastern Ontario Model Forest
FM	Forest Matrix
GB	Grassland Birds
GIS	Geographic Information System
GPS	Global Positioning System
HA	Hectares
HR	Human Resources
IBA	Important Bird Area
ISS	Interim Stewardship Statement
IUCN	International Union for the Conservation of Nature
MDDEFP, MDDEP, MEF	Ministère du Développement durable, de l'Environnement, de la Faune et Parcs

MMLTC	Mississippi Madawaska Land Trust Conservancy
MOS	Measures of Success
MOS-E	Effectiveness Measure of Success
MOS-I	Implementation Measure of Success
MRC	Municipalité régionale de comté
MRN	Ministère des Ressources Naturelles
NA	Natural Area
NACP	Natural Area Conservation Plan
NABCI	North American Bird Conservation Initiative
NHIC	Natural Heritage Information Centre
OFNC	Ottawa Field-Naturalists' Club
OMNR	Ontario Ministry of Natural Resources
ON	Ontario
OP	Ontario Parks
ORV	Off-road vehicle
ORHDC	Ottawa River Heritage Designation Project
PMP	Property Management Plan
PSW	Provincially Significant Wetland
QC	Québec
RCM	Regional Municipal County
RRH	Rivers and Riparian Habitats
RVCA	Rideau Valley Conservation Authority
SAR	Species at Risk
SEF	Stewardship Endowment Fund
SIEF	Système d'information éco-forestière
SLLCV	St. Lawrence and lake Champlain Valley
SNC	South Nation Conservation
TBD	To be determined
The Conservancy	Nature Conservancy of Canada
TNC	The Nature Conservancy
UCPR	United Counties of Prescott & Russell
USA	United States of America
WC	Wetland Complexes
YBP	Years Before Present

APPENDIX TWO: Glossary of Biodiversity and Conservation Ranks

Committee on the Status of Endangered Wildlife in Canada (COSEWIC): is a national committee of experts that assesses and designates which wild species are in danger of disappearing from Canada. COSEWIC assigns the following status to species:

Extinct (EXT)	A species that no longer exists
Extirpated (EXP)	A species no longer existing in the wild in Canada, but occurring elsewhere in the wild
Endangered (END)	A species facing imminent extirpation or extinction throughout its range
Threatened (THR)	A species likely to become endangered if nothing is done to reverse the factors leading to its extirpation or extinction
Special Concern (SC)	A species of special concern because of characteristics that make it particularly sensitive to human activities or natural events, but does not include an extirpated, endangered or threatened species
Not At Risk (NAR)	A species that has been evaluated and found to be not at risk
Data Deficient (DD)	A species for which there is insufficient information to support a status designation

Species at Risk (SAR): species designated as Endangered, Threatened or Special Concern by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) or listed through provincial endangered species legislation.

Endangered Species Act, 2007: provincial legislation in Ontario that designates species as Extinct, Extirpated, Endangered, Threatened or Special Concern as determined by the Committee on the Status of Species at Risk in Ontario (COSSARO).

An Act Respecting Threatened or Vulnerable Species, 1989: provincial legislation in Québec that designates species as Threatened (Ménacée), Vulnerable (Vulnérable) or likely to be designated Threatened or Vulnerable (Susceptible).

Global Rank (G-RANK): the overall status of a species or ecological community is regarded as its "global" status; this range-wide assessment of condition is referred to as its global conservation status rank (NatureServe 2013). Global conservation status assessments are generally carried out by NatureServe scientists with input from relevant natural heritage member programs (e.g., Conservation Data Centres [CDCs] and Natural Heritage Information Centres [NHICs]) and experts on particular taxonomic groups, and are based on a combination of quantitative and qualitative information. The factors considered in assessing conservation status include the total number and condition of occurrences; population size; range extent and area of occupancy; short- and long-term trends in these previous factors; scope, severity, and immediacy of threats, number of protected and managed occurrences, intrinsic vulnerability and environmental specificity.

Global Ranks

Rank	Definition
GX	**Presumed Extinct** (species): Not located despite intensive searches and virtually no likelihood of rediscovery. **Eliminated** (ecological communities): Eliminated throughout its range, with no restoration potential due to extinction of dominant or characteristic species.
GH	**Possibly Extinct** (species): Missing; known from only historical occurrences but still some hope of

	rediscovery. **Presumed Eliminated**: Historic, ecological communities)-Presumed eliminated throughout its range, with no or virtually no likelihood that it will be rediscovered, but with the potential for restoration, for example, American Chestnut Forest.
G1	**Critically Imperilled**: At very high risk of extinction due to extreme rarity (often 5 or fewer populations), very steep declines, or other factors.
G2	**Imperilled**: At high risk of extinction due to very restricted range, very few populations (often 20 or fewer), steep declines, or other factors.
G3	**Vulnerable**: At moderate risk of extinction due to a restricted range, relatively few populations (often 80 or fewer), recent and widespread declines, or other factors.
G4	**Apparently Secure**: Uncommon but not rare; some cause for long-term concern due to declines or other factors.
G5	**Secure**: Common; widespread and abundant.

Variant Ranks

Rank	Definition
G#G#	**Range Rank**—A numeric range rank (e.g., G2G3) is used to indicate the range of uncertainty in the status of a species or community. A G2G3 rank would indicate that there is a roughly equal chance of G2 or G3 and other ranks are much less likely. Ranges cannot skip more than one rank (e.g., GU should be used rather than G1G4).
GU	**Unrankable**—-Currently unrankable due to lack of information or due to substantially conflicting information about status or trends. Whenever possible, the most likely rank is assigned and a question mark qualifier may be added (e.g., G2?) to express minor uncertainty, or a range rank (e.g., G2G3) may be used to delineate the limits (range) of uncertainty.
GNR	**Unranked**—Global rank not yet assessed.
GNA	**Not Applicable**—A conservation status rank is not applicable because the species is not a suitable target for conservation activities.

Rank Qualifiers

Rank	Definition
?	**Inexact Numeric Rank**—Denotes some uncertainty about the numeric rank (e.g., G3? - Believed most likely a G3, but some chance of either G2 or G4).
Q	**Questionable taxonomy**—Taxonomic distinctiveness of this entity at the current level is questionable; resolution of this uncertainty may result in change from a species to a subspecies or hybrid, or the inclusion of this taxon in another taxon, with the resulting taxon having a lower conservation priority.
C	**Captive or Cultivated Only**—At present extant only in captivity or cultivation, or as a reintroduced population not yet established.

Sub-national (Provincial) Rank (S-RANK): provincial ranks are used by natural heritage member programs to set conservation priorities for rare species and vegetation communities. These ranks are not legal designations. Provincial ranks are assigned in a manner similar to that described for global ranks, but consider only those factors within the political boundaries of a province. Comparison of global and provincial ranks, gives an indication of the status and rarity of an element in that province in relation to its overall conservation status, therefore providing insight into the urgency of conservation action for it in the province.

Subnational (S) Conservation Status Ranks

Status	Definition
SX	**Presumed Extirpated**—Species or community is believed to be extirpated from the province. Not located despite intensive searches of historical sites and other appropriate habitat, and virtually no likelihood that it will be rediscovered.
SH	**Possibly Extirpated** (Historical)—Species or community occurred historically in the province, and there is some possibility that it may be rediscovered. Its presence may not have been verified in the past 20-40 years. A species or community could become SH without such a 20-40 year delay if the only known occurrences in a nation or state/province were destroyed or if it had been extensively and unsuccessfully looked for. The SH rank is reserved for species or communities for which some effort has been made to relocate occurrences, rather than simply using this status for all elements not known from verified extant occurrences.
S1	**Critically Imperilled**—Critically imperilled in the province because of extreme rarity (often 5 or fewer occurrences) or because of some factor(s) such as very steep declines making it especially vulnerable to extirpation from the province.
S2	**Imperilled**—Imperilled in the province because of rarity due to very restricted range, very few populations (often 20 or fewer), steep declines, or other factors making it very vulnerable to extirpation from the nation or state/province.
S3	**Vulnerable**—Vulnerable in the province due to a restricted range, relatively few populations (often 80 or fewer), recent and widespread declines, or other factors making it vulnerable to extirpation.
S4	**Apparently Secure**—Uncommon but not rare; some cause for long-term concern due to declines or other factors.
S5	**Secure**—Common, widespread, and abundant in the province.
SNR	**Unranked**—Province conservation status not yet assessed.
SU	**Unrankable**—Currently unrankable due to lack of information or due to substantially conflicting information about status or trends.
SNA	**Not Applicable** —A conservation status rank is not applicable because the species is not a suitable target for conservation activities.
S#S#	**Range Rank** —A numeric range rank (e.g., S2S3) is used to indicate any range of uncertainty about the status of the species or community. Ranges cannot skip more than one rank (e.g., SU is used rather than S1S4).

APPENDIX THREE: List of Significant Species for the Ottawa Valley Natural Area

Appendix Three provides a list of all globally, nationally and provincially significant species that have been documented in the NA. The status of each species is indicated in **Table A3.A**, and the biodiversity target associated with each species is indicated in **Table A3.B**. These tables include several species that are not included in the Great Lakes Conservation Blueprint. Their status has been changed since the analysis of information for the blueprint report (which occurred in 2003), and they are now either listed by COSEWIC and/or tracked by the CDC or NHIC due to a change in their subnational or global ranks. This list includes 28 globally rare species (i.e., ranked G1-G3 by NatureServe), 64 species listed as at-risk by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC), 56 listed as at-risk provincially in Ontario and 138 listed as at-risk provincially in Québec. Six species were not captured as part of the biodiversity targets indentified for this plan –A Lichen (*Vazdaea leprosa*), Calcareous Ragged Moss (*Brachythecium calcareum*), Oval-leaf Sedge (*Carex cephalophora*), Horsemint (*Monarda punctata*) and Round Hornwort (*Notothylas orbicularis*). Habitats for these species are primarily grasslands.

Element Occurrence Viability Ranks are only noted in the Conservation Blueprint target column if their ranks were historic (H), extirpated (X) and searched but not found (F).

Species listed by habitat, as captured by biodiversity targets. It should be noted that these groupings include the identified nested targets (e.g., Forest Matrix target also includes the barren rock outcroppings. Wetland Complexes also includes lakes and streams).

NOTE: These data were current as of March 2013.

TABLE A3.A: Conservation Species Known Within the Natural Area and Their Status

Scientific Name	French Name	English Name	COSEWIC Status	QC status	ON status	G rank	S rank (QC)	S rank (ON)
FUNGI OR LICHENS								
Bacidia trachona	-	A Lichen				G5	SNR	S1S2
Lecidea plebeja	-	A Lichen				G3G5	SNR	S1S2
Leptogium rivulare	-	Flooded Jellyskin	THR		THR	G3G5	-	S3
Physconia subpallida	Physconie pâle	Pale-bellied Frost Lichen	END		END	GNR	-	S2
Steinia geophana	-	A Lichen				GNR	SNR	S1
Thyrea confusa	-	Jelly Strap Lichen				G3G5	SNR	SNA
Vezdaea leprosa	-	A Lichen				GNR	SNR	S1?
NON-VASCULAR PLANTS								
Amphidium mougeotii	-	Mougeot's Yoke Moss				G5	S1	S1
Brachythecium calcareum	-	Calcareous Ragged Moss				G3G4	S3	S2
Fontinalis sullivantii	-	A Moss				G3G5	-	S1
Forsstroemia trichomitria	-	Forsstroemia Moss		Susceptible		G5	S1	SH
Lycopodium x habereri	Lycopode de haberer	Haberer's Clubmoss				GNA	-	S2
Lycopodium x zeilleri	Lycopode de zeiller	Zeiller's Ground-Cedar				GNA	-	S2
Plagiothecium latebricola	-	Lurking Leskea				G3G4	S2	S2
Riccia sullivantii	Riccie de sullivant	Sullivant's Crystalwort		Susceptible		G4Q	S1	S1
VASCULAR PLANTS								
Adlumia fungosa	Adlumie fongueuse	Climbing Fumitory		Susceptible		G4	S2	S4
Allium canadense var. canadense	L'ail du Canada	Meadow Garlic		Susceptible		G5T5	S2	S5
Allium tricoccum	Ail des bois	Small Wild Leek		Vulnérable		G5	S3	S4
Amelanchier sanguinea	Amélanchier gracieux	Roundleaf Shadbush		Susceptible		G4?	S2	S2S3
Aplectrum hyemale	Aplectrelle d'hiver	Puttyroot				G5	S1	S2
Arethusa bulbosa	Aréthuse bulbeuse	Swamp-pink				G4	S3	S4
Armoracia lacustris	-	Lake-cress				G4?	S1	S3?
Asclepias tuberosa var. interior	Asclépiade tubéreuse variété de l'intérieur	Butterflyweed		Menacée		G5?T5? (T5)	S1	SNR
Asplenium platyneuron	Doradille ébène	Ebony Spleenwort		Susceptible		G5	S2	S4
Asplenium rhizophyllum	Doradille ambulante	Walking-fern Spleenwort		Susceptible		G5	S3	S4
Asplenium ruta-muraria	Doradille des murailles	Wallrue Spleenwort		Menacée		G5	S1	S2
Astragalus australis	Astragale austral	Indian Milkvetch		Susceptible		G5	S2	S1
Astragalus neglectus	Astragale négligé	Cooper's Milk-vetch				G4	-	S3
Azolla caroliniana	Azole de Caroline	Eastern Mosquito Fern				G5	-	S1?

Scientific Name	French Name	English Name	COSEWIC Status	QC status	ON status	G rank	S rank (QC)	S rank (ON)
Betula x sandbergii - Britt	-	Sandberg's Birch				GNA	-	S3?
Boechera canadensis	Arabette du Canada	Sicklepod		Susceptible		G5	S1	S4
Boechera retrofracta	Arabette à fruits réfléchis	Holboell's Rockcress		Susceptible		G5	S2S3	S4?
Botrychium lanceolatum	Botryche lancéolé	Triangle Grapefern				G5	-	S3?
Botrychium lineare	Botryche linéaire	Narrowleaf Grapefern		Susceptible		G2?	S1	
Botrychium oneidense	Botryche d'Oneida, Botryche du lac Oneida	Blunt-lobe Grapefern				G4	S1	S3?
Botrychium rugulosum	Botryche à limbe rugueux	Rugulose Grapefern		Susceptible		G3	S2	S2
Bromus kalmii	Brome de Kalm	Wild Chess		Susceptible		G5	S2S3	S4
Cardamine bulbosa	Cardamine bulbeuse	Bulbous Bitter-cress		Susceptible		G5	S2S3	S4
Cardamine maxima	-	Large Toothwort				G5	S3	S3
Carex annectens	Carex à gaine tronquée	Yellow-fruit Sedge		Susceptible		G5	S1	S2
Carex appalachica	Carex des Appalaches	Appalachian Sedge		Susceptible		G4	S2S3	S2S3
Carex argyrantha	Carex argenté	Hay Sedge		Susceptible		G5	S2	S2?
Carex atlantica ssp. capillacea	Carex à feuilles capillaires	Prickly Bog Sedge				G5T5	S1	S1
Carex cephalophora	Carex porte-tête	Oval-leaf Sedge		Susceptible		G5	S2S3	S5
Carex folliculata	Carex folliculé	Northern Long Sedge		Susceptible		G4G5	S3	S3
Carex molesta	Carex dérangeant	Troublesome Sedge		Susceptible		G4	S1	S4?
Carex muehlenbergii var. muehlenbergii	Carex de Mühlenberg	Muhlenberg's Sedge		Susceptible		G5T5	S2	S4S5
Carex oligocarpa	Carex à fruits clairsemé	Eastern Few-fruit Sedge		Susceptible		G4	S1	S3
Carex sartwellii	Carex de Sartwell	Sartwell's Sedge		Susceptible		G4G5	S2	S4
Carex siccata	Carex sec	Dry Spike Sedge		Susceptible		G5	S2	S5
Carex sparganioides	Carex faux-rubanier	Bur-reed Sedge		Susceptible		G5	S3	S5
Carex sychnocephala	Carex compact	Many-headed Sedge		Susceptible		G4	S1	S4
Carex typhina	Carex massette	Cattail Sedge		Susceptible		G5	S3	S2
Carya ovata var. ovate	Caryer ovale	Shagbark Hickory		Susceptible		G5T5	S3	S5
Castanea dentata	Châtaignier d'Amérique	American Chestnut	END		END	G4		S2
Ceanothus americanus	Céanothe d'Amérique	New Jersey Tea		Susceptible		G5	S2	S4
Ceanothus herbaceus	Céanothe à feuilles eroites	Prairie Redroot		Susceptible		G5	S2	S4
Celtis occidentalis	-	Common Hackberry		Susceptible		G5	S3	S4
Cerastium brachypodum	-	Short-stalked Chickweed				G5	-	S2
Cerastium nutans var. nutans	Céraiste penché	Nodding Chickweed		Susceptible		G5	S2	S4
Ceratophyllum echinatum	Cornifle échinée	Prickly Hornwort				G4?	S3	S3?
Chenopodium foggii	Chénopode de Fogg	Fogg’s Goosefoot		Susceptible		G2G3	S2	S2
Cirsium discolor	-	Field Thistle				G5	S3S4	S3
Claytonia virginica	Claytonie de Virginie	Narrowleaf Springbeauty		Susceptible		G5	S2	S5

Scientific Name	French Name	English Name	COSEWIC Status	QC status	ON status	G rank	S rank (QC)	S rank (ON)
Corydalis aurea ssp. aurea	Corydale dorée	Golden Corydalis		Susceptible		G5T5	S2	S5
Crataegus apiomorpha	-	Fort Sheridan Hawthorn				G3G4Q	-	S1S2
Cyperus dentatus	Souchet denté	Toothed Flatsedge				G4	S2S3	S1
Cyperus houghtonii	Souchet de Houghton	Houghton's Flatsedge				G4?	S3	S3
Cyperus lupulinus ssp. macilentus	Souchet grêle	Great Plains Flatsedge		Susceptible		G5T5?	S2S3	S4
Cyperus odoratus	Souchet odorant	Rusty Flatsedge		Susceptible		G5	S2S3	S5
Cypripedium arietinum	Cypripède tête-de-bélier	Ram's Head Lady's-Slipper		Vulnérable		G3	S3	S3
Cypripedium reginae	Cypripède royal	Showy Lady's-slipper		Susceptible		G4	S3	S4
Desmodium nudiflorum	Desmodie nudiflore	Naked-flower Tick-trefoil		Susceptible		G5	S2S3	S4
Draba nemorosa	Drave des bois	Wood Whitlow-Grass		Susceptible		G5	S1	S4?
Dryopteris clintoniana	Dryoptère de Clinton	Clinton's Woodfern				G5	S3	S4
Dryopteris x michelii	Dryoptère de Mickel	Mickel's Wood Fern				GNA	-	S1?
Echinochloa walteri	-	Walter's Barnyard Grass				G5	SH	S3
Elaeagnus commutata	Chalef argenté	American Silverberry		Susceptible		G5	S2S3	S5
Elatine americana	Élatine d'Amérique	American Waterwort				G4	SNR	S3
Elliptio dilatata	Elliptio pointu	Spike		Susceptible		G5	S2S3	S5
Elodea nuttallii	-	Nuttall's Waterweed				G5	S3	S3
Elymus riparius	Élyme des rivages	River Wild Rye				G5	S2S3	S4?
Eriophorum x porsildii	-	Porsild's Cottongrass				GNA	-	S1?
Fimbristylis autumnalis	Fimbristyle d'automne	Slender Fimbry		Susceptible		G5	S2S3	S4
Galearis spectabilis	Galéaris remarquable	Showy Orchid		Susceptible		G5	S3	S4
Galium circaezans	Gaillet fausse-circée	Wild Licorice		Susceptible		G5	S2S3	S5
Gentianopsis crinita	Gentianopsis frangé	Fringed Gentian		Susceptible		G5	S2	S5
Geranium carolinianum	Géranium de Caroline	Carolina Crane's-bill		Susceptible		G5	S1	S4
Goodyera pubescens	Goodyérie pubescente	Downy Rattlesnake-plantain		Susceptible		G5	S2	S4
Gratiola aurea	Gratiole dorée	Golden Hedge-hyssop		Susceptible		G5	S2S3	S4?
Grimmia pilifera	Grimmie porte-poil	Grimmia Dry Rock Moss		Susceptible		G4G5	S1	S2
Gymnocarpium robertianum	Gymnocarpe de Robert	Limestone Oak Fern				G5	S3	S2
Hedeoma hispida	Hédéoma rude	Rough False Pennyroyal		Susceptible		G5	S2	S4
Helianthemum canadense	Hélianthème du Canada	Canada Frostweed		Susceptible		G5	S1	S3
Helianthus divaricatus	Hélianthe à feuilles étalées	Woodland Sunflower		Vulnérable		G5	S3	S5
Hieracium kalmia var. fasciculatum	-	Kalm's Hawkweed				G5T3T5	-	SU
Hierochloe odorata	-	Vanilla Grass				G4G5	-	S2S3
Hudsonia tomentosa	Hudsonie tumenteuse	Woolly Beachheather		Susceptible		G5	S3	S3
Hypericum kalmianum	Millepertuis de Kalm	Kalm's St. John's-wort		Susceptible		G4	S2	S4

Scientific Name	French Name	English Name	COSEWIC Status	QC status	ON status	G rank	S rank (QC)	S rank (ON)
Isoetes riparia	Isoète des rivages	Riverbank Quillwort				G5	S3?	S3
Juglans cinerea	Noyer cendré	Butternut	END	Susceptible	END	G4	S3	S3?
Juncus greenei	Jonc de Greene	Greene's Rush		Susceptible		G5	S2	S3
Juncus longistylis	Jonc longistyle	Long-styled Rush				G5	S1	S3
Juncus subtilis	-	Creeping Rush				G4	S4	S3
Juncus vaseyi	-	Vasey's Rush				G5?	S3	S3
Juniperus virginiana var. virginiana	Génévrier de Virginie	Eastern Red Cedar		Susceptible		G5T5	S3	S5
Lactuca hirsuta	Laitie hirsute	Hairy Lettuce		Susceptible		G5?	S2	S4?
Lathyrus ochroleucus	Gesse jaunâtre	Pale Vetchling		Susceptible		G5	S3	S4
Leucophysalis grandiflora		Large-Flowered Ground-Cherry				G4?	S2?	S3
Listera australis	Listère australe	Southern Twayblade				G4	S2	S1
Lithospermum caroliniense	-	Golden Puccoon				G4G5		S3
Littorella uniflora	-	American Shore-grass				G5	S3	S3
Lycopus americanus var. laurentianus	Lycope du Saint-Laurent	St. Lawrence Water-horehound		Susceptible		G5T3	S3	-
Lysimachia hybrida	-	Lanceleaf Loosestrife				G5	S2	S1
Lysimachia quadrifolia	Lysimaque à quatre feuilles	Whorled Yellow Loosestrife		Susceptible		G5	S2	S4
Lythrum alatum	-	Winged-loosestrife				G5		S3
Minuartia michauxii	Minuartie de Michaux	Michaux's Stitchwort		Susceptible		G5	S2	S5
Monarda punctata var. villicaulis	Monarde ponctuée	Horsemint		Menacée		G5T5?	S1	S1
Muhlenbergia sylvatica	Muhlenbergie des bois	Woodland Muhly				G5	S2	S2
Notothylas orbicularis	Anthocérote orbiculaire	Round Hornwort		Susceptible		G5	S1	S1S2
Nuphar lutea ssp. pumila	-	Yellow Cow-lily				G5T4T5	S4	S3
Nuphar lutea ssp. rubrodisca	-	Yellow Pond-lily				G5T3T5	S4S3	S3?
Oenothera pilosella ssp. pilosella	Onagre piloselle	Meadow Evening-primrose		Susceptible		G5T5?	S1	S2
Oligoneuron album	Verge d'or faux-ptarmica	Prairie Goldenrod		Susceptible		G5	S3	S5
Panax quinquefolius	Ginseng à cinq folioles	American Ginseng	END	Menacée	END	G3G4	S2	S2
Panicum flexile	Panic flexible	Wiry Witch Grass		Susceptible		G5	S2	S4
Panicum philadelphicum	Panic de Philadelphie	Philadelphia Panicgrass		Susceptible		G5	S3	S4
Pellaea atropurpurea	Pelléade à stipe sourpre	Purple-stemmed Cliff-brake				G5	S2	S3
Pellaea glabella ssp. glabella	Pelléade glabre	Smooth Cliffbrake		Susceptible		G5T5	S1	S4
Persicaria hydropiperoides	Persicaire faux-poivre-d'eau	Mild Water-pepper				G5	S3	S5
Persicaria robustior	Persicaire robuste	Stout Smartweed		Susceptible		G4G5	S1	S2
Pinus rigida	Pin rigide	Pitch Pine				G5	S2	S2?
Platanthera flava var. herbiola	Platanthère petite-herbe	Pale-green Orchid		Susceptible		G4?T4Q	S2S3	S3

Scientific Name	French Name	English Name	COSEWIC Status	QC status	ON status	G rank	S rank (QC)	S rank (ON)
Platanthera grandiflora	Platanthère grandiflore	Large Purple Fringe-orchis				G5	S3?	S1
Platanthera leucophaea	Platanthère blanchâtre de l'Est	Eastern Prairie Fringed-orchid	END		END	G2G3	-	S2
Podostemum ceratophyllum	Podostémon à feuilles cornées	Threadfoot				G5	S2	S2
Polygala polygama	Polygale polygame	Racemed Milkwort		Susceptible		G5	S2	S4
Polygala senega	Polygale sénéca	Seneca Snakeroot		Susceptible		G4G5	S2S3	S4
Polygala sanguinea	-	Field Milkwort				G5	S4S5	S3
Polygonella articulata	Polygonelle articulée	Eastern Jointweed		Susceptible		G5	S3	S4
Polygonum arifolium	Renouée à feuilles d'arum	Halberd-leaved Tearthumb				G5	S3	S3
Polygonum douglasii	Renouée de Douglas	Douglas' Knotweed		Vulnérable		G5	S3	S4
Polypodium appalachianum	Polypode des Appalaches	Appalachian Rockcap Fern				G4G5	-	S1
Polystichum scopulinum	Polystic des rochers	Mountain Holly Fern	THR			G4	S1	
Proserpinaca palustris	Proserpinie des marais	Marsh Mermaidweed		Susceptible		G5	S2	S4
Prunus susquehanae	Cerisier de la Susquehanna	Susquehana Cherry		Susceptible		G5T4	S2S3	S4?
Pterospora andromedea	Ptérospore à fleurs d'andromède	Giant Pine Drops		Menacée		G5	S2	S2
Pycnanthemum virginianum	Pycnanthème de Virginie	Virginia Mountainmint		Susceptible		G5	S2S3	S4
Quercus alba	Chêne blanc	White Oak		Susceptible		G5	S3	S5
Quercus bicolor	Chêne bicolore	Swamp White Oak		Susceptible		G5	S3	S4
Ranunculus flabellaris	Renoncule à flagelles	Yellow Water-Crowfoot		Susceptible		G5	S3	S4?
Rhododendron canadense	Rhododendron du Canada	Rhodora				G5	S4S5	S1
Rhus aromatica var. aromatica	Sumac aromatique	Fragrant Sumac		Vulnérable		G5T5	S3	SNR
Rubus flagellaris	Ronce à flagelles	Northern Dewberry		Susceptible		G5	S2S3	S4
Rumex altissimus	Patience élevée	Tall Dock				G5	-	S2?
Sagittaria cristata	Sagittaire à crête	Crested Arrowhead				G4?	-	S3
Saururus cernuus	-	Lizard's-tail				G5	S2	S3
Schoenoplectus heterochaetus	-	Slender Bulrush				G5	S2	S3
Scirpus pendulus	Scirpe pendant	Pendulous Bulrush				G5	S3	S5
Selaginella eclipes	Sélaginelle apode	Hidden Spikemoss		Susceptible		G4	S2	S4
Sisyrinchium angustifolium	Bermudienne à feuilles étroites	Pointed Blue-eyed-grass		Susceptible		G5	S2	S4
Solidago puberula	-	Downy Goldenrod				G5	S4S5	S2
Sparganium androcladum	Rubanier branchu	Branching Bur-reed		Susceptible		G4G5	S2	SH
Spiranthes casei var. casei	Spiranthe de Case	Case's Ladies'-tresses		Susceptible		G4T4	S1	S4
Spiranthes lucida	Spiranthe lustrée	Shining Ladies'-tresses		Susceptible		G5	S2S3	S4
Sporobolus compositus var. compositus	Sporobole rude	Tall Dropseed		Susceptible		G5T5	S1	S4
Sporobolus cryptandrus	Sporobole à fleurs cachées	Sand Dropseed		Susceptible		G5	S2S3	S4

Scientific Name	French Name	English Name	COSEWIC Status	QC status	ON status	G rank	S rank (QC)	S rank (ON)
Sporobolus heterolepis	Sporobole à glumes inégales	Northern Dropseed		Susceptible		G5	S2	S3
Sporobolus vaginiflorus var. vaginiflorus	Sporobole engainé	Poverty Dropseed		Susceptible		G5T5	S1S2	S5
Staphylea trifolia	Staphylier à trois folioles	American Bladdernut		Susceptible		G5	S3	S4
Thelypteris simulata	Thélyptère simulatrice	Bog Fern				G4G5	S1	S1
Torreyochloa pallida var. pallida	Glycérie pâle	Pale False Mannagrass		Susceptible		G5T5?	S1	S2
Toxicodendron vernix	Sumac à vernis	Poison-Sumac		Susceptible		G5	S2	S4
Triadenum virginicum	Millepertuis de Virginie	Marsh St. John's-wort		Susceptible		G5	S1	S4
Trichostema brachiatum	Trichostème à sépales égaux	False Pennyroyal		Susceptible		G5	S2	S4
Ulmus thomasii	Orme liège	Rock Elm		Menacée		G5	S2	S4?
Utricularia geminiscapa	Utriculaire à scapes géminés	Hidden-fruit Bladderwort		Susceptible		G4G5	S3	S3?
Utricularia gibba	Utriculaire à bosse	Humped Bladderwort		Susceptible		G5	S3	S4
Valeriana uliginosa	Valériane des tourbières	Marsh Valerian				G4Q	S3	S2
Veronica anagallis-aquatica	Véronique mouron-d'eau	Brook-pimpernel		Susceptible		G5	S2	SNA
Vicia americana	Vesce d'Amérique	American Purple Vetch		Susceptible		G5	S2S3	S5
Viola affinis	Violette affine	Le Conte's Violet		Susceptible		G5	S2	S4?
Viola sagittata var. ovata	Violette à feuilles frangées	Arrowleaf Violet		Susceptible		G5T5	S1	S4
Woodsia obtusa ssp. obtusa	Woodsie à lobes arrondis	Blunt-lobe Cliff Fern	THR	Menacée		G5T5	S2	S1
Woodsia oregana ssp. cathcartiana	Woodsie de Cathcart	Oregon Woodsia (Tetraploid)		Susceptible		G5T5	S2	S4
Zizania aquatica var. aquatica	Zizanie à fleurs blanches variété à fleurs blanches	Indian Wild rice		Susceptible		G5T5	S3	S3
MAMMALS								
Canis lupus lycaon	Loup de l'Est	Eastern Wolf	SC		SC	G4G5TNR	SNR	S4
Glaucomys volans	Petit polatouche	Southern Flying Squirrel	NAR	Susceptible		G5	S3	S4
Lasionycteris noctivagans	Chauve-souris argentée	Silver-haired Bat		Susceptible		G5	S3	S4
Lasiurus borealis	Chauve-souris rousse	Eastern Red Bat		Susceptible		G5	S3	S4
Lasiurus cinereus	Chauve-souris cendrée	Hoary Bat		Susceptible		G5	S3	S4
Myotis lucifugus	Petite chauve-souris brune, Vespertilion brun	Little Brown Myotis	END		END	G5	S1	S4
Myotis septentrionalis	Chauve-souris nordique, Vespertilion nordique	Northern Myotis	END		END	G1G3	S1	S3
Perimyotis subflavus	Pipistrelle de l'Est	Tricolored Bat	END	Susceptible		G5	S1	S3?
Puma concolor	Cougar de l'Est	Eastern Cougar			END	G5THQ		SH
Urocyon cinereoargenteus	Renard gris	Grey Fox	THR		THR	G5		S1
FISHES								
Acipenser fulvescens pop. 3	Esturgeon jaune	Lake Sturgeon (Great Lakes	THR	Susceptible	THR	G3G4TNR	SNR	S2

Scientific Name	French Name	English Name	COSEWIC Status	QC status	ON status	G rank	S rank (QC)	S rank (ON)
		- Upper St. Lawrence River population)						
Anguilla rostrata	Anguille d'Amérique	American Eel	THR		END	G4	S3	S1?
Hybognathus hankinsoni	Méné laiton	Brassy Minnow		Susceptible		G5	S3S4	S5
Ichthyomyzon fossor	Lamproie du nord	Northern Brook Lamprey	SC	Menacée	SC	G4	S2S3	S3
Ichthyomyzon unicuspis	Lamproie argentée	Silver Lamprey	SC		SC	G5	S3S4	S3
Moxostoma carinatum	Chevalier de rivière	River Redhorse	SC	Vulnérable		G4	S2S3	S2
Moxostoma valenciennesi	Chevalier jaune	Greater Redhorse				G4	S3S4	S3
Notropis bifrenatus	Méné d'herbe	Bridle Shiner	SC		SC	G3	S3	S2
Noturus insignis	Chat-fou liséré	Margined Madtom	DD	Susceptible	END	G5	S1	SU
Percina copelandi	Fouille-roche gris	Channel Darter	THR	Vulnérable	THR	G4	S2S3	S2
AMPHIBIANS								
Hemidactylium scutatum	Salamandre à quatre orteils	Four-toed Salamander	NAR	Susceptible		G5	S2	S4
Lithobates palustris	Grenouille des marais	Pickerel Frog	NAR	Susceptible		G5	S3S4	S4
Pseudacris triseriata	Rainette faux-grillon de l'ouest	Western Chorus Frog	THR	Vulnérable		G5TNR		S4
REPTILES								
Diadophis punctatus	Couleuvre à collier	Ring-necked Snake		Susceptible		G5	S3S4	S4
Lampropeltis triangulum	Couleuvre tachetée	Milksnake	SC	Susceptible	SC	G5	S3	S3
Nerodia sipedon	Couleuvre d'eau	Northern Watersnake	NAR	Susceptible		G5	S3	S5
Opheodrys vernalis	Couleuvre verte	Smooth Greensnake		Susceptible		G5	S3S4	S4
Pantherophis spiloides pop. 1	Couleuvre obscure	Gray Ratsnake (Frontenac Axis population)	THR		THR	G5T3	-	S3
Thamnophis sauritus pop.2	Couleuvre mince	Eastern Ribbonsnake - Great Lakes Population	SC	Susceptible	SC	G5TNR	-	S3
Diadophis punctatus	Couleuvre à collier	Ring-necked Snake		Susceptible		G5	S3S4	S4
TURTLES								
Apalone spinifera	Tortue-molle à épines	Spiny Softshell	THR	Menacée	THR	G5	S1	S3
Chelydra serpentina	Tortue serpentine	Snapping Turtle	SC		SC	G5	S4	S3
Clemmys guttata	Tortue ponctuée	Spotted Turtle	END		END	G5	S1	S3
Emydoidea blandingii	Tortue mouchetée	Blanding's Turtle	THR	Menacée	THR	G4	S1	S3
Glyptemys insculpta	Tortue des bois	Wood Turtle	THR		END	G3	S2	S2
Sternotherus odoratus	Tortue musquée	Common Musk Turtle	SC	Menacée	THR	G5	S1	S3
BIRDS								
Ammodramus henslowii	Bruant de Henslow	Henslow's Sparrow	END		END	G4	S1	SHB
Ammodramus savannarum	Bruant sauterelle	Grasshopper Sparrow		Susceptible		G5	S2	S4B
Asio flammeus	Hibou des marais	Short-eared Owl	SC		SC	G5	S3S4	S2N,S4B
Antrostomus vociferus	Engoulevent bois-pourri	Eastern Whip-poor-will	THR		THR	G5	S3	S4B

Scientific Name	French Name	English Name	COSEWIC Status	QC status	ON status	G rank	S rank (QC)	S rank (ON)
Aquila chrysaetos	Aigle royal	Golden Eagle	NAR		END	G5	S2s3	S2B
Calidris canutus rufa	Bécasseau maubèche	Red Knot	END		END	G4T2	S1M	S1N
Chaetura pelagica	Martinet ramoneur	Chimney Swift	THR		THR	G5	S2S3	S4B,S4N
Chlidonias niger	Guifette noire	Black Tern	NAR		SC	G4	S3	S3B
Chordeiles minor	Engoulevent d'Amérique	Common Nighthawk	THR		SC	G5	S3	S4B
Cistothorus platensis	Troglodyte à bec court	Sedge Wren		Susceptible		G5	S2B	S4B
Contopus borealis	Moucherolle à côtés olive	Olive-sided Flycatcher	THR	Susceptible	SC	G4	S3	S4B
Contopus virens	Pioui de l'Est	Eastern Wood-Pewee	SC			G5	?	S4B
Coturnicops noveboracensis	Râle jaune	Yellow Rail	SC		SC	G4	S2S3B	S4B
Dolichonyx oryzivorus	Goglu des prés	Bobolink	THR		THR	G5	S3	S4B
Euphagus carolinus	Quiscale rouilleux	Rusty Blackbird	SC		NAR	G4	S3S4	S4B
Falco peregrinus anatum	Faucon pèlerin anatum	American Peregrine Falcon	SC	Vulnérable		G4T4	S3	S3B
Haliaeetus leucocephalus	Pygargue à tête blanche	Bald Eagle	NAR	Vulnérable	SC	G5	S3S4	S2N,S4B
Hirundo rustica	Hirondelle rustique	Barn Swallow	THR		THR	G5	S4?	S4B
Hylocichla mustelina	Grive des bois	Wood Thrush	THR			G5	S3S4	S4B
Ixobrychus exilis	Petit blongios	Least Bittern	THR	Vulnérable	THR	G5	S2S3	S4B
Lanius ludovicianus	Pie-grièche migratrice	Loggerhead Shrike	THR		END	G4	S1B	S2B
Melanerpes erythrocephalus	Pic à tête rouge	Red-headed Woodpecker	THR	Menacée	SC	G5	S1B	S4B
Parkesia motacilla	Paruline hochequeue	Louisiana Waterthrush	SC		SC	G5	S1B	S3B
Setophaga cerulea	Paruline azurée	Cerulean Warbler	END	Menacée	SC	G4	S1B	S3B
Setophaga kirtlandii	Paruline de Kirtland	Kirtland's Warbler	END		END	G1	S1B	S1B
Setophaga palmarum hypochrysea	-	Yellow Palm Warbler	END			G5TU	-	S1B
Sturnella magna	Sturnelle des prés	Eastern Meadowlark	THR		THR	G5	S3B	S4B
Tyto alba	effraie des clochers	Barn Owl	END		END	G5	S1B	S1
Vermivora chrysoptera	Paruline à ailes dorées	Golden-winged Warbler	THR	Susceptible	SC	G4	S2	S4B
Wilsonia canadensis	Paruline du Canada	Canada Warbler	THR	Susceptible	SC	G5	S3S4	S4B
INVERTEBRATES								
Aeshna clepsydra	Aeschne clepsydre	Mottled Darner				G4	S3	S3
Aeshna verticalis	Aeschne verticale	Green-striped Darner				G5	S3	S3
Arigomphus cornutus	Gomphe cornu	Horned Clubtail				G4	S3	S3
Arigomphus furcifer	Gomphe fourchu	Lilypad Clubtail				G5	S3	S3
Bombus affinis	-	Rusty-patched Bumble Bee	END		END	G1G2	SNR	S1
Callophrys lanoraieensis	Lutin des tourbières	Bog Elfin				G3G4	S3S4	S1
Catinella aprica		Diurnal Ambersnail				G2	-	S2
Cicindela patruela	Cicindèle verte à lunules	Northern Barrens Tiger Beetle	END			G3	SH	S1

Scientific Name	French Name	English Name	COSEWIC Status	QC status	ON status	G rank	S rank (QC)	S rank (ON)
Cordulegaster obliqua	Cordulégastre oblique	Arrowhead Spiketail				G4	S3	S2
Danaus plexippus	Monarque	Monarch	SC		SC	G5	S5B	S2N, S4B
Enallagma aspersum	Agrion saupoudré	Azure Bluet				G5	S3	S3
Erynnis martialis	Hespérie tachetée	Mottled Duskywing				G3	SH	S2
Gomphaeschna furcillata	Aeschne pygmée	Harlequin Darner				G5	S2S3	S3
Gomphus quadricolor	Gomphe des rapides	Rapids Clubtail				G3G4	-	S1
Gomphus vastus	Gomphe-cobra	Cobra Clubtail				G5	S4	S1
Gomphus ventricosus	Gomphe ventru	Skillet Clubtail				G3	SH	SH
Hemileuca sp. 1	-	Bogbean Buckmoth				G1Q	-	S1
Leptodea fragilis	Leptodée fragile	Fragile Papershell		Susceptible		G5	S2	S4
Leucorrhinia patricia	Leucorrhine nordique	Canada Whiteface				G4	S4	S2S3
Obovaria olivaria	Obovarie olivâtre	Hickorynut	END	Susceptible	END	G4?	S2	S1?
Ophiogomphus anomalus	Ophiogomphe bariolé	Extra-striped Snaketail				G4	S2S3	S3
Pieris virginiensis	Piéride de Virginie	West Virginia White			SC	G3?	S3	S3
Potamilus alatus	Potamile ailé	Pink Heelsplitter		Susceptible		G5	S1	S3
Somatochlora forcipata	Cordulie fourchue	Forcipate Emerald				G5	S5	S3
Stylurus notatus	Gomphe marqué	Elusive Clubtail				G3	S3S4	S2
Stylurus spiniceps	Gomphe fléché	Arrow Clubtail				G5	S4	S2
Vertigo elatior	-	Tapered Vertigo				G5	SNR	S2S3
Williamsonia fletcheri	Cordulie bistrée	Ebony Boghaunter				G4	S2S3	S2
Vertigo paradoxa	-	Mystery Vertigo				G4G5Q	SNR	S2S3
Appalachina sayana	-	Spike-lip Crater				G5	SNR	S3

TABLE A3.B: Conservation Species Known Within the Natural Area and Associated Biodiversity Target(s)

Scientific Name	French Common Name	English Common Name	Element Occurrence Quality Rank	Last Obser-vation Date	Biodiversity Targets					
					Forest Matrix	Wetlands	Rivers and Riparian Habitats	Alvars, Limestone and Karst	Dunes and Sand Barrens	Grassland Birds
FUNGI OR LICHENS										
Bacidia trachona	-	A Lichen	H	1973	X		X			
Lecidea plebeja	-	A Lichen	H	1981	X					
Leptogium rivulare	-	Flooded Jellyskin	E	2008	X	X				
Physconia subpallida	Physconie pâle	Pale-bellied Frost Lichen	H	1902	X					
Steinia geophana	-	A Lichen	E	2000	X					
Thyrea confusa	-	Jelly Strap Lichen	E	2012	X			X		
Vezdaea leprosa	-	A Lichen	E	2000						
NON-VASCULAR PLANTS										
Amphidium mougeotii		Mougeot's Yoke Moss			X		X			
Brachythecium calcareum	-	Calcareous Ragged Moss	H	1899	X					
Fontinalis sullivantii	-	A Moss	H	1972	X	X	X			
Forsstroemia trichomitria	-	Forsstroemia Moss			X					
Lycopodium x habereri	Lycopode de haberer	Haberer's Clubmoss			X					
Lycopodium x zeilleri	Lycopode de zeiller	Zeiller's Ground-Cedar			X					
Plagiothecium latebricola	-	Lurking Leskea	H	1987		X				
Riccia sullivantii	Riccie de sullivant	Sullivant's Crystalwort								
VASCULAR PLANTS										
Adlumia fungosa	Adlumie fongueuse	Climbing Fumitory			X					
Allium canadense var. canadense	L'ail du Canada	Meadow Garlic			X					X
Allium tricoccum	Ail des bois	Small Wild Leek			X					
Amelanchier sanguinea	Amélanchier gracieux	Roundleaf Shadbush			X					
Aplectrum hyemale	Aplectrelle d'hiver	Puttyroot			X					
Arethusa bulbosa	Aréthuse bulbeuse	Swamp-pink				X				
Armoracia lacustris	-	Lake-cress				X	X			
Asclepias tuberosa var. interior	Asclépiade tubéreuse variété	Butterflyweed					X	X		

Scientific Name	French Common Name	English Common Name	Element Occurrence Quality Rank	Last Obser-vation Date	Biodiversity Targets					
					Forest Matrix	Wetlands	Rivers and Riparian Habitats	Alvars, Limestone and Karst	Dunes and Sand Barrens	Grassland Birds
	de l'intérieur									
Asplenium platyneuron	Doradille ébène	Ebony Spleenwort			X			X		
Asplenium rhizophyllum	Doradille ambulante	Walking-fern Spleenwort			X			X		
Asplenium ruta-muraria	Doradille des murailles	Wallrue Spleenwort			X			X		
Astragalus australis	Astragale austral	Indian Milkvetch			X			X		
Astragalus neglectus	Astragale négligé	Cooper's Milk-vetch	E	1998			X			
Azolla caroliniana	Azole de Caroline	Eastern Mosquito Fern				X				
Betula x sandbergii	-	Sandberg's Birch				X				
Boechera canadensis	Arabette du Canada	Sicklepod			X					
Boechera retrofracta	Arabette à fruits réfléchis	Holboell's Rockcress			X					
Botrychium lanceolatum	Botryche lancéolé	Triangle Grapefern			X					
Botrychium lineare	Botryche linéaire	Narrowleaf Grapefern			X			X		
Botrychium oneidense	Botryche d'Oneida, Botryche du lac Oneida	Blunt-lobed Grapefern	E	1996	X					
Botrychium rugulosum	Botryche à limbe rugueux	Rugulose Grapefern	H	1977	X					
Bromus kalmii	Brome de Kalm	Wild Chess			X					
Cardamine bulbosa	Cardamine bulbeuse	Bulbous Bitter-cress			X	X				
Cardamine maxima	-	Large Toothwort			X					
Carex annectens	Carex à gaine tronquée	Yellow-fruit Sedge				X				
Carex appalachica	Carex des Appalaches	Appalachian Sedge			X					
Carex argyrantha	Carex argenté	Hay Sedge			X				X	
Carex atlantica ssp. capillacea	Carex à feuilles capillaires	Atlantic Sedge	H	1989		X				
Carex cephalophora	Carex porte-tête	Oval-leaf Sedge								
Carex folliculata	Carex folliculé	Northern Long Sedge	H	1986		X				
Carex molesta	Carex dérangeant	Troublesome Sedge			X					
Carex muehlenbergii var. muehlenbergii	Carex de Mühlenberg	Muhlenberg's Sedge			X					
Carex oligocarpa	Carex à fruits clairsemé	Eastern Few-fruit Sedge			X		X			
Carex sartwellii	Carex de Sartwell	Sartwell's Sedge				X				

Scientific Name	French Common Name	English Common Name	Element Occurrence Quality Rank	Last Obser-vation Date	Biodiversity Targets					
					Forest Matrix	Wetlands	Rivers and Riparian Habitats	Alvars, Limestone and Karst	Dunes and Sand Barrens	Grassland Birds
Carex siccata	Carex sec	Dry Spike Sedge			X					
Carex sparganioides	Carex faux-rubanier	Bur-reed Sedge			X					
Carex sychnocephala	Carex compact	Many-headed Sedge				X	X	X		
Carex typhina	Carex massette	Cattail Sedge	E	1997	X	X				
Carya ovata var. ovata	Caryer ovale	Shagbark Hickory			X	X		X		
Ceanothus americanus	Céanothe d'Amérique	New Jersey Tea			X					
Ceanothus herbaceus	Céanothe à feuilles étroites	Prairie Redroot			X					
Celtis occidentalis	-	Common Hackberry			X		X			
Cerastium brachypodum	-	Short-stalked Chickweed						X		
Cerastium nutans var. nutans	Céraiste penché	Nodding Chickweed			X					
Ceratophyllum echinatum	Cornifle échinée	Prickly Hornwort	E	2000		X				
Chenopodium foggii	Chénopode de Fogg	Ceratophyllum echinatum			X					
Cirsium discolor	-	Field Thistle			X					
Claytonia virginica	Claytonie de Virginie	Narrowleaf Springbeauty			X					
Corallorhiza striata var. striata	Corallorhize striée	Striped Coralroot			X	X				
Corydalis aurea ssp. aurea	Corydale dorée	Golden Corydalis						X		
Crataegus apiomorpha		Fort Sheridan Hawthorn			X					
Cyperus dentatus	Souchet denté	Toothed Flatsedge	H	1982		X	X			
Cyperus houghtonii	Souchet de Houghton	Houghton's Flatsedge	H	1969	X		X		X	
Cyperus lupulinus ssp. macilentus	Souchet grêle	Great Plains Flatsedge			X		X	X	X	
Cyperus odoratus	Souchet odorant	Rusty Flatsedge					X			
Cypripedium arietinum	Cypripède tête-de-bélier	Ram's Head Lady's-Slipper	E	2001	X			X		
Cypripedium reginae	Cypripède royal	Showy Lady's-slipper			X	X	X	X		
Desmodium nudiflorum	Desmodie nudiflore	Naked-flower Tick-trefoil			X					
Draba nemorosa	Drave des bois	Wood Whitlow-Grass			X	X	X			
Dryopteris clintoniana	Dryoptère de Clinton	Clinton's Woodfern			X	X				
Dryopteris x mickelii	Dryoptère de Mickel	Mickel's Wood Fern			X					
Echinochloa walteri	-	Walter's Barnyard Grass				X				

Scientific Name	French Common Name	English Common Name	Element Occurrence Quality Rank	Last Obser-vation Date	Biodiversity Targets					
					Forest Matrix	Wetlands	Rivers and Riparian Habitats	Alvars, Limestone and Karst	Dunes and Sand Barrens	Grassland Birds
Elaeagnus commutata	Chalef argenté	American Silverberry					X			
Elatine americana	Élatine d'Amérique	American Waterwort	H	1955		X				
Elliptio dilatata	Elliptio pointu	Spike				X	X			
Elodea nuttallii	-	Nuttall's Waterweed				X				
Elymus riparius	Élyme des rivages	River Wild Rye			X	X	X			
Eriophorum x porsildii	-	Porsild's Cottongrass				X				
Fimbristylis autumnalis	Fimbristyle d'automne	Slender Fimbry				X	X			
Galearis spectabilis	Galéaris remarquable	Showy Orchis			X					
Galium circaezans	Gaillet fausse-circée	Wild Licorice			X					
Gentianopsis crinita	Gentianopsis frangé	Fringed Gentian			X	X				
Geranium carolinianum	Géranium de Caroline	Carolina Crane's-bill			X					
Goodyera pubescens	Goodyérie pubescente	Downy Rattlesnake-plantain			X					
Gratiola aurea	Gratiole dorée	Golden Hedge-hyssop				X	X			
Grimmia pilifera	Grimmie porte-poil	Grimmia Dry Rock Moss						X		
Gymnocarpium robertianum	Gymnocarpe de Robert	Limestone Oak Fern				X		X		
Hedeoma hispida	Hédéoma rude	Rough False Pennyroyal							X	
Helianthemum canadense	Hélianthème du Canada	Canada Frostweed			X					
Helianthus divaricatus	Hélianthe à feuilles étalées	Woodland Sunflower			X			X		
Hieracium kalmia var. fasciculatum	-	Kalm's Hawkweed			X					
Hierochloe odorata	-	Vanilla Grass			X		X			
Hudsonia tomentosa	Hudsonie tumenteuse	Woolly Beachheather							X	
Hypericum kalmianum	Millepertuis de Kalm	Kalm's St. John's-wort				X	X		X	
Isoetes riparia	Isoète des rivages	Riverbank Quillwort	E	2003		X	X			
Juglans cinerea	Noyer cendré	Butternut	E	2009	X		X			
Juncus greenei	Jonc de Greene	Greene's Rush	H	1970			X		X	
Juncus longistylis	Jonc longistyle	Long-styled Rush	H	1986		X				
Juncus subtilis	-	Creeping Rush				X				
Juncus vaseyi	-	Vasey's Rush				X				
Juniperus virginiana var.	Génévrier de Virginie	Eastern Red Cedar						X		

Scientific Name	French Common Name	English Common Name	Element Occurrence Quality Rank	Last Obser-vation Date	Biodiversity Targets					
					Forest Matrix	Wetlands	Rivers and Riparian Habitats	Alvars, Limestone and Karst	Dunes and Sand Barrens	Grassland Birds
virginiana										
Lactuca hirsuta	Laitie hirsute	Hairy Lettuce			X					
Lathyrus ochroleucus	Gesse jaunâtre	Pale Vetchling			X					
Leucophysalis grandiflora	-	Large-Flowered Ground-Cherry					X			
Listera australis	Listère australe	Southern Twayblade	H	1973		X				
Lithospermum caroliniense	-	Golden Puccoon							X	
Littorella uniflora	-	American Shore-grass				X				
Lycopus americanus var. Laurentianus	Lycope du Saint-Laurent	St. Lawrence Water-horehound				X	X			
Lysimachia hybrida	-	Lanceleaf Loosestrife				X				
Lysimachia quadrifolia	Lysimaque à quatre feuilles	Whorled Yellow Loosestrife			X					
Lythrum alatum	-	Winged-loosestrife				X				
Minuartia michauxii	Minuartie de Michaux	Michaux's Stitchwort			X			X		
Monarda punctata var. villicaulis	Monarde ponctuée	Horsemint								
Muhlenbergia sylvatica	Muhlenbergie des bois	Woodland Muhly			X					
Notothylas orbicularis	Anthocérote orbiculaire	Round Hornwort								
Nuphar lutea ssp. pumila	-	Yellow Cow-lily				X	X			
Nuphar lutea ssp. rubrodisca	-	Yellow Pond-lily				X	X			
Oenothera pilosella ssp. pilosella	Onagre piloselle	Meadow Evening-primrose			X	X				
Oligoneuron album	Verge d'or faux-ptarmica	Prairie Goldenrod			X			X		
Panax quinquefolius	Ginseng à cinq folioles	American Ginseng	E	1999	X					
Panicum flexile	Panic flexible	Wiry Witch Grass			X			X		
Panicum philadelphicum	Panic de Philadelphie	Philadelphia Panic Grass						X		
Pellaea atropurpurea	Pelléade à stipe pourpre	Purple-stemmed Cliff-brake	H	1979	X			X		
Pellaea glabella ssp. glabella	Pelléade glabre	Smooth Cliffbrake			X			X		
Persicaria hydropiperoides	Persicaire faux-poivre-d'eau	Mild Water-pepper				X	X			
Persicaria robustior	Persicaire robuste	Stout Smartweed				X	X			
Pinus rigida	Pin rigide	Pitch Pine	H	1969	X				X	

Scientific Name	French Common Name	English Common Name	Element Occurrence Quality Rank	Last Obser-vation Date	Biodiversity Targets					
					Forest Matrix	Wetlands	Rivers and Riparian Habitats	Alvars, Limestone and Karst	Dunes and Sand Barrens	Grassland Birds
Platanthera flava var. herbiola	Platanthère petite-herbe	Pale-green Orchid				X	X			
Platanthera grandiflora	Platanthère grandiflore	Large Purple Fringed-orchid	E	1996	X	X	X			
Platanthera leucophaea	Platanthère blanchâtre de l'Est	Eastern Prairie Fringed-orchid	E	2000		X				
Podostemum ceratophyllum	Podostémon à Feuilles Cornées	Threadfoot					X			
Polygala polygama	Polygale polygame	Racemed Milkwort			X					
Polygala senega	Polygale sénéca	Seneca Snakeroot			X					
Polygala sanguinea	-	Field Milkwort								
Polygonella articulata	Polygonelle articulée	Eastern Jointweed							X	
Polygonum arifolium	Renouée à feuilles d'arum	Halberd-leaved Tearthumb	E	1991		X				
Polygonum douglasii	Renouée de Douglas	Douglas' Knotweed			X			X		
Polypodium appalachianum	Polypode des Appalaches	Appalachian Rockcap Fern			X					
Polystichum scopulinum	Polystic des rochers	Mountain Holly Fern			X					
Proserpinaca palustris	Proserpinie des marais	Marsh Mermaidweed				X				
Prunus susquehanae	Cerisier de la Susquehanna	Susquehana Cherry			X					
Pterospora andromedea	Ptérospore à fleurs d'andromède	Giant Pine Drops			X					
Pycnanthemum virginianum	Pycnanthème de Virginie	Virginia Mountainmint			X					
Quercus alba	Chêne blanc	White Oak			X					
Quercus bicolor	Chêne bicolore	Swamp White Oak			X	X	X			
Ranunculus flabellaris	Renoncule à flagelles	Yellow Water-Crowfoot				X				
Rhododendron canadense	Rhododendron du Canada	Rhodora	H	1989	X	X				
Rhus aromatica var. aromatica	Sumac aromatique	Fragrant Sumac			X					
Rubus flagellaris	Ronce à flagelles	Northern Dewberry			X					
Rumex altissimus	Patience élevée	Tall Dock	H	1989		X				
Sagittaria cristata	Sagittaire à crête	Crested Arrowhead		2003		X	X			
Saururus cernuus	-	Lizard's-tail			X	X				
Schoenoplectus heterochaetus	-	Slender Bulrush				X				
Scirpus pendulus	Scirpe pendant	Pendulous Bulrush				X	X			
Selaginella eclipes	Sélaginelle apode	Hidden Spikemoss				X	X			
Sisyrinchium angustifolium	Bermudienne à feuilles étroites	Pointed Blue-eyed-grass			X					

Scientific Name	French Common Name	English Common Name	Element Occurrence Quality Rank	Last Obser-vation Date	Biodiversity Targets					
					Forest Matrix	Wetlands	Rivers and Riparian Habitats	Alvars, Limestone and Karst	Dunes and Sand Barrens	Grassland Birds
Solidago puberula	-	Downy Goldenrod			X		X			
Sparganium androcladum	Rubanier branchu	Branching Bur-reed				X	X			
Spiranthes casei var. casei	Spiranthe de Case	Case's Ladies'-tresses			X					
Spiranthes lucida	Spiranthe lustrée	Shining Ladies'-tresses				X				
Sporobolus compositus var. compositus	Sporobole rude	Tall Dropseed			X			X		
Sporobolus cryptandrus	Sporobole à fleurs cachées	Sand Dropseed			X					
Sporobolus heterolepis	Sporobole à glumes inégales	Northern Dropseed	E	1996	X					
Sporobolus vaginiflorus var. vaginiflorus	Sporobole engainé	Poverty Dropseed			X			X		
Staphylea trifolia	Staphylier à trois folioles	American Bladdernut			X		X	X		
Thelypteris simulata	Thélyptère Simulatrice	Bog Fern			X	X				
Torreyochloa pallida var. pallida	Glycérie pâle	Pale False Mannagrass	H	1898		X				
Toxicodendron vernix	Sumac à vernis	Poison-Sumac				X				
Triadenum virginicum	Millepertuis de Virginie	Marsh St. John's-wort				X				
Trichostema brachiatum	Trichostème à sépales égaux	False Pennyroyal			X			X	X	
Ulmus thomasii	Orme liège	Rock Elm			X			X		
Utricularia geminiscapa	Utriculaire à scapes géminés	Hidden-fruit Bladderwort	H	1979		X				
Utricularia gibba	Utriculaire à bosse	Humped Bladderwort				X				
Valeriana uliginosa	Valériane des tourbières	Marsh Valerian		2004		X				
Veronica anagallis-aquatica	Véronique mouron-d'eau	Brook-pimpernel				X	X			
Vicia americana	Vesce d'Amérique	American Purple Vetch			X					
Viola affinis	Violette affine	Le Conte's Violet			X	X				
Viola sagittata var. ovata	Violette à feuilles frangées	Arrowleaf Violet			X					
Woodsia obtusa ssp. obtusa	Woodsie à lobes arrondis	Blunt-lobe Cliff Fern						X		
Woodsia oregana ssp. cathcartiana	Woodsie de Cathcart	Oregon Woodsia (Tetraploid)			X			X		
Zizania aquatica var. aquatica	Zizanie à fleurs blanches variété à fleurs blanches	Indian Wild rice				X	X			

Scientific Name	French Common Name	English Common Name	Element Occurrence Quality Rank	Last Obser-vation Date	Biodiversity Targets					
					Forest Matrix	Wetlands	Rivers and Riparian Habitats	Alvars, Limestone and Karst	Dunes and Sand Barrens	Grassland Birds
MAMMALS										
Canis lupus lycaon	Loup de l'Est	Eastern Wolf			X	X	X			
Glaucomys volans	Petit polatouche	Southern Flying Squirrel			X					
Lasionycteris noctivagans	Chauve-souris argentée	Silver-haired Bat						X		
Lasiurus borealis	Chauve-souris rousse	Eastern Red Bat						X		
Lasiurus cinereus	Chauve-souris cendrée	Hoary Bat						X		
Myotis leibii	Chauve-souris pygmée de l'Est	Eastern Small-footed Myotis	H	1962	X			X		
Myotis lucifugus	Petite chauve-souris brune, Vespertilion brun	Little Brown Myotis			X			X		
Myotis septentrionalis	Chauve-souris Nordique, Vespertilion Nordique	Northern Myotis	H	1967	X		X			
Perimyotis subflavus	Pipistrelle de l'Est	Tricolored Bat	H	1966	X		X			
Urocyon cinereoargenteus	Renard gris	Grey Fox			X	X	X			
FISHES										
Acipenser fulvescens pop. 3	Esturgeon jaune	Lake Sturgeon (Great Lakes - Upper St. Lawrence River population)	E	2011		X	X			
Anguilla rostrata	Anguille d'Amérique	American Eel					X			
Hybognathus hankinsoni	Méné laiton	Brassy Minnow				X	X			
Ichthyomyzon fossor	Lamproie du Nord	Northern Brook Lamprey	H	1992			X			
Ichthyomyzon unicuspis	Lamproie argentée	Silver Lamprey					X			
Moxostoma carinatum	Chevalier de rivière	River Redhorse	E	2001		X	X			
Moxostoma valenciennesi	Chevalier jaune	Greater Redhorse	E	1991			X			
Notropis bifrenatus	Méné d'herbe	Bridle Shiner				X	X			
Noturus insignis	Chat-fou liséré	Margined Madtom	E	2000			X			
Percina copelandi	Fouille-roche gris	Channel Darter					X			
AMPHIBIANS										
Hemidactylium scutatum	Salamandre à quatre orteils	Four-toed Salamander			X	X				
Lithobates palustris	Grenouille des marais	Pickerel Frog			X	X				
Pseudacris triseriata	Rainette faux-grillon de l'ouest	Western Chorus Frog				X	X			

Scientific Name	French Common Name	English Common Name	Element Occurrence Quality Rank	Last Obser-vation Date	Biodiversity Targets					
					Forest Matrix	Wetlands	Rivers and Riparian Habitats	Alvars, Limestone and Karst	Dunes and Sand Barrens	Grassland Birds
REPTILES										
Diadophis punctatus	Couleuvre à collier	Ring-necked Snake			X					
Lampropeltis triangulum	Couleuvre tachetée	Milksnake	E	1995	X	X	X		X	X
Nerodia sipedon	Couleuvre d'eau	Northern Watersnake				X	X			
Opheodrys vernalis	Couleuvre verte	Smooth Greensnake			X	X				
Pantherophis spiloides pop. 1	Couleuvre obscure	Gray Ratsnake (Frontenac Axis population)	E	2010	X	X				
Thamnophis sauritus pop.2	Couleuvre mince	Eastern Ribbonsnake - Great Lakes Population	E	1993	X	X	X			
TURTLES										
Apalone spinifera	Tortue-molle à épines	Spiny Softshell	E	1997		X	X		X	
Chelydra serpentina	Tortue serpentine	Snapping Turtle	E	2010		X	X			
Clemmys guttata	Tortue ponctuée	Spotted Turtle	E	2004		X	X			
Emydoidea blandingii	Tortue mouchetée	Blanding's Turtle	E	2013		X	X			
Glyptemys insculpta	Tortue des bois	Wood Turtle	E	1997	X	X	X		X	
Graptemys geographica	Tortue géographique	Common Map Turtle	E	2003		X	X		X	
Sternotherus odoratus	Tortue musquée	Common Musk Turtle	E	1992		X	X			
BIRDS										
Ammodramus henslowii	Bruant de Henslow	Henslow's Sparrow	H	1980						X
Ammodramus savannarum	Bruant sauterelle	Grasshopper Sparrow								X
Asio flammeus	Hibou des marais	Short-eared Owl	E	2001		X				X
Antrostomus vociferus	Engoulevent bois-pourri	Eastern Whip-poor-will	E	2009	X					X
Aquila chrysaetos	Aigle royal	Golden Eagle			X			X		X
Calidris canutus rufa	Bécasseau maubèche	Red Knot				X				
Chaetura pelagica	Martinet ramoneur	Chimney Swift	E	2010	X	X				
Chlidonias niger	Guifette noire	Black Tern	E	2002		X				
Chordeiles minor	Engoulevent d'Amérique	Common Nighthawk			X				X	X
Cistothorus platensis	Troglodyte à bec court	Sedge Wren				X				
Contopus borealis	Moucherolle à côtés olive	Olive-sided Flycatcher			X	X	X			

Scientific Name	French Common Name	English Common Name	Element Occurrence Quality Rank	Last Obser-vation Date	Biodiversity Targets					
					Forest Matrix	Wetlands	Rivers and Riparian Habitats	Alvars, Limestone and Karst	Dunes and Sand Barrens	Grassland Birds
Contopus virens	Pioui de l'Est	Eastern Wood-Pewee			X		X			
Coturnicops noveboracensis	Râle jaune	Yellow Rail	E	1998		X				X
Dendroica kirtlandii	Paruline de Kirtland	Kirtland's Warbler	E	2008	X					
Dendroica palmarum hypochrysea	Paruline à couronne rousse	Yellow Palm Warbler	E	1996	X	X				
Dolichonyx oryzivorus	Goglu des prés	Bobolink	E	2010				X		X
Euphagus carolinus	Quiscale rouilleux	Rusty Blackbird			X	X	X			
Falco peregrinus anatum	Faucon pèlerin anatum	American Peregrine Falcon	E	2008	X	X	X			
Haliaeetus leucocephalus	Pygargue à tête blanche	Bald Eagle	E	2007	X	X	X			
Hirundo rustica	Hirondelle rustique	Barn Swallow	E	2011		X	X		X	X
Hylocichla mustelina	Grive des bois	Wood Thrush			X					
Ixobrychus exilis	Petit blongios	Least Bittern	E	2002	X					
Lanius ludovicianus	Pie-grièche migratrice	Loggerhead Shrike	E	2008				X		X
Melanerpes erythrocephalus	Pic à tête rouge	Red-headed Woodpecker			X		X			
Parkesia motacilla	Paruline hochequeue	Louisiana Waterthrush			X		X			
Setophaga cerulea	Paruline azurée	Cerulean Warbler			X					
Setophaga kirtlandii	Paruline de Kirtland	Kirtland's Warbler			X					
Setophaga palmarum hypochrysea	-	Yellow Palm Warbler			X					X
Sturnella magna	Sturnelle des prés	Eastern Meadowlark								X
Tyto alba	Effraie des clochers	Barn Owl	E	2011						X
Vermivora chrysoptera	Paruline à ailes dorées	Golden-winged Warbler			X	X	X			
Wilsonia canadensis	Paruline du Canada	Canada Warbler			X	X	X			
INVERTEBRATES										
Aeshna clepsydra	Aeschne clepsydre	Mottled Darner	E	2000		X				
Aeshna verticalis	Aeschne verticale	Green-striped Darner	H	1922		X				
Appalachina sayana	-	Spike-lip Crater	E	1995	X			X		
Arigomphus cornutus	Gomphe cornu	Horned Clubtail	E	2002		X	X			
Arigomphus furcifer	Gomphe fourchu	Lilypad Clubtail	E	2000		X	X			
Bombus affinis	-	Rusty-patched Bumble Bee	H	1976	X	X			X	

Scientific Name	French Common Name	English Common Name	Element Occurrence Quality Rank	Last Obser-vation Date	Biodiversity Targets					
					Forest Matrix	Wetlands	Rivers and Riparian Habitats	Alvars, Limestone and Karst	Dunes and Sand Barrens	Grassland Birds
Callophrys lanoraieensis	Lutin des tourbières	Bog Elfin	E	2007		X				
Catinella aprica	-	Diurnal Ambersnail	E	1995		X				
Cicindela patruela	Cicindèle verte à lunules	Northern Barrens Tiger Beetle	H	1960	X				X	
Cordulegaster obliqua	Cordulégastre oblique	Arrowhead Spiketail	H	1923	X	X				
Danaus plexippus	Monarque	Monarch			X	X			X	
Enallagma aspersum	Agrion saupoudré	Azure Bluet	E	1996		X				
Erynnis martialis	Hespérie tachetée	Mottled Duskywing	E	2008	X			X	X	
Gomphaeschna furcillata	Aeschne pygmée	Harlequin Darner	E	2000		X				
Gomphus quadricolor	Gomphe des rapides	Rapids Clubtail	E	2005	X		X			
Gomphus vastus	Gomphe-cobra	Cobra Clubtail	H	1941			X			
Gomphus ventricosus	Gomphe ventru	Skillet Clubtail	H	1924			X			
Hemileuca sp. 1	-	Bogbean Buckmoth	E	2011		X				
Leptodea fragilis	Leptodée fragile	Fragile Papershell					X			
Leucorrhinia patricia	Leucorrhine Nordique	Canada Whiteface	H	1981		X				
Obovaria olivaria	Obovarie olivâtre	Hickorynut					X			
Ophiogomphus anomalus	Ophiogomphe bariolé	Extra-striped Snaketail	H	1936			X			
Pieris virginiensis	Piéride de Virginie	West Virginia White			X	X				
Potamilus alatus	Potamile ailé	Pink Heelsplitter					X			
Somatochlora forcipata	Cordulie fourchue	Forcipate Emerald	E	2001		X				
Stylurus notatus	Gomphe marqué	Elusive Clubtail	E	2011			X			
Stylurus spiniceps	Gomphe fléché	Arrow Clubtail	H	1928			X			
Vertigo elatior	-	Tapered Vertigo	E	1995		X		X		
Williamsonia fletcheri	Cordulie bistre	Ebony Boghaunter	E	2002	X	X				
Vertigo paradoxa	-	Mystery Vertigo	E	1995	X					

APPENDIX FOUR: Methods - Conservation Actions Prioritization

This appendix describes the analysis used to identify priority areas where conservation efforts should focus to protect the Ottawa Valley NA's biodiversity. It was achieved through a GIS-based analysis similar to the methods used by Henson *et al*. (2005) for the Great Lakes Conservation Blueprint and modified by the Conservancy Québec region based on a similar analysis done in its planning work with regional stakeholders in the St. Lawrence Valley and the Appalachians (CRRNT-Montérégie 2010; CRRNT-Estrie 2011).

1. DATA SOURCES

GIS layers and databases used for this spatial analysis to identify priority sites are as follows:

A. Topography

i. Québec: MRN's topographical database (BDTQ) at a 1/20 000 scale for land topography (including road networks and hydrography).
ii. Ontario: OBM Database at a (1/10 000) scale for land topography (including road networks and hydrography).

B. Forestry

i. Québec: MRN's ecoforestry information System, FORGEN Database (*Système d'information écoforestière* or SIEF) at a scale of 1/20 000 (2011) used for forested lands and selecting old-growth communities.
ii. Ontario: SOLRIS (Provincial Forest Inventory) and MNR's ecosystem evaluation (old-growth communities).

C. Wetlands

i. Québec: Ducks Unlimited Canada wetlands coverage (2007),
ii. Ontario: MNR's wetland and SOLRIS Database (2013 and 2008 respectively)

D. Targeted Species

i. Québec: CDPNQ's (CDC) element occurrences (2013) for species that are designated as threatened, vulnerable or that are likely to be designated (susceptible). These are polygonal dimension data. The Conservancy's field work point dimension data (2013) have also been used as input.
ii. Ontario: NHIC's (CDC) element occurrences (2013) for species that are designated as threatened, vulnerable or that are likely to be designated (susceptible).

E. Habitats and Exceptional ecosystems

i. Québec: MRN's exceptional forest ecosystems database (2010), MRN's alvars communities Database, MRN's geology survey layer (for limestone) and Environment Canada's grassland bird habitats layer.
ii. Ontario: SOLRIS Treed Database, NHIC's cave and karst data, and Environment Canada's grassland bird habitats layer.

F. Protected Areas

i. MDDEFP's Québec Protected Area Registry Database (2012), National Capital Commission's layer for national parks and the Conservancy Québec's Projects Inventory (2013)
ii. Ontario: Compiled data from partner groups (Ontario Parks and Conservation Authorities) (2013) and the Conservancy Ontario's Projects Inventory (2013).

2. ANALYSIS

The analysis was performed on a 40-ha[1] polygon-based grid (40 ha cell). This is a very large NA and since forest and wetlands are the dominant features of this landscape, the patch size was based on what is required to protect interior habitats for a forest or wetland fragment. Each cell on the landscape was given a conservation value based on the combined values of a series of eight criteria.

A. **Conservation value**

The conservation value was determined for each 40-ha cell in the grid and is based on two sub-classes: biodiversity and ecological functions for which a series of criteria were given a score (**Table A4.1**). These are described below.

i. Biodiversity

Priority was given to rare ecosystems (alvars, sand barrens and dunes) and exceptional forests. Tracked species were used as a surrogate to identify important habitats for species at risk. Grasslands were not factored into the analysis as habitat occupied by grassland birds is cultural grasslands. Rather the conservation goals of the NACP with respect to grasslands birds are focused on stewardship.

Presence of a mature forest stand
This criterion refers to the presence of mature forest stands since these are more likely to bear features associated with a more diverse forest ecosystem such as high cover, complex structure, snags and woody debris (Crête *et al.* 2004).

From the SIEF (2012), mature deciduous forest stands were identified as stands of 120 years or older and coniferous or mixed forest stands of 90 years and older. The Ottawa Valley Natural Area is mostly

[1] By comparison, a quarter section in Saskatchewan is 65 ha (160 ac).

covered by mixed and coniferous forest stands. The 90-years-old value was used and unknown-age stands described as old and unequal height were also captured within this criterion.

The presence of a mature forest (criterion A1.a) stand of known age within a cell was noted 1 (yes) and given a value of 2. Absence was noted 0 (no) and given no value (0).

The presence of a mature forest (criterion A1.b) stand of unknown-age and unequal height (for Québec) within a cell was noted 1 (yes) and given a value of 1. Absence was noted 0 (no) and given no value (0).

Presence of a tracked species
This criterion refers to the presence of EO data for species at risk provided by the CDPNQ database (2013), the NHIC database (2013) or by the Conservancy (Unpublished).

In this analysis, the presence of an EO globally ranked G1 to G4 (SAR and endemics) contributed to the value of a parcel. Records of historical occurrences (more than 25 years) and extirpated species were not included.

The number of G1 to G4 species for each cell was summed and a value was given based on this sum. The cell with the greatest number of G1 to G4 EOs in the NA had 18, and we defined five different classes based on the number of G1 to G4 EOs. A value was given to each of the five classes (**Table A4.1**).

This prevented the tracked-species criterion from overwhelming the entire analysis by limiting it to a value of 8, instead of the raw number of EOs observed.

Presence of priority habitats
Priority habitats were identified as grassland birds areas (using data from the NHIC and Environment Canada), ecosystem mapping and local knowledge of locations of caves and karst systems, alvars, sand barrens, dunes, and biological refuges from MRNF's (now MDDEFP) Québec and NHIC (Ontario) data.

Presence of a priority habitat was noted 1 (yes) and the cell was given a value based on the criteria table (Table A4.1). Absence was noted 0 (no) and the cell was given no value.

Presence of an exceptional forest ecosystem
Three types of exceptional forest ecosystems are present in the Natural Area: old-growth stands, rare forest communities and refuge forests; this last type was not considered in the analysis because it is redundant with the species-at-risk attribute.

The presence of an old-growth or rare forest ecosystem within the cell was noted 1 (yes) and was given a value based on the criteria table (Table A4.1). Absence was noted 0 (no) and given no value.

Area of interior forest habitat

This criterion was omitted to prevent redundancy with A1 and A4 (Table A4.1).

Area of wetland
Wetlands are a critical habitat for a great variety of flora and fauna, including migratory and resident birds, as well as numerous reptiles and amphibians (Henson *et al.* 2005). The distance of a cell from a wetland is an indicator of species richness. It reflects capacity to provide habitat for a great number of species that depend entirely or for part of their life cycle on the presence of wetlands (EC 2004). Wetlands also deliver critical ecological functions across the landscape, including the protection of surface and groundwater resources to ensure a long-term supply of water (Devitto *et al.* 2000; Baker *et al.* 2003).

The area of a wetland within a cell was calculated and translated into percentage, which was written to a field. A value was given to the cell based on the criteria table (Table A4.1). When no wetland was detected within a cell, no value was given.

ii. Ecological Functions

Coincidence or proximity of existing protected area
This criterion corresponds to the distance between a cell and a protected area (edge-to-edge). Contiguity to a protected area increases the conservation value of a cell. Conserving a protected areas' ecological integrity involves protecting the condition of lands and waters beyond its limits. Applied to protected areas, island biogeography theory shows that small, isolated protected areas are at risk of losing more species than large and well-connected ones (EC 2005).

Distance to the nearest protected land (edge-to-edge) was calculated for each cell and written into a field. A value was given based on this distance. When the distance was greater than 4 km, no value was given to the cell.

Coincidence or proximity to a wetland

See justified above in A.6
Distance to the nearest wetland (edge-to-edge) was calculated for each cell and written into a field. A value was given based on this distance. When the distance was > 1 km, no value was given to the cell.

Riparian habitat length density

A wide range of species depend on shoreline and riparian habitats. According to Maisonneuve and Rioux (2001), these habitats are used by 80% of reptile species, almost 60% of all mammal and amphibian species and 40% of breeding birds. The length of lake and river shoreline within a cell gives an indication of the potential use of riparian habitats by wildlife. As for wetlands, these riparian areas, when natural,

offer ecological functions in terms of nutrient cycling, retention and filtration of water, erosion control and flood abatement (Environment Canada 2004).

Provincial databases (BDTQ and OBM) were used to identify riparian habitats. Polygonal waterbodies (lakes, ponds, large rivers) were transformed into lines. Small rivers and permanent streams were used as-is. The length of only one shoreline was included for rivers and permanent streams. Intermittent streams were not included. After merging the rivers, streams, and waterbodies lines, the layer was intersected with the cell layer, so that a single line part would always be entirely included in only one specific cell. The length of each line feature was measured in meters and aggregate by the ID of the cell (dissolve). The riparian habitat length density was then calculated (m/40 ha) and written into a field and a value was given to the cell based on the criteria table (Table A4.1). When the density was equal or inferior to 10 m/ha, no value was given.

Table A4.1 Prioritization Methods Criteria Table

Sub-class	Criterion	Parameters	Database	Scale/Dimension	Values
A.Biodiversity elements (results are worth 65% of the final score)	1A) Presence of a mature forest stand	Coniferous and decidious CL_AGE>= 90 years old or ON Forest Resource Inventory (FRI) Data Forest Stands >=90 years old	Data QC: TERGEN-FORGEN (MRN) Data ON: FRI-SOLRIS (Provincial Forest Inventory) and MNR ecosystem evaluation	Cell / polygon	Presence : 2 Absence : 0
	1B) Presence of a mature forest stand, unequal age	Coniferous and deciduous CL_AGE = VIN *plantations excluded	Data QC: TERGEN-FORGEN (MRN)	Cell / polygon	Presence : 1 Absence : 0
	2. Presence of a tracked species	QC: Remove EORANK=H OR EORANK=X and Remove PRECISON=M or PRECISION=G ON: OBS_DATE< 1988 AND ACC <= 2	Data QC : CDC Spp: CDPNQ fauna and flora species at risk and the Conservancy field inventory Data ON: CDC: NHIC observation data	Cell / Points For each G1 to G4 species (this prevented scores as high as 178 which would skew results)	Number of G1 toG4 endangered species: 16-20 : 8 11-15 : 6 6-10 : 4 1-5 : 2 Absence: 0
	3.Presence of priority habitat	*Environment Canada (e.g., alvars, karsts, known grassland habitats)	Both ON and QC: Environment Canada shared data	Cell / polygon	Presence: 4 Absence: 0
	4.Presence of an EFE	QC: Remove EFE	Data QC: EFE Database from MRN (Québec's	Cell / point	Presence : 2 Absence : 0

Sub-class	Criterion	Parameters	Database	Scale/Dimension	Values
		TYPE=Refuge	natural ressources ministry) Data ON:Old growth 120 years, mixture of dominant spp (ash, Basswood, Bur Oak)		
	5. Area of wetland	Calculate % of wetland in a cell (Ha/40 Ha)	QC: Ducks Unlimited Canada wetland coverage (2007) ON: OMNR Wetlands (2012)	Cell/ polygon	0 : 0]0-20[% : 2 [20-40[% : 4 [40-60[% : 6 [60-80[% : 8 [80-100] % : 10
B. Ecological functions (results are worth 35% of the final score)	1.Coincidence or proximity of existing protected land	Calculate distance to nearest feature	QC: Registre des Aires protégées du Québec (MRN, 2012) + Inventaire de projets CNC ON: Nature Conservancy of Canada – ON Securement Properties (2013), County Forest (2013), Ontario Provincial Parks (2012), Area of Natural and Scientific Interest (ANSI) (2012), Provincial Crown Game Preserve (2012).	Cell / polygon	0 – 1000 m: 12 1001 – 2000 m: 8 2001-4000m: 4 >4000 m: 0
	2.Coincidence or proximity to a wetland	Calculate distance to nearest feature	QC: Ducks Unlimited Canada wetland coverage (2007) ON: MNR wetlands and SOLRIS	Cell / polygon	0 – 100 m: 12 101 – 500 m: 8 501 – 1000 m: 4 >1000 m: 0
	3.Riparian habitat length density	Calculate length of banks on permanent streams[1] and lake or other water bodies. Report total length of banks by cell, and calculate density (Length/ha)	QC: Water lines and water bodies from BDTQ (Québec topographical Database) ON: Water poly and lines from provincial database	Cell / polygon and line	0 - 10 m/ha: 0 10.1 – 20m/ha: 4 20.1 – 30 m/ha: 8 >30 m/ha: 12

[1] Length of stream banks is measured along one shore only.

3. Results

Details for each criterion were registered in at least two fields: one that was used to note the attribute of the criterion (e.g., Presence = 1/Absence = 0, the number of occurrences, the distance, the area or the density) and a second field that was used to register the value as shown in the criteria table. Each criterion attributes or value could be re-calculated independently of the attributes or values of other criteria allowing for fine-tuning of the spatial analysis.

The combined values for different attributes give the conservation score for each cell. The weight given for each criterion as determined by partners is the following: 65% for biodiversity components and 35% for ecological functions. The higher proportion given to biodiversity components is in line with the Conservancy's mission to protect species and ecosystems. The final score is therefore an unnormalized weighted average, with a maximum value of 21.7.

To classify the results into four priority ranks, quantile (quartiles) classifications were established using a classification algorithm provided by the ArcGIS (ArcMap 9.3) software; it creates classes each containing approximately 25% of the occurrences. **(Table A4.2)**.

Table A4.2: Class intervals

Priority	Class interval
Other	[0.0 – 4.85]
P3	[4.85 – 6.9]
P2	[6.9 – 9.7]
P1	]9.7 – 21.7]

Results of analysis are shown below in **Table A4.3** and in **Figure 5**. The output reflects the landscape's conservation values shared by the Conservancy staff and partners.

Table A4.3: Analysis Results

Priority Ranking	Break Values/ Score	# of Land Units (40-ha cells)	Ac	Ha	% of NA
P1	9.7	6125	600267.81	242919.76	25
P2	6.9	6522	632127.95	255813.11	25.5
P3	4.85	6475	619258.59	250605.06	25.5
No priority	0.00	6390	576789.22	233418.32	24
Total (max score)	21.7	25512	2428443.57	982756.25	100.0

4. Method Limitations

- The mapping and delineation of wetlands for Québec's side of the NA remains imprecise and the type of many wetlands remains undetermined. Also, wetlands < 1 ha were not available in Ducks Unlimited Canada 2007 database (Québec).
- Distribution of species at risk is correlated with the survey effort that is not consistent across the Natural Area.
- Data on entire groups of species are not available (non-vascular plants and invertebrates).
- Data on rare plant communities are restricted to exceptional forest ecosystems.

5. Crosswalk to Properties

Because the entire renovated parcel layer for Québec is not yet available in digital format suitable for spatial analysis (ArcInfo), having performed a grid-based priority analysis on the entire Natural Area will enable a crosswalk to properties eventually targeted for securement in the implementation of this conservation plan. To establish a property priority rank, a polygon will be created from the single or multiple parcel limits provided by the government's geodatabase (MRN - Infolot) or from the surveyor's data. By overlaying the property polygon onto the grid, it will be possible to assess its priority rank. For larger properties straddling several cells, the representation of each level of priority could be assessed. Within the next two years, the government's cadastre layer will be completely renovated and available in a format that will facilitate spatial analysis. Right now, the old parcel layer would be very expensive to buy for the entire extent of a NA and it would soon be obsolete. The new parcel layer (renovated) is not yet completed for most of this NA.