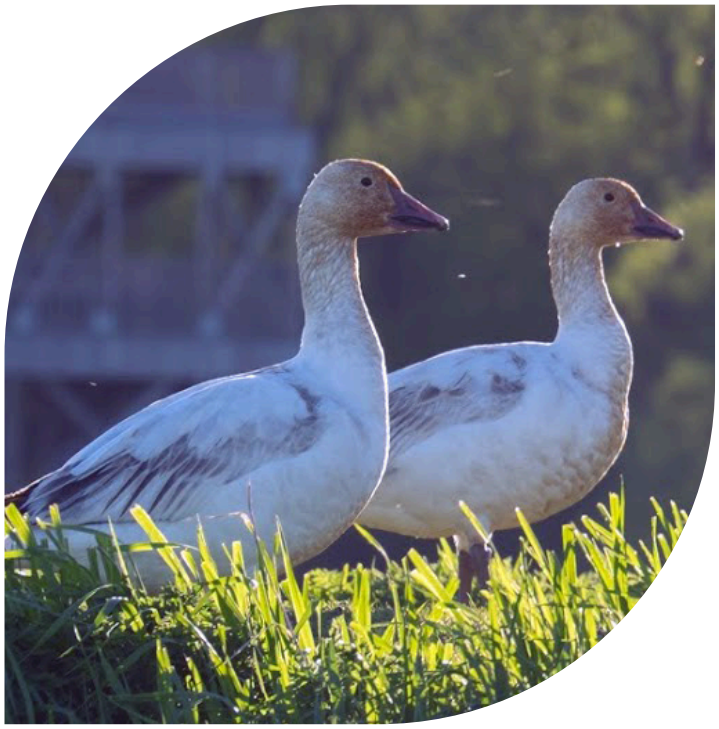
Environment and Climate Change Canada
Environnement et Changement climatique Canada

CAP-TOURMENTE NATIONAL WILDLIFE AREA



MANAGEMENT PLAN
2021

Canada

Cat. No.: CW66-680/2020E-PDF
ISBN: 978-0-660-36328-8

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Acknowledgements:

This management plan was developed by Benoît Roberge of Environment and Climate Change Canada's Canadian Wildlife Service. Special thanks to Christiane Foley, Marie-Hélène Dickey, Marie-Fortier and the members of Cap Tourmente NWA team—Stéphane Turgeon, Chantal Lepire, Francine Rousseau, Simon Bourbeau and Isabelle Fortin—for their valuable contribution to this work. Thanks also to the Canadian Wildlife Service employees who participated in the preparation of this document or provided comments, including Marie-Josée Couture, Marielou Verge, Grégory Bourguelat, Luc Bélanger, Stéphane Turgeon, Chantal Lepire, Francine Rousseau, Simon Bourbeau, Renée Langevin, Isabelle Fortin, Martine Benoit, Matthieu Allard, Josée Tardif, Josée Lefebvre, Olaf Jensen, David Boivin and Édith Leclerc. The Canadian Wildlife Service is also grateful to the employees who participated in the management plan pre-consultation workshops held in November and December 2015: Mélanie Chabot, Danielle Coulombe, Kristina Fickes, Chantal Lepire, Alex Martin, Francine Rousseau, Stéphane Turgeon and Stéphanie Tremblay for the workshop on interpretation, communications and marketing; Simon Bourbeau, Daniel Bordage, Emmanuelle Fay, Stéphanie Gagnon, Benoît Jobin, Patrick Labonté, Renée Langevin, François Shaffer and Stéphane Turgeon for the natural resources conservation workshop; Daniel Bordage, Simon Bourbeau, Mélanie Chabot, Patricia Desilets, Manon Dubé, Gilles Falardeau, Stéphanie Gagnon, Benoît Jobin, Patrick Labonté, Renée Langevin, Josée Lefebvre and Stéphane Turgeon for the agriculture workshop; and Simon Bourbeau, Pierre Brousseau, Isabelle Fortin, Stéphanie Gagnon, Patrick Labonté, Josée Lefebvre and Stéphane Turgeon for the hunting workshop.

The Canadian Wildlife Service would also like to thank Louis Lesage and Isabelle Lechasseur of the Huron-Wendat community who participated in a consultation held in February 2016. Thanks are also extended to the Environment and Climate Change Canada employees who participated in the management plan consultation workshop with external collaborators held in February 2016: David Boivin, Caroline Bureau, Chantal Lepire, Jean Rodrigue and Stéphane Turgeon of the Canadian Wildlife Service, and Bruno Rodrigue of the Wildlife Enforcement Directorate. Sincere thanks also go to all external collaborators who participated in this workshop in February 2016, namely Pierre Desrochers and Éric Dussault of Natural Resources Canada's Laurentian Forestry Centre, David Dorion of Développement Côte-de-Beaupré, Denis Dufour and Claude Samson of the Parks Canada Agency, Mustapha Eddib of the Quebec Department of Agriculture, Fisheries and Food, Jacques Fortin of the Quebec Department of Forests, Wildlife and Parks, Capitale-Nationale, and Chaudière-Appalaches Wildlife Protection Branch, Jean-François Guillot of the RCM of La-Côte-de-Beaupré, Norbert Lacroix and Gaétan Lord of Club des ornithologues de Québec inc., Jean Langlais of the Montreal Biosphere, Simon Mainville of the Centre d'excellence des milieux humides de la Côte-de-Beaupré – École secondaire Mont Sainte-Anne, Alex Martin of the Centre d'initiation au patrimoine de la Grande-Ferme, André Michaud of Ducks Unlimited Canada, and Anick Patoine of the municipality of Saint-Joachim-de-Montmorency. CWS would also like to thank all the organizations and individuals who provided valuable comments at the public online consultation held in July and August 2020. Lastly, thanks to the Regroupement QuébecOiseaux, Bird Studies Canada and the Cornell Lab of Ornithology for providing the data on the eBird Québec website and to all individuals who reported their observations.

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Environment and Climate Change Canada – Protected Areas website:
https://www.canada.ca/en/environment-climate-change/services/national-wildlife-areas.htm

How to cite this document:
Environment and Climate Change Canada. 2020. Cap Tourmente National Wildlife Area Management Plan. Environment and Climate Change Canada, Canadian Wildlife Service, Quebec, 118 p.

About Environment and Climate Change Canada's Protected Areas and Management Plans

What are Environment and Climate Change Canada Protected Areas?

Environment and Climate Change Canada establishes marine and terrestrial National Wildlife Areas for the purposes of conservation, research and interpretation. National Wildlife Areas are established under the authority of the *Canada Wildlife Act* to protect migratory birds, species at risk, and other wildlife and their habitats. National Wildlife Areas are established under the authority of the *Canada Wildlife Act* and are, first and foremost, places for wildlife. Migratory Bird Sanctuaries are designated under the authority of the *Migratory Birds Convention Act, 1994* and to protect migratory birds and their nests in the marine and terrestrial environment.

How has the federal government's investment from Budget 2018 helped manage and expand Environment and Climate Change Canada's National Wildlife Areas and Migratory Bird Sanctuaries?

The Nature Legacy represents a historic investment over five years of 1.3 billion dollars that will help Environment and Climate Change Canada expand its national wildlife areas and migratory bird sanctuaries, pursue its biodiversity conservation objectives, and increase its capacity to manage its protected areas.

According to the 2018 budget, Environment and Climate Change Canada will be conserving more protected areas, and have more resources to effectively manage and monitor the habitats and species found inside these areas until 2023.

What is the size of the Environment and Climate Change Canada Protected Areas Network?

The current Protected Areas Network consists of 55 National Wildlife Areas and 92 Migratory Bird Sanctuaries, comprising more than 14 million hectares across Canada.

What is a management plan?

A management plan provides the framework in which management decisions are made. It is intended to be used by Environment and Climate Change Canada staff to guide decision making, notably with respect to permitting. Management is undertaken in order to maintain the

ecological integrity of the protected area and to maintain the attributes for which the protected area was established. Environment and Climate Change Canada prepares a management plan for each protected area in consultation with First Nations, the public and other stakeholders.

A management plan specifies activities that are allowed and identifies other prohibited activities that may be undertaken under the authority of a permit. It may also describe the necessary improvements needed in the habitat, and specify where and when these improvements should be made. A management plan identifies Aboriginal rights and allowable practices specified under land claims agreements. Further, measures carried out for the conservation of wildlife must not be inconsistent with any law respecting wildlife in the province in which the protected area is situated.

What is Protected Area Management?

Management includes monitoring wildlife, maintaining and improving wildlife habitat, periodic inspections, enforcement of regulations, as well as the maintenance of facilities and infrastructure. Research is also an important activity in protected areas; hence, Environment and Climate Change Canada staff carries out or coordinates research in some sites.

The series

All of the National Wildlife Areas are to have a management plan. The management plans should be initially reviewed 5 years after the approval of the first plan, and every 10 years thereafter.

To learn more

To learn more about Environment and Climate Change Canada's protected areas, please visit our website at **https://www.canada.ca/en/environment-climate-change/services/national-wildlife-areas.html** or contact the Canadian Wildlife Service in Ottawa.

Cap Tourmente National Wildlife Area

Cap Tourmente National Wildlife Area (NWA) is a key site in Environment and Climate Change Canada's (ECCC's) network of protected areas thanks to its ecological value and historical importance as well as its vast reputation. For over 40 years, the NWA has been reknown for species and habitat management, agriculture, migratory bird hunting and interpretation services offered to the public. Cap Tourmente NWA was created in 1978 by the Canadian Wildlife Service (CWS) to protect an American bulrush marsh that is one of the main habitats of the greater snow goose in the St. Lawrence Estuary during migration periods.

Cap Tourmente NWA is a 2,308 hectare protected area located in the municipality of Saint-Joachim on the north shore of the St. Lawrence River, 50 kilometres northeast of downtown Quebec City. It was the first North American site to be designated a Wetland of International Importance under the Ramsar Convention. It has also been designated an Important Bird Area (IBA). In addition, the NWA and its many historic buildings testify to more than 400 years of human occupation and agricultural activities. In 2017, the house of La Petite Ferme was designated a national historic site by the Government of Canada.

Located at the junction of the Canadian Shield, the St. Lawrence Lowlands, and the Appalachians, as well as at the confluence of the upper and middle St. Lawrence estuaries, Cap Tourmente NWA is made up of diverse ecosystems including the intertidal marsh, the coastal swamp, the agricultural plain, and the forest. These ecosystems contain a wide variety of animal and plant species. This protected area hosts some 180 bird species every year and is home to about 35 mammal species, 21 forest stand types, and 700 plant species. Several of these species are at risk, including the bobolink, the wood thrush, the Nelson's sparrow, the monarch and the butternut. The NWA is famous for the breathtaking spectacle offered by the tens of thousands of greater snow geese during spring and fall migration and for the many migratory birds that use its mosaic of habitats. It is home to about 20 species of ducks and geese, 10 species of birds of prey, and 20 species of warblers. In the spring, the wood duck, northern harrier, pileated woodpecker, ruffed grouse, scarlet tanager, indigo bunting and American redstart are often seen in this protected area. The coastal swamp is used by the red-winged blackbird, swamp sparrow, American black duck, and others. In the winter, the NWA is home to more than 20 bird species, including the black-capped chickadee, blue jay, and barred owl. The most common mammals are the muskrat, white-tailed deer, and red squirrel. The American porcupine, red fox, and black bear are also observed.

Cap Tourmente NWA is open to the public almost year-round, but opening times and time periods vary according to the season. Fees apply when visitor services are provided. The following activities are permitted: hiking, nature observation and photography on the trails, and picnicking at authorized locations as well as agricultural activities and migratory game bird (waterfowl) hunting with permits and in designated areas.

Cap Tourmente NWA faces significant threats and presents various management challenges[1], including human presence and disturbances, agriculture, biological resource use (hunting), pollution (risk of accidental spills), invasive or otherwise problematic species, genes and diseases, transportation and service corridors (roads and railways), and climate change and extreme weather events. This protected area also presents other management challenges, such as public awareness regarding the NWA's conservation, collaboration among governments, local stakeholders and residents in conservation efforts, and scientific knowledge gaps.

The goals of this management plan are to:

1) protect and enhance important habitats for the greater snow goose and other waterfowl species, species at risk, priority bird species and other wildlife species;
2) reduce the impact of human activities on the NWA;
3) adopt an integrated agricultural approach aiming to conserve the habitats of the greater snow goose, other waterfowl species and grassland birds at risk, to sustain practice of the controlled goose hunt and to respect the historical agricultural character and rural landscapes of the NWA;
4) review the greater snow goose controlled hunt program, taking into account behavioral changes in this population, the *Snow Goose in Québec 2013–2018 Action Plan* as well as the conservation of species and habitats, and to harmonize it with the other activities offered to visitors;
5) in cooperation with outside collaborators, reduce pressures to the NWA and its area of influence in order to promote regional biodiversity, the conservation of natural habitats in adjacent areas, connectivity between habitats, and better ecological conditions;
6) consolidate and implement the NWA's interpretation program in order to promote public and local communities' awareness of the conservation of this protected area, wildlife species and their habitats;

[1] The nomenclature of the threats and management challenges is based on the Threats Classification System of the International Union for the Conservation of Nature (IUCN, 2015; see also Salafsky et al., 2008).

7) work with and obtain support from local communities to protect the NWA's habitats and species;
8) conduct ecological monitoring of the NWA and improve knowledge of wildlife species and their habitats; and
9) preserve and highlight the NWA's historical and cultural heritage.

Over the coming years, the ECCC-CWS team responsible for management of Cap Tourmente NWA will continue its wildlife and habitat conservation mission with the collaboration and support of regional stakeholders, various government departments, and scientists. This NWA will become a demonstration site (model) for the development of best practices in wildlife management, agriculture, migratory bird hunting, and interpretation services for the public. It will be an important site for raising the public's awareness of and appreciation for Canada's network of NWAs.

The first management plan for Cap Tourmente NWA was published in 1986. This document constitutes the new management plan for this protected area. It will be implemented over a 10-year timeline, depending on priorities and available resources.

Nothing in this management plan shall be construed so as to abrogate or derogate from the protection provided for existing Aboriginal or treaty rights of the Indigenous peoples of Canada by the recognition and affirmation of those rights in section 35 of the *Constitution Act*, *1982*.

Cap Tourmente NWA Helps Connect Canadians with Nature

Cap Tourmente NWA is one of 10 NWAs selected as part of the Connecting Canadians with Nature initiative. Through this initiative, Environment and Climate Change Canada allocated funds in selected sites to improve public infrastructure and promote the development of on-site interpretation programs through partnerships. The initiative aims to provide Canadians with more opportunities for recreation and connection with nature on federal lands managed on their behalf, as long as the activities do not adversely affect wildlife conservation and are consistent with site objectives.

Cap Tourmente NWA was selected as part of the initiative because of its appeal to visitors (nearly 40,000 people visited the site in 2018), proximity to Quebec City, trail network, its well-established interpretation centre and varied interpretation activities including wildlife.

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1 DESCRIPTION OF THE PROTECTED AREA

Cap Tourmente National Wildlife Area (NWA) is located on the north shore of the St. Lawrence River, 50 kilometres northeast of downtown Quebec City (Figure 1). This 2,308-hectare protected area was created in 1978 by Environment and Climate Change Canada (ECCC, then Environment Canada) to protect an American bulrush (*Schoenoplectus americanus*) marsh that provides important habitat for greater snow geese (*Anser caerulescens atlantica*) during migration and is one of the most important marshes of its kind in the St. Lawrence Estuary. Located at the junction of three geological regions—the Canadian Shield (Laurentians), the St. Lawrence Platform (or Lowlands) and the Appalachians—and at the confluence of the upper and middle St. Lawrence estuaries, the NWA includes varied ecosystems and numerous habitats that support a very high diversity of animal and plant species. It has four main ecosystem types: the intertidal marsh, the coastal swamp, the agricultural plain, and the forest. In addition, this protected area contains many buildings of great historical value that bear witness to more than 400 years of human occupation and agricultural activities. Cap Tourmente's many treasures attract about 40,000 visitors each year.

Due to its many habitats and remarkable biodiversity, the NWA is a prime site for bird watching: 326 bird species have been observed since its creation among which 180 species are recorded each year, including 120 on-site breeding species. During migratory periods, in addition to the tens of thousands of greater snow geese that gather on the flats and make the site famous, large numbers of birds stop here, including several species of warblers, dabbling ducks, and birds of prey. The NWA is also used by some 35 mammal species, 10 amphibian species, 2 reptile species, 21 forest stand types and 700 plant species. Many of these species are at risk.

Cap Tourmente NWA was recognized as a Wetland of International Importance under the Ramsar Convention in 1981 and was the first site to obtain this recognition in North America (Ramsar, 2016). It is also part of the Cap Tourmente Important Bird Area (IBA). In addition, the house of La Petite Ferme was designated a national historic site by the Government of Canada in 2017. Table 1 summarizes general information about this protected area.

Toponymic Note

During the first half of the 18th century, the geographic name "Cap-Tourmente" applied to the entire eastern sector of Côte-de-Beaupré (CTQ, 2016). However, it seems that the only municipality that has officially been called, and is still officially called Cap-Tourmente is the

parish municipality of Saint-Louis-de-Gonzague-du-Cap-Tourmente. In this document, the term "Cap Tourmente" or "Cap-Tourmente" is used to refer to any administrative entity and place name (e.g. NWA, sector, region). The term "Cape Tourmente" refers to the cape (the promontory or geological feature) itself. However, the (highly variable) spelling used by the various sources has been reproduced unedited in the references.

Table 1 Information on Cap Tourmente National Wildlife Area

Protected Area Designation	National Wildlife Area
Province or territory	Quebec – Parish municipality of Saint-Joachim, aquatic unorganized territory (UT) of the RCM of La Côte-de-Beaupré and UT of Sault-au-Cochon; RCM of La Côte-de-Beaupré
Latitude and longitude	47º 04′ N and 70º 47′ W
Area	2,308.17 ha
Protected Area Designation Criteria (Protected Areas Manual[1])	Historical: Protect the American bulrush marsh, the main habitat of the greater snow goose during migration periods. Current: Criterion 1b – The area supports at least 1% of the Canadian population of a species or subspecies or group of species at any time of the year. Criterion 2a – The area supports an appreciable fauna assemblage of rare, vulnerable, threatened or endangered species or subspecies of plants or animals, or an appreciable number of individuals of any one or more of these species or subspecies. Criterion 3a – The area is a rare or unusual wildlife habitat, of a specific type in a biogeographic region.
Protected Area Classification System[1]	Category A – Species or critical habitat conservation Category C – Information and interpretation
International Union for Conservation of Nature (IUCN[2]) Classification	Category IV – Habitat/Species Management Area: a protected area managed primarily for conservation purposes, with management intervention.
Order in Council Number	*SOR 78-408*
Directory of Federal Real Property (DFRP) number	67466
Publication in Canada Gazette	1978
Additional designations	Wetland of International Importance (Ramsar Site), part of an Important Bird Area (Cap Tourmente IBA) and part of the Charlevoix World Biosphere Reserve. The NWA includes an area where hunting is prohibited (Zone d'interdiction de chasse or ZIC Cap-Tourmente). The house of La Petite Ferme is a national historic site of Canada and a classified federal heritage building.

Table 1 Information on Cap Tourmente National Wildlife Area

Faunistic[3] and floristic[4] importance	Presence of wetlands, agricultural areas and forests that constitute a staging site and important breeding grounds for birds. Great diversity of habitats and plant and animal species in a relatively small area. Presence of wildlife and plant species at risk.
Invasive species	The NWA is home to 21 potentially problematic species, including five plant species considered more threatening than the others, namely the common reed, Japanese knotweed, wild chervil, smooth bedstraw, and rough mannagrass, as well as a very problematic fungus species, the butternut canker.
Species at risk	The NWA is home to at least 37 species considered to be at risk or likely to be designated as such under Canada's *Species at Risk Act* (SARA) or the Quebec *Act Respecting Threatened or Vulnerable Species*. Examples include the bobolink, the wood thrush, the Nelson's sparrow, the monarch, and the butternut.
Management agency	Environment and Climate Change Canada – Canadian Wildlife Service
Public Access and Use	Accessible almost all year round, but opening periods and times vary according to the season. Fees are charged when visitor services are offered. Authorized activities: hiking (approximately 19 km of trails), nature observation, photography and visiting the interpretation centre, which includes an exhibition room, audiovisual presentations and awareness activities. The fall greater snow goose hunt and agricultural activities are authorized in the NWA under permits issued by ECCC.

1. Environment Canada, 2005
2. IUCN, 2008
3. Names of vertebrate species used by the MFFP, 2020a.
4. Names of plant species used by Brouillet et al., 2010+ (VASCAN, accepted names).

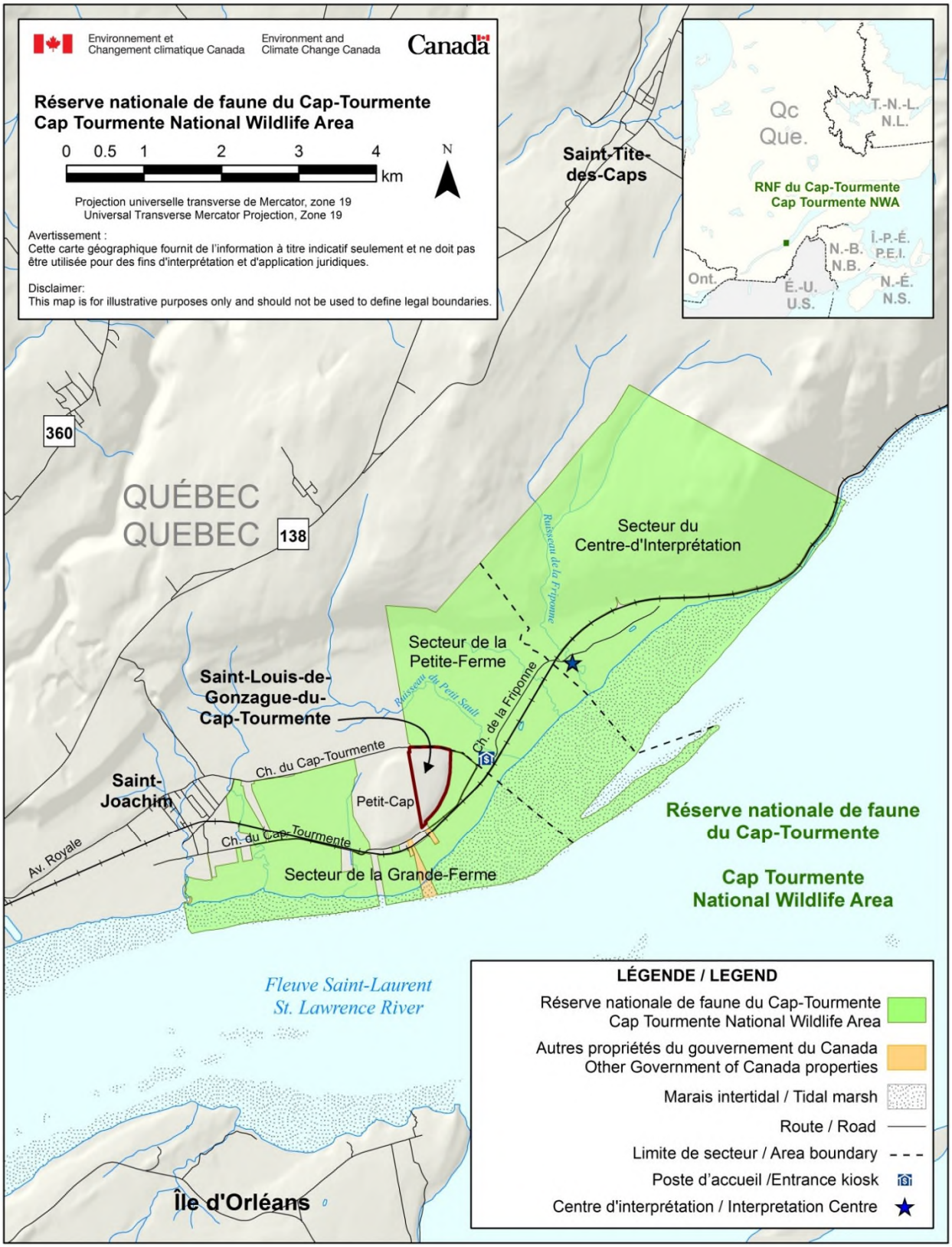

Figure 1 Cap Tourmente National Wildlife Area

1.1 REGIONAL CONTEXT

Cap Tourmente National Wildlife Area (Figure 1) is located in the administrative National Capital Region of Quebec and in the Regional County Municipality (RCM) of La Côte-de-Beaupré, on the north shore of the St. Lawrence River. The entrance and most of the NWA are located in the parish municipality of Saint-Joachim. The NWA also slightly overlaps with the aquatic unorganized territory (UT) of the RCM of La Côte-de-Beaupré, to the south, as well as the UT of Sault-au-Cochon, to the east.

Saint-Joachim is an agricultural municipality with a population of approximately 1,500 (1,452 in 2019; Municipalité de Saint-Joachim, 2019). Nearly 73% of its area is devoted to agriculture. This municipality organizes the Snow Goose Festival every fall. It is home to, among other things, the Centre d'initiation au patrimoine – La Grande Ferme (La Grande Ferme Heritage Initiation Centre), whose mission is to promote the region's heritage. This centre hosts the annual Fall Market as part of the Snow Goose Festival.

The RCM of La Côte-de-Beaupré has a population of approximately 27,000 (27,394 in 2014; MRC de La Côte-de-Beaupré, 2019). The area, which dates back to the early days of French settlement in North America, is known for its rich historical and natural heritage. At the western edge of the RCM is Montmorency Falls which, at 83 metres (30 metres higher than Niagara Falls), dominates the landscape (Sépaq, 2016). Approximately 85% of the area of this RCM consists of two UTs intended for recreation, conservation or forestry, namely Lac-Jacques-Cartier and Sault-au-Cochon UTs. The RCM also includes an aquatic UT. Lac-Jacques-Cartier UT includes the Laurentides Wildlife Reserve, Jacques-Cartier Provincial Park, Montmorency Forest and the Seigneurie de Beaupré, which is also known as the "Terres du Séminaire" (MRC de La Côte-de-Beaupré, 2019). Sault-au-Cochon UT is home to the Sault-au-Cochon old-growth forest, an exceptional forest ecosystem located approximately 15 kilometres northeast of Sainte-Anne-de-Beaupré (MRNF, 2005). This UT includes the Sentier des Caps de Charlevoix trail, which is connected to Cap Tourmente NWA.

La Côte-de-Beaupré is also home to nearly 400 companies in the service, manufacturing, health care, wholesale and retail, construction, and agriculture sectors (MRC de La Côte-de-Beaupré, 2011). The tourism industry is one of its most important economic drivers. The Sainte-Anne-de-Beaupré Basilica and Mont Sainte-Anne, which attract hundreds of thousands of visitors each year (approximately 1,000,000 and 733,000 respectively), are major tourist attractions. Other attractions in the RCM include Chute-Montmorency Park (more than 600,000 visitors/year), Sainte-Anne Canyon (more than 100,000 visitors/year), Jean-Larose Falls, the Sentier des Caps de Charlevoix trail and several agri-tourism farms (MRC de La Côte-

de-Beaupré, 2011). In addition, the organization Aux Trois Couvents offers cultural and educational programs in the Vieux-Couvent de Château-Richer (the old convent of Château Richer). Finally, since 2012, the Charlevoix tourist train has been operating on various routes in the region, between Montmorency Falls Park and La Malbaie.

Figure 2 Aerial view of Cap Tourmente National Wildlife Area
Photo © Environment and Climate Change Canada

Cap Tourmente NWA is an important protected area and a popular ecotourism site in the National Capital Region of Quebec. It is open to the public almost all year round, but opening periods and times vary according to the season. Access fees are charged when visitor services are offered. The NWA receives some 40,000 visitors every year. Visitors include nature lovers, ornithologists, hikers and photographers who come to enjoy the beauty and vastness of the landscape, the exceptional biodiversity, the rich historical heritage and the interpretation services offered. The NWA is an ideal site near Quebec City for hiking and, of course, for observing the tens of thousands of greater snow geese that stop there during migration. The new Les Chutes trail is now a “must-see” for visitors. In the fall, the area also attracts hundreds of goose and waterfowl hunters who are authorized to hunt in certain areas of the NWA under a

permit issued by ECCC as part of a controlled hunt program whose participants are determined by a draw. In 2001, the economic impact of this activity in the region was approximately $1 million (Campagna et al., 2001).

1.2 HISTORICAL OVERVIEW

1.2.1 Prehistory

Artifacts found on the coastal plain of Cap Tourmente NWA provide evidence of the presence of Indigenous peoples for over 2,000 years. Some traces of prehistoric human presence are concentrated in summer hunting and fishing camps that were occupied by Indigenous peoples between May and October (Mercier et al., 1986). Excavations carried out by J. Dumont in 1983 in the Petite-Ferme sector (at the junction of the two plots of land closest to the parking lot between the road and the railway) uncovered a cache of palaeohistorical artifacts (fragments and stone and ceramic tools) suggesting that this site was occupied during the Middle Woodland (2,400 to 1,000 years ago) and the Late Woodland (1,000 to 400 years ago) (Pintal and Lambert, 2014). Other excavations carried out in 1992 and 1993 around the house of La Petite Ferme uncovered remains showing two distinct occupation periods (Guimont, 1996). The oldest period, occupation by small bands of St. Lawrence Iroquoians, dates back to at least the 13th century and perhaps even the 11th century. The second is a little more recent and would be between the 14th and 16th centuries. Presumed remains of longhouses have been found there, but for the time being their construction cannot be associated with either of these two periods. Corn kernels dating back about a thousand years have also been found there. These kernels may have come from trade with other Iroquoians living further west or could be evidence that this plant was cultivated on the site (Guimont, 1996).

The Iroquoians were the dominant group in the St. Lawrence Valley several centuries before the arrival of Europeans. At that time, several villages were distributed along both shores of the St. Lawrence River (Guimont, 1996). These Iroquoians lived in multi-family longhouses surrounded by clearings where they grew corn, squash, beans, pumpkins and tobacco. They subsisted on agriculture, hunting and fishing. They accumulated large reserves of smoked fish, in addition to enjoying the abundance of passenger pigeons (*Ectopistes migratorius*) and migrating waterfowl. They sometimes hunted white-tailed deer (*Odocoileus virginianus*)], black bear (*Ursus americanus*) and muskrat (*Ondatra zibethicus*) (Mercier et al., 1986).

1.2.2 History

European Contact and Colonization

During his voyage along the St. Lawrence Valley in 1535, Jacques Cartier saw several Iroquoian villages on both sides of the river. The territory of the Cap Tourmente NWA may have been the site of one of these villages (Guimont, 1996) (see 1.2.1 Prehistory).

During his first trip in 1603, Champlain found no trace of Iroquoian presence on the territory. In 1623, he ordered the harvesting of “beach hay” (natural grasslands including the American bulrush), which grew in abundance at the foot of Cape Tourmente, and had it transported to the habitation at Quebec City to feed livestock. Recognizing the agricultural potential of the lands adjacent to the escarpment and wishing to put an end to the constant voyages between the colony of Québec and the Cape, Champlain had a fortified farm built in 1626 on the current site of La Petite Ferme (De Repentigny, 1979). This farm, which served as a food reserve for the first settlers of Quebec City, became the first livestock farm in the St. Lawrence Valley, and one of the first farms in New France (Guimont, 1996). The building was burned down two years later by the English (Mercier et al., 1986; Lepage and De Repentigny, 2004).

Resource Use and Development

In 1627, the Compagnie des Cent-Associés acquired the La Petite Ferme site and used it for livestock grazing. In 1636, the land became the property of the Compagnie de Beaupré, which administered the Seigneury de Beaupré and Île d’Orléans until 1664 (De Repentigny, 1989), when Monsignor François de Montmorency de Laval, founder of the Séminaire de Québec, acquired almost all of these seigneuries. Monsignor de Laval had the Cap Tourmente residence built precisely where Champlain’s establishments were located, a site that corresponds to the current house of La Petite Ferme. He also ordered the construction of buildings on the La Grande Ferme site. From 1667 onwards, farming activity once again flourished in Cap Tourmente (De Repentigny, 1992). In 1680, Monsignor de Laval transferred all his property to the Séminaire de Québec (De Repentigny, 1992). In 1683, he commissioned the construction of the first public road on the farm estate to facilitate communications between the city and the Séminaire de Québec farms located in Saint-Joachim and Cap Tourmente (Guimont, 1996).

Towards the end of the 17th century, the construction of numerous farm buildings, the increase in the area of cultivated land and excellent agricultural yields brought prosperity to the farms of Cap Tourmente. The La Petite Ferme site, still managed by the Séminaire de Québec,

then by Joseph Cadet from 1748 (De Repentigny, 1992), was one of the most important farms in New France (Guimont, 1996).

Agriculture

Under French rule (between 1664 and 1759), livestock production and agriculture were the two main activities carried out at La Petite Ferme. The grasslands had significant value as forage for livestock, while wheat and corn were grown on a large scale, along with barley and oats (Guimont, 1996). The farms of Cap Tourmente enjoyed a certain prosperity until the English burned and looted the area in 1759, damaging part of La Petite Ferme. Agricultural activities were suspended, except those at La Grande Ferme, leaving the Séminaire penniless (Guimont, 1996). In 1763, the vast majority of the farms and mills were restored, and the abundant and diverse harvests breathed new life into the Cap Tourmente estate. In the 18th century, wheat was the main crop grown there, but in the 19th century it was replaced by oats and potatoes (Lepage and De Repentigny, 2004). Until the mid-19th century, farms offered a wide variety of food products such as dairy and meat products, flour and eggs. Bread and butter were produced on site and new land was cultivated (Guimont, 1996). Around the middle of the 20th century, dairy production activities intensified (Lepage and De Repentigny 2004).

In the second half of the 20th century, the Séminaire began to sell off its land. In 1969, the Canadian Wildlife Service of Environment and Climate Change Canada (then Environment Canada) acquired the farms located on the NWA's current territory. Cap Tourmente NWA is an important historic site that saw more than 300 years of continuous farming and was the site of the first livestock farm in the St. Lawrence Valley. Even today, some agricultural plots are still cultivated there to preserve the traditional agricultural landscape and to provide nesting and feeding sites for migratory bird species, particularly grassland birds and waterfowl.

Hunting

Under French rule (1664–1759), waterfowl hunting on the flats of Cap Tourmente was probably the most popular activity (Guimont, 1996). Species hunted by farmers included the snow goose, Canada goose (*Branta canadensis*), ruffed grouse (*Bonasa umbellus*), passenger pigeon, snow bunting (*Plectrophenax nivalis*), American robin (*Turdus migratorius)*, willow ptarmigan (*Lagopus lagopus*), shorebirds, pigeons, and mammals such as the snowshoe hare (*Lepus americanus*), American beaver (*Castor canadensis*), American mink (*Neovison mink*), red fox (*Vulpes vulpes*) and muskrat (Mercier et al., 1986).

The popularity of hunting among the inhabitants of Cap Tourmente continued into the 19th and 20th centuries (Guimont, 1996). It was not until 1908 that the Séminaire de Québec

began to divest itself of its exclusive hunting rights and to rent the Cap Tourmente flats to private clubs. The first hunting club, the Cap Tourmente Hunting Club, was formed in 1908. The club's first hunting season, from September 1 to October 12, 1909, lasted 16 days, with an average of three hunters per day. During that first hunting season, members hunted 15 greater snow geese and 309 black ducks (*Anas rubripes*) (Mercier et al., 1986). In the years preceding the acquisition of the farm by the CWS, no fewer than six private hunting clubs were established in the Cap Tourmente region (Guimont, 1996). The exclusivity enjoyed by hunting clubs and game wardens indirectly protected waterfowl, in this case the popular greater snow goose, before new regulations enacted under the *Migratory Birds Convention Act* of 1916 prohibited the spring migratory bird hunt in 1918 (Mercier et al., 1986).

Greater Snow Goose

At the turn of the 20th century, the world's sole greater snow goose population comprised only 3,000 individuals (Lefebvre et al., 2017a). In 1934, the importance of the Cap Tourmente flats for the survival of this subspecies was addressed in a lecture presented at the congress of the Association canadienne-française pour l'avancement des sciences (ACFAS; the French-Canadian Association for the Advancement of the Sciences). The presentation focused on the natural history of the greater snow goose and reported the presence of 12,000 individuals in the Cap Tourmente sector. This was the beginning of a collective awareness movement for the protection of this bird (Mercier et al., 1986). The population increased for the first time in the 1960s and then remained stable in the 1970s as a result of conservation measures and hunting restrictions. Since the mid-1980s, it has grown exponentially (Batt, 1998). The causes of this significant growth include increased use of agricultural fields by geese, both on wintering grounds and at staging sites (Gauthier et al., 2005). By this time, the population was considered to be overabundant and therefore posed a threat to its own natural habitats and the species occurring there (Lefebvre et al., 2017a). Since the implementation of special conservation measures in 1999 in Canada and 2009 in the United States, the greater snow goose population has ranged from 800,000 to 1 million individuals (Lefebvre et al., 2017a; also see 2.2.4 Birds – Greater snow goose).

When the federal government acquired the Cap Tourmente territory in 1969, all hunting activities were suspended until 1972, when the Canadian Wildlife Service began its controlled hunting program to regulate the greater snow goose population (Lepage and De Repentigny, 2004). Until 2010, draft horses (traditional hunting) were used to transport hunters to hunting sites. This practice was abandoned to optimize hunting success and streamline costs. In 2009 and 2010, an experimental licence was issued to the Association des amis du cap Tourmente

(AACT) to conduct a spring hunting program in the western sector of the NWA. This license was not renewed subsequently.

Forestry

When colonization of Cap Tourmente began, the lowland forest was logged to obtain timber for construction and heating. It was not until the construction of a sawmill in 1762 that forestry began in earnest on the plateau forest, through selective logging. White pine (*Pinus strobus*), spruce, balsam fir (*Abies balsamea*), eastern hemlock (*Tsuga canadensis*), some hardwoods and occasionally oak were harvested in the southeastern part of the forest. Softwoods were used to construct buildings for the Séminaire and the farmers, while hardwoods were used for firewood, except for oaks taken from the sides of the cape, which were used for the construction of transport boats by the people of Petite-Rivière-Saint-François (Mercier et al., 1986). This logging ended around 1940.

From about 1940 to 1945, selective logging of fir, spruce and yellow birch (*Betula alleghaniensis*) was carried out in the northwestern sector of Cape Tourmente mountain to produce pulpwood (conifers) and lumber (birch). Large numbers of eastern white cedar (*Thuja occidentalis*) were removed from the forests of the Cape to make fences, poles or shingles for roof construction (Mercier et al., 1986).

At the beginning of the 20th century, a fire ravaged part of the western flank of the cape, mainly destroying the forest stands along the cliff edge. This fire may have encouraged the development of red spruce (*Pinus resinosa*) forests or American beech (*Fagus Americana*) forests in this area. In the 1950s, a tornado severely damaged a stand of white pine (Mercier et al., 1986).

Fishing

At the start of the French colonization, Cap Tourmente settlers commonly fished for American eels (*Anguilla rostrata*), once very abundant in the St. Lawrence River. Farmers also fished for brook trout (*Salvelinus fontinalis*) and carp [sp] in streams, as well as cod probably Atlantic tomcod (*Microgadus tomcod*) in the river (Lepage and De Repentigny, 2004). In the second half of the 19th century, eel was still fished extensively on the coast (Guimont, 1996). The fishery of this species has not been conducted within the boundaries of the NWA since its creation (Mercier et al., 1986).

National Wildlife Area

On April 12, 1969, the Department of Indian Affairs and Northern Development, which included the Canadian Wildlife Service at the time, acquired a large part of the lands of the Séminaire de Québec in Cap Tourmente. Dairy operations ceased, but farming continued and even expanded, with many old fields being returned to cultivation and grazing being allowed on some plots (Mercier et al., 1986).

On April 27, 1978, the Cap Tourmente area was designated a National Wildlife Area under Canada's *Wildlife Area Regulations* to protect an American bulrush marsh that is a key habitat for the greater snow goose during migration (Mercier et al., 1986).

The first management plan for Cap Tourmente NWA was published in 1986 (see Mercier et al., 1986). The present document constitutes the new management plan. A conservation plan for the NWA was published in 2003 (see CWS, 2003). The full description of the management of Cap Tourmente NWA and the status of activities and programs carried out in this protected area since 1986 are presented in Appendix 2.

1.3 LAND OWNERSHIP

Cap Tourmente National Wildlife Area covers an area of 2,308.17 hectares. It is owned by the Government of Canada and managed by Environment and Climate Change Canada (ECCC). ECCC also owns 8.91 hectares of land adjacent to the NWA that do not have protected status. These properties are located in two areas in the Grande-Ferme sector: one is south of Saint-Joachim, on the western edge of the NWA (along the river), and the other is south of the Petit-Cap and is partially enclosed in the NWA.

1.3.1 Agricultural Permits

Today, the Canadian Wildlife Service of ECCC still farms some of the land in order to provide wildlife nesting and foraging habitat and to respect the agricultural history of the site. The NWA has approximately 695.5 hectares of agricultural plains (ECCC, 2016), of which approximately 425 hectares are cultivated. Of these, some 20 agricultural plots with a total area of roughly 250 hectares are leased to about a dozen farmers who hold permits (S. Bourbeau, CWS, unpublished data, 2015) (Figure 3). The Canadian Wildlife Service regulates these activities through three- to five-year agricultural permits that are issued under the *Wildlife Area Regulations* (*Canada Wildlife Act*) and that can be renewed annually. The rest of the agricultural plain is a wildlife area managed by the Canadian Wildlife Service. However, note that the plots leased to farmers are also, in a way, used for wildlife (see description of agricultural activities under 2.1.3 – Agricultural plain).

1.3.2 Hunting Permits

In the fall, a controlled greater snow goose hunt is authorized in some areas of the NWA. Participants are selected through a draw. The NWA includes eight hunting grounds grouped into four zones with a total area of approximately 53 hectares (Figure 15). For the fall of 2019, 128 permits allowing to accommodate a maximum of 512 hunters were issued under this controlled hunt program. In addition, each year, permits are issued to young hunters (maximum 12) for Waterfowler Heritage Day. This annual event, authorized by ECCC, was established in 2002 to allow young people to practice their waterfowl hunting skills and learn about wildlife conservation during the regular hunting season.

1.4 FACILITIES, INFRASTRUCTURE AND HABITAT ENHANCEMENT

Cap Tourmente National Wildlife Area has a large number of facilities, infrastructure and wildlife habitat enhancements (Table 2 and Figure 4), including around 20 buildings, some of which have historic value. The NWA also has several roads providing access to public activity and hunting areas as well as numerous hiking trails, totalling approximately 19 kilometres. The NWA's territory is divided into three areas (Figure 1): the Interpretation Centre Area and the Petite-Ferme Area, which are linked to public awareness activities and provide access to the hiking trail network, and the Grande-Ferme Area, which provides access to two observatories and two habitat enhancements (marshes).

The Interpretation Centre Area includes three main buildings. The Interpretation Centre (Figure 5) houses an exhibit on the NWA's biodiversity—which has been completely renewed in 2020 and should open to the public in 2021—, two projection rooms, an employee office and public washrooms. Near the centre is an interpretation equipment shed and the Maison des Français (Figure 6), an 18th century building designated as a Recognized Federal Heritage Building by the Federal Heritage Buildings Review Office (FHBRO), which is now used as a shed. This area also includes the Pavillon Léon-Provancher, which once housed offices, a snack bar and a store. In 2015, a duck banding station was put up beside the Pavillon to study bird migration and increase visitors' awareness of conservation issues about these animals. The station managed by the Observatoire d'oiseaux de Tadoussac will be operated until October 2022. As part of this research project, all measures are taken to prevent bird injuries.

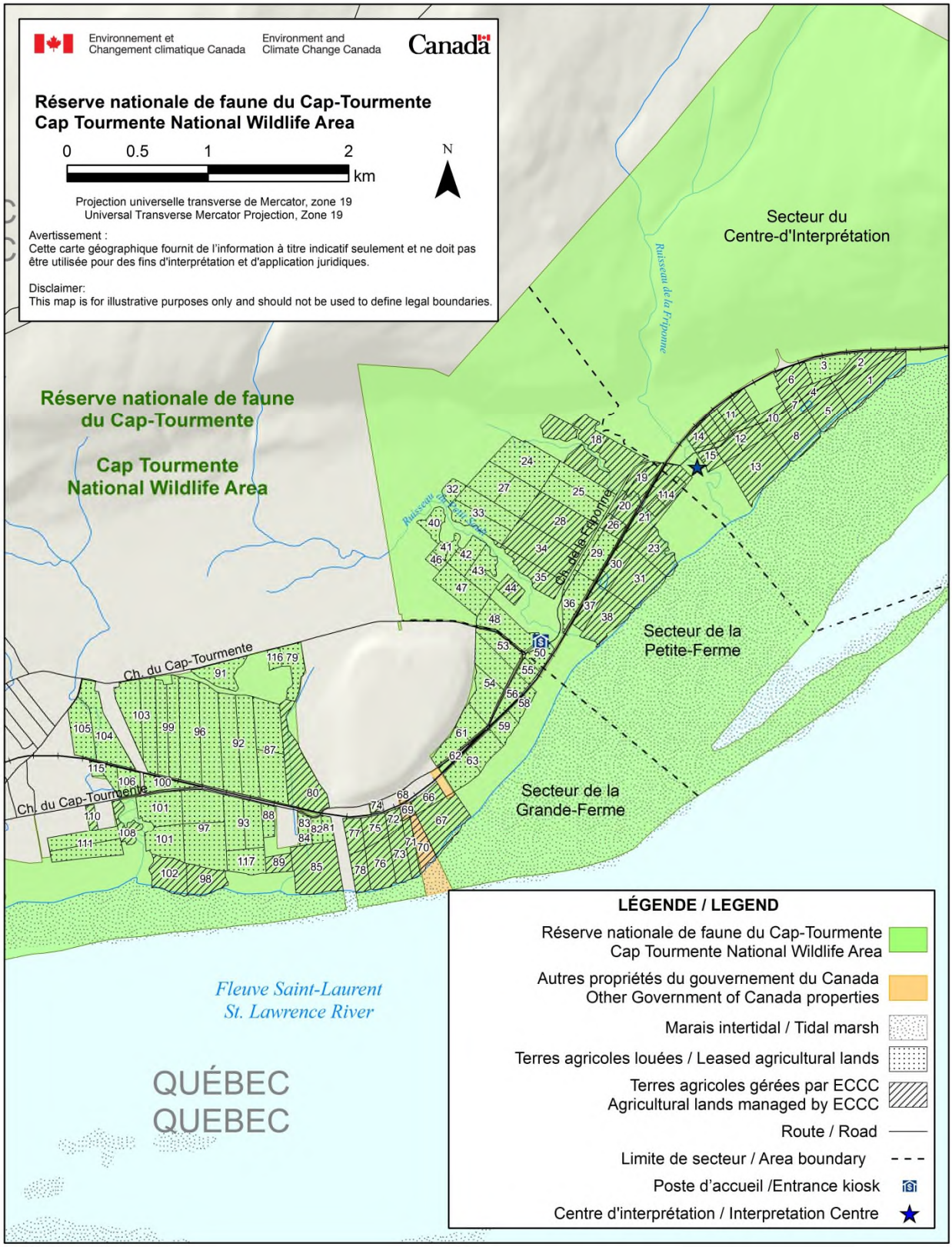

Figure 3 Lands leased under agricultural permits (2018) in Cap Tourmente National Wildlife Area

The Interpretation Centre Area also has a picnic shelter with infrared heating and five picnic areas. In addition, this area includes the ruins of a house in the historic complex of Ferme-du-Cap, as well as two hunting sites containing eight cylindrical steel blinds, a hunting shed and two hunting camps. It also includes a former stable that serves as a storage area, four main bridges crossing Ruisseau de la Friponne, three parking lots, a weather station and a wastewater pumping station that carries water to the settling tank in the Petite-Ferme Area. There is a network of eight established trails that includes eight lookout decks and two observation blinds (called lookout, *halte* or observatory) (Figure 7). Les Chutes trail is noteworthy with its four lookouts overlooking three beautiful waterfalls, the heritage buildings of La Petite-Ferme Area, and the Marais de la Petite-Ferme (marsh). Finally, this area also includes nine markers along the “Le passé se dévoile” historical trail or tour, and a wildlife habitat enhancement (at the Marais du Cap).

The Petite-Ferme Area includes about 10 buildings, most of which are part of the historic complex of La Petite Ferme. The house of La Petite Ferme (Figure 8) is a former 17th century farmhouse, which was designated a National Historic Site of Canada in 2017, and a Classified Federal Heritage Building (very high heritage value) by FHBRO in 1992. It now serves as an administrative office. A former forge now serves as a multi-purpose building; an old barn that was also used as a cowshed and stable is now used to store equipment and materials; a former grain store (granary) now serves as a warehouse with a refrigerated room to store game; a former workshop now serves as a mechanical and carpentry workshop. Buildings also include an office, an employee room, a first aid room, and public washrooms. The Petite-Ferme Area also includes an entrance (or toll) kiosk (Figure 9) at the entrance to the NWA, a fuel warehouse, and a radiocommunication equipment shed. There are also two hunting sites including eight cylindrical steel hunting blinds, two hunting camps, two hunting sheds, an information shelter, three picnic areas, four bridges crossing Ruisseau du Petit Sault (two for vehicles and two for hikers), a parking area, two wastewater pumping stations, a settling tank and a settling field (or polishing field), a telemetric antenna, and two fire hydrants. Finally, this area includes a network of nine established trails that includes the L’Érablière Shelter (Figure 10), a dry toilet, a lookout deck and an observation blind (both called “observatories”), an observation tower (Figure 11), 13 winter bird feeding stations, four historic trail markers (two of which are in the same location) and two habitat enhancements (at the Marais de la Petite-Ferme (marsh) [Figure 12] and the Marais du Carouge).

The Grande-Ferme Area (Figure 13) includes two habitat enhancements, one at the Marais de la Grande-Ferme and one at the Marais des Graves, each equipped with an

observation blind (both called observatories) accessible through a short path. ECCC has recently installed an information shelter at each place. This area also includes a warehouse owned by ECCC, four hunting sites including 16 cylindrical steel blinds, two hunting camps, two hunting sheds, a bridge, several hay dryers and a fire hydrant. The area takes its name from the historic La Grande Ferme site, of which only the ruins of a church and a farmhouse called “La Grande Ferme” remain today. These ruins are not part of the NWA. La Grande Ferme farmhouse is classified as a heritage building in Quebec and has housed the Centre d’initiation au patrimoine – La Grande Ferme since 1979. This centre is managed by the Corporation du Centre d’initiation au patrimoine – La Grande Ferme, which owns the La Grande Ferme house and site (including the remains of the church). The site includes a parking lot.

The NWA also includes other facilities and infrastructure, namely 64 fences and 47 gates, a network of nest boxes, traffic signs, a water system and an electricity system.

Between 1972 and 1995, Ducks Unlimited Canada created four marshes in this protected area: Marais de la Petite-Ferme, Marais du Cap, Marais de la Grande-Ferme and Marais des Graves. A fifth marsh, Marais du Carouge, is the remaining portion of a pre-existing habitat enhancement that is under the responsibility of Environment and Climate Change Canada (e.g. sealing breaches to maintain water levels). Lastly, since archaeological digs have been carried out at the NWA, several remains of significant historical value have been collected for conservation and presentation purposes.

Table 2 Facilities and infrastructure in Cap Tourmente National Wildlife Area

Area	Type of facility or infrastructure	Approximate size[1]	Owner
Interpretation Centre Area			
Facilities and infrastructure			
Interpretation Centre Area	Interpretation centre One exhibit, two projection rooms, employee offices and public toilets (10 toilets and 3 urinals)	570 m^2	ECCC
Interpretation Centre Area	A bat maternity colony (Installed near the interpretation centre.)		ECCC
Interpretation Centre Area	Interpretation centre shed		ECCC
Interpretation Centre Area	Maison des Français (shed) (federal heritage building.)	20 m^2	ECCC
Interpretation Centre Area	Pavillon Léon-Provancher (purpose to be established)	95 m^2	ECCC
Interpretation Centre Area	Summer bird feeding station (next to the Pavillon Léon-Provancher)		

Table 2 Facilities and infrastructure in Cap Tourmente National Wildlife Area

Area	Type of facility or infrastructure	Approximate size[1]	Owner
Interpretation Centre Area	Bird banding station managed by the Observatoire d'oiseaux de Tadoussac (from 2015 to 2022) (next to the Pavillon Léon-Provancher)		ECCC
Interpretation Centre Area	The Ruins – Ferme-du-Cap house		ECCC
Interpretation Centre Area	The Old Stable (warehouse and hunting shed for C1)		ECCC
Interpretation Centre Area	Picnic areas (5): Interpretation centre (1) Maison des Français (1) Pavillon Léon-Provancher (1) Le Souchet trail (1) The Forge (1)		ECCC
Interpretation Centre Area	Picnic shelter (with infrared heating)	32 m^2	ECCC
Interpretation Centre Area	Information shelter	2.5 m	ECCC
Interpretation Centre Area	Hunting site C1 and C2 (8 cylindrical steel blinds)		ECCC
Interpretation Centre Area	Hunting shed for C2 (1)		ECCC
Interpretation Centre Area	Hunting camps for C1 and C2 (2)	11.8 m^2 each	ECCC
Interpretation Centre Area	Main bridges (4) crossing Ruisseau de la Friponne at the interpretation centre and at L'Allée d'Ormes, Le Moqueur-Chat and La Cédrière trails		ECCC
Interpretation Centre Area	Meteorological station		ECCC
Interpretation Centre Area	Wastewater pumping station (1) that conveys water to the settling tank in the Petite-Ferme Area		ECCC
Interpretation Centre Area	Historical trail markers (9)		ECCC
Interpretation Centre Area	Parking areas (3): P2 (interpretation centre) P3 (west of P2; west of access road) P4 (west of P3; fields used for parking during fall peak periods)		ECCC
Interpretation Centre Area	Fire hydrant (1)		ECCC
Interpretation Centre Area	Birds of Prey Observatory La Halte-du-Pèlerin Observatory (observation platforms, L'Allée-d'Ormes trail)	37 m^2	ECCC
Interpretation Centre Area	Marais-du-Cap Observatory (observation blind, L'Allée-d'Ormes trail)		ECCC
Interpretation Centre Area	Le Bois-Sent-Bon Observatory (observation blind, Le Bois-Sent-Bon trail)		ECCC

Table 2 Facilities and infrastructure in Cap Tourmente National Wildlife Area

Area	Type of facility or infrastructure	Approximate size[1]	Owner
Interpretation Centre Area	La Falaise Lookout (observation platform, La Falaise trail)		ECCC
Interpretation Centre Area	La Cime Lookout (observation platform, La Cime trail)		ECCC
Interpretation Centre Area	Lookouts (4) (observation platforms, Les Chutes trail)		ECCC
Trails			
Interpretation Centre Area	Le Bois-Sent-Bon *Trail* *Access trail* *Bridges (5)* *Boardwalk (1)*	1,227.5 m: *952 m* *74 m* *41.5 m total* *160 m*	ECCC
Interpretation Centre Area	Le Moqueur-Chat *Trail* *Bridges (2)*	180 m: *158.9 m* *21.1 m*	ECCC
Interpretation Centre Area	L'Allée-d'Ormes *Trail* *Access trail* *Bridge (1)*	2,040 m: *1,579.5 m* *455 m* *5.5 m*	ECCC
Interpretation Centre Area	La Cédrière *Trail* *Boardwalks (12)* *Bridge (1)*	1,668 m: *1,571.2 m* *80.8 m* *16 m*	ECCC
Interpretation Centre Area	Le Pierrier *Trail* *Boardwalks (5)* *Bridges (at least 5)*	1,250 m: *1,014.1 m* *211.8 m* *24.1 m*	ECCC
Interpretation Centre Area	La Falaise *Trail* *Boardwalk (1)* *Staircase (1)* *Bridge (1)*	1,048 m: *1,035.7 m* *2.9 m* *4.8 m* *4.6 m*	ECCC
Interpretation Centre Area	La Cime *Trail* *Boardwalks (3)*	2,500 m: *2,483.6 m* *16.4 m*	ECCC
Interpretation Centre Area	Les Chutes *Landings (16)* *Lookout or observation decks (4)*	900 m	ECCC
Wildlife habitat enhancements			
Interpretation Centre Area	Marais du Cap (marsh)	9.3 ha (marsh: 3.7 ha; upland: 5.6 ha)	ECCC
Petite-Ferme Area			
Facilities and infrastructure			

Table 2 Facilities and infrastructure in Cap Tourmente National Wildlife Area

Area	Type of facility or infrastructure	Approximate size[1]	Owner
Petite-Ferme Area	Entrance kiosk (or toll kiosk, ticket office)		ECCC
Petite-Ferme Area	Information shelter	3 m	ECCC
Petite-Ferme Area	Petite-Ferme House (National historic site and classified federal heritage building; serves as an office.)	930 m^2	ECCC
Petite-Ferme Area	Petite-Ferme Workshop (Serves as a mechanical and carpentry workshop and includes an office, an employee room, a first aid room and public washrooms.)	320 m^2	ECCC
Petite-Ferme Area	Petite-Ferme Granary (Hangar) (Serves as a warehouse; refrigerated room for game storage.)	355 m^2	ECCC
Petite-Ferme Area	Petite-Ferme Barn (Serves as a warehouse.)	1,015 m^2	ECCC
Petite-Ferme Area	Petite-Ferme Forge (Serves as a multifunctional building.)	40 m^2	ECCC
Petite-Ferme Area	Radio/telecommunication equipment shed	7 m^2	ECCC
Petite-Ferme Area	Fuel warehouse	28 m^2	ECCC
Petite-Ferme Area	Petite-Ferme parking lot (P1)		ECCC
Petite-Ferme Area	Wastewater pumping stations (2)		ECCC
Petite-Ferme Area	Sewage tank with settling (or polishing) field for the wastewater system	130 x 80 x 3.6 m	ECCC
Petite-Ferme Area	Telemetry antenna		ECCC
Petite-Ferme Area	Historical trail markers (3)		ECCC
Petite-Ferme Area	Bridges (2)		ECCC
Petite-Ferme Area	Hunting sites 3 and 4 (8 cylindrical steel blinds)		ECCC
Petite-Ferme Area	Hunting sheds C3 and C4 (2)		ECCC
Petite-Ferme Area	Hunting camps C3 and C4 (2)	11.8 m^2 each	ECCC
Petite-Ferme Area	Fire hydrants (2)		ECCC
Petite-Ferme Area	Winter bird feeding stations distributed across the trails (13 stations)		ECCC
Petite-Ferme Area	Picnic area (3): Next to the forge (1) Next to L'Érablière Shelter (1) On Le Souchet trail (1)		ECCC

Table 2 Facilities and infrastructure in Cap Tourmente National Wildlife Area

Area	Type of facility or infrastructure	Approximate size[1]	Owner
Petite-Ferme Area	L'Érablière (Shelter) (L'Érablière trail)	55 m^2	ECCC
Petite-Ferme Area	Dry toilet (composting toilet) (next to L'Érablière Shelter)	2 m^2	ECCC
Petite-Ferme Area	L'Écart Observatory (observation platform, L'Écart trail)		ECCC
Petite-Ferme Area	Marais-de-la-Petite Ferme Observatory (observation blind, Le Souchet trail)		ECCC
Petite-Ferme Area	Observation tower (Le Petit-Sault trail)		ECCC
Trails			
Petite-Ferme Area	L'Aulnaie	1,100 m	ECCC
Petite-Ferme Area	Le Carouge *Trail* *Access trail* *Boardwalks (5)* *Bridges (2)*	1,374 m: *1,150 m* *181 m* *20.5 m* *22.5 m*	ECCC
Petite-Ferme Area	L'Écart	433 m	ECCC
Petite-Ferme Area	L'Érablière *Trail* *Boardwalks (6)* *Bridge (1)*	1,511.1 m: *1,373.8 m* *115.7 m* *21.6 m*	ECCC
Petite-Ferme Area	Le Petit-Sault *Trail* *Boardwalks (6)*	1,342 m: *1,304.5 m* *37.5 m*	ECCC
Petite-Ferme Area	Le Piedmont	1,238 m	ECCC
Petite-Ferme Area	La Prucheraie	900 m	ECCC
Petite-Ferme Area	Le Souchet	1.6 km	ECCC
Wildlife habitat enhancements			
Petite-Ferme Area	Marais-de-la-Petite-Ferme Habitat Enhancement (marsh)	20.72 ha (marsh:18.21 ha; upland: 2.52 ha)	ECCC
Petite-Ferme Area	Marais du Carouge Habitat Enhancement (marsh)	2.38 ha (marsh: 0.99 ha; upland: 1.38 ha)	ECCC
Grande-Ferme Area			
Facilities and infrastructure			

Table 2 Facilities and infrastructure in Cap Tourmente National Wildlife Area

Area	Type of facility or infrastructure	Approximate size[1]	Owner
Grande-Ferme Area	La Grande-Ferme (house, ruins of a church and site) (outside the NWA)		Corporation du Centre d'initiation au patrimoine – La Grande-Ferme
Grande-Ferme Area	Information shelters (2): one at Marais de la Grande-Ferme, one at Marais des Graves		ECCC
Grande-Ferme Area	Warehouse	183 m^2	ECCC
Grande-Ferme Area	Hunting sites 5, 6, 7 and 8 (16 cylindrical steel blinds)		ECCC
Grande-Ferme Area	Hunting sheds C5-6 and C7-8 (2)		ECCC
Grande-Ferme Area	Hunting camps C 5-6 and C7-8 (2)	11.8 m^2 each	ECCC
Grande-Ferme Area	Marais de la Grande-Ferme Observatory (observation blind)		ECCC
Grande-Ferme Area	Marais des Graves Observatory (observation blind)		ECCC
Trails			
Grande-Ferme Area	Short trail leading to the Marais des Graves Observatory	20 m	ECCC
Grande-Ferme Area	Short trail leading to the Marais de la Grande-Ferme Observatory	200 m	ECCC
Wildlife habitat enhancements			
Grande-Ferme Area	Marais de la Grande-Ferme Habitat Enhancement (marsh)	5.6 ha (marsh: 3.7 ha; upland: 1.9 ha)	ECCC
Grande-Ferme Area	Marais des Graves Habitat Enhancement (marsh)	8 ha (marsh: 5 ha; upland: 3 ha)	ECCC
All areas			
All areas	Fences (64)		ECCC
All areas	Gates (47)		ECCC

1 Trail lengths are from PWGSC (2007) (except for the two short trails leading to the marshes in the Grande-Ferme Area). They do not necessarily correspond to the lengths presented in the trail map, as te map gives the length of loops or round trips, if applicable. Habitat enhancement areas are from DUC (2014).

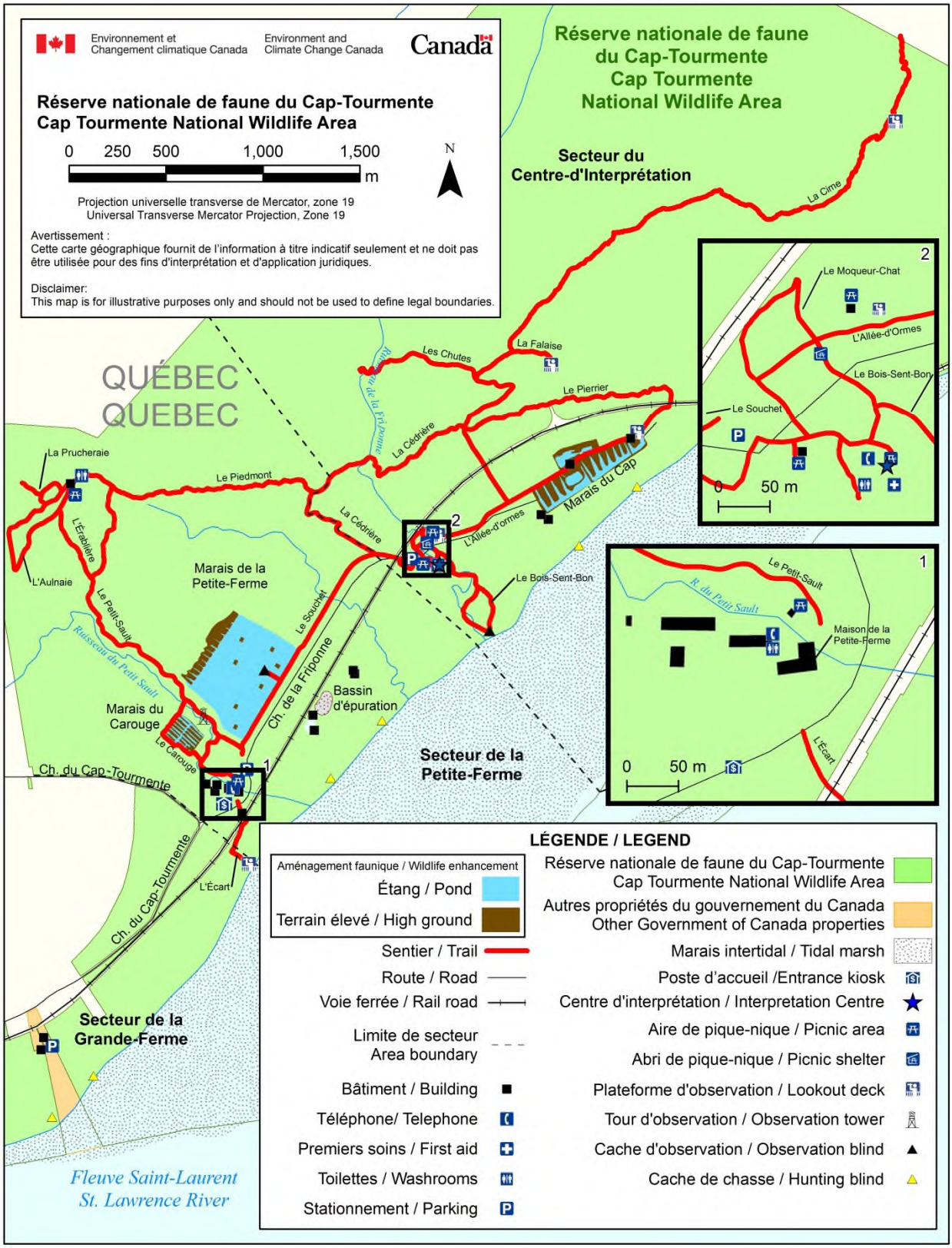

Figure 4 Facilities, infrastructure, and habitat enhancements at Cap Tourmente National Wildlife Area

Figure 5 Cap Tourmente NWA Interpretation Centre

Photo S. Turgeon © Environment and Climate Change Canada, Canadian Wildlife Service

Figure 6 Maison des Français

Photo M. Allard © Environment and Climate Change Canada, Canadian Wildlife Service

Figure 7 Le Bois-Sent-Bon Observatory

Photo S. Turgeon © Environment and Climate Change Canada, Canadian Wildlife Service

Figure 8 House of La Petite-Ferme

Photo Fabrice Kerleau

Figure 9 Entrance kiosk at NWA entrance

Photo S. Bourbeau © Environment and Climate Change Canada, Canadian Wildlife Service

Figure 10 L'Érablière Shelter on L'Érablière trail

Photo S. Bourbeau © Environment and Climate Change Canada, Canadian Wildlife Service

Figure 11 Le Petit-Sault trail observation tower

Photo © Environment and Climate Change Canada, Canadian Wildlife Service

Figure 12 Marais de la Petite-Ferme wildlife habitat enhancement

Photo © Environment and Climate Change Canada, Canadian Wildlife Service

Figure 13 Buildings in the Grande-Ferme Area (the house is outside the NWA). The marsh in the foreground is Marais de la Grande-Ferme (which is part of the NWA).

Photo © Ducks Unlimited Canada

2 ECOLOGICAL RESOURCES

2.1 TERRESTRIAL AND AQUATIC HABITATS

Cap Tourmente National Wildlife Area is located at the junction of the Canadian Shield (which includes the Laurentian Mountains), the St. Lawrence Platform and the Appalachians as well as at the confluence of the upper and middle St. Lawrence estuaries, which create a multitude of ecosystems that provide varied habitats to a very great diversity of animal and plant species. This protected area supports 21 types of forest stands and approximately 700 plant species (Lehoux et al., 1997).

The NWA has a cold temperate climate with wet winters and cool summers typical of the climatic region of the St. Lawrence Estuary. The presence of the St. Lawrence River and the particular orientation of the slopes of Cape Tourmente influence the daily temperatures and create a microclimate within the NWA (CWS, 2003).

The southern and western areas of the NWA are part of the St. Lawrence Lowlands Ecoregion (Mixedwood Plains Ecozone), which is characterized by a succession from intertidal marsh to coastal swamp to coastal plain. The northeastern part of the NWA encompasses the mountains and boreal forest, which are part of the Southern Laurentians Ecoregion (Boreal Shield Ecozone). The summit of Cape Tourmente is located around 571 m above sea level. In 1997, nearly one-half (40%) of the area of the NWA consisted of forested land, followed by the intertidal marsh (which includes a sand and gravel peninsula;34%), agricultural plain (18%) and coastal swamp (8%) (Lehoux et al., 1997). In 2015, the Canadian Wildlife Service (unpublished data) mapped land use and environments in the National Wildlife Area (Figure 14).

2.1.1 Intertidal Marsh

The intertidal marsh of Cap Tourmente National Wildlife Area has long been known for its vast areas of American bulrushes, which attract tens of thousands of greater snow geese during the spring and fall migrations. This marsh is one of the largest bulrush marshes of the St. Lawrence estuary (Lehoux et al., 1997; Girard, 2009). It was primarily to protect this wetland that the NWA was established in 1978.

The intertidal marsh is subject to the daily influence of the tides. A large proportion of the marsh is exposed to frequent and lengthy episodes of flooding, which largely explains the limited number of plant species that grow there (Lehoux et al., 1997). Reed (1989 in Lehoux et al., 1997) divided the marsh into three separate zones: upper, middle and lower. At the time, the upper portion of the marsh consisted of a thin strip dominated by the American bulrush and the southern wild rice (*Zizania aquatica*), where the spikerush (*Eleocharis sp.*), estuary beggarticks

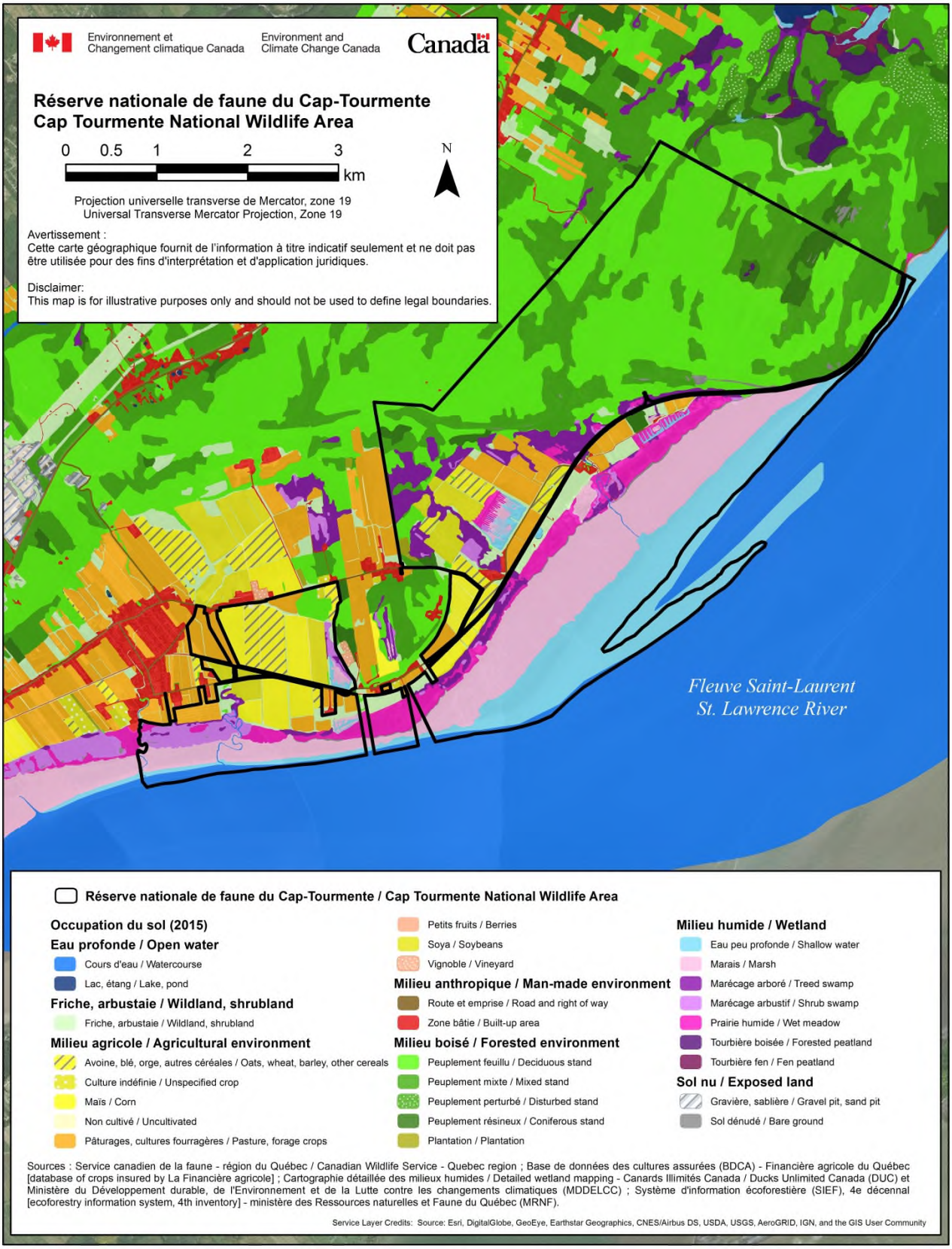

Figure 14 Land use (environments) of Cap Tourmente National Wildlife Area

(*Bidens hyperborea*) and broad-leaved arrowhead (*Sagittaria latifolia*) were also present. The middle zone, much wider, was dominated by the American bulrush, but broad-leaved arrowhead and southern wild rice were also abundant. Finally, the lower zone of the marsh, relatively narrow, was almost exclusively composed of American bulrushes. It should be noted that a sharp drop-off of as much as 1 m in spots marks the point where the intertidal marsh ends and the coastal swamp begins (Lehoux et al., 1997).

Monitoring of the intertidal marsh productivity carried out in the Petite-Ferme Area between 1971 and 2002 showed that the density of American bulrushes decreased by 47% during this period (Lefebvre and Cotter, 2002), possibly owing to heavy use of the marsh by geese between 1970 and 1980 (J. Lefebvre, pers. comm., 2019). Another monitoring study of the marsh productivity carried out between 2004 and 2007 showed an increase in the density of bulrush stems in this area beginning in 2002 (Girard, 2009). This increase could be related to a reduction in the use of the marsh by geese beginning in the mid-1990s (J. Lefebvre, pers. comm., 2019). At the moment, it is not possible to determine whether this trend is continuing in the NWA since there have been no further studies on this subject since then. The monitoring carried out by Girard (2009) also led to the observation that browsing of bulrushes by geese kept the growth of the bulrush marsh below its potential, but that the integrity of the marsh appeared to be intact. In addition, another study carried out in the NWA between 1977 and 2002 revealed that the proportion of the American bulrush had decreased significantly in the intertidal marsh during this period, with the bulrush gradually replaced by the southern wild rice (Allard et al., 2012). However, the bulrush still remained the most common species and the only species present in the lower parts of the marsh.

2.1.2 Coastal Swamp

The coastal swamp is a more or less swampy environment which can be flooded periodically, particularly during the highest tides of the year (Lehoux et al., 1997). Although it covers only a narrow strip approximately 200 m wide between the intertidal marsh and the coastal plain, the coastal swamp is known for its extraordinary diversity of plants (CWS, 2003). Fifty-three herbaceous species were surveyed there in the 1980s (Lehoux and Bourget, 1980 in Lehoux et al., 1997). Lehoux et al. (1997) described three types of habitats in the swamp: herbaceous, shrub and tree. Herbaceous habitat, which accounted for nearly 80% of the total area of the swamp and included 38 plant communities, was by far the largest. In 1997, the communities dominated by the prairie cordgrass (*Spartina pectinata*) and the purple loosestrife (*Lythrum salicaria*) were the best represented, but the purple loosestrife has now almost

disappeared (S. Turgeon, CWS, pers. comm., 2016). Shrub habitat, which occupied nearly 10% of the area of the coastal swamp, included 13 communities dominated by the sweet gale (*Myrica gale*), dogwood or willow, and the pure sweet gale community was the most abundant (Lehoux et al., 1997), but it appears that the speckled alder (*Alnus incana*) is currently more abundant than dogwoods (S. Turgeon, CWS, pers. comm., 2016) and that the density of sweet gales has decreased over the years, at least in the Bois-Sent-Bon trail (C. Lepire, CWS, pers. comm., 2016). Finally, the tree habitat covered approximately 10% of the coastal swamp area. It included seven communities where willow-ash stands were dominant and one community where ashes were dominant (Lehoux et al., 1997).

2.1.3 Agricultural Plain

The coastal swamp gives way to the agricultural plain, which consists of cultivated fields, tree and shrub edges, as well as waterfowl enhancements carried out by Ducks Unlimited Canada between 1972 and 1995. It also provides suitable nesting habitats for several species of grassland birds in precarious status (Aparicio et al., 2001).

The agricultural plain covers an area of approximately 695.5 ha in the NWA, of which approximately 425 ha are cultivated (ECCC, 2016). Of these 425 ha, approximately 250 ha are leased to local farmers who have a permit for this purpose (S. Bourbeau, CWS, unpublished data 2015) (Figure 3). The rest of the agricultural plain consists of areas managed by the Canadian Wildlife Service from a wildlife conservation perspective. It should be noted that the plots leased to farmers also serve the same purpose in a manner of speaking, since losses during harvests and the regrowth of green manures sown as companion plants (e.g. red alfalfa) benefit several animal species, such as the greater snow goose, white-tailed deer and black bear.

The various types of crops grown in the NWA include cereal grains such as barley, forages (grasses such as millet, timothy, bromegrass and fescue or legumes such as clover and alfalfa), as well as corn and soybeans (Table 3).

Table 3 Management of the agricultural plain in Cap Tourmente NWA in 2015 (S. Bourbeau, CWS, unpublished data, 2015)

Type of crop or environment	Area in the NWA (ha)	Lands managed by the CWS (ha)
Cereal grain	114.2	28.6
Crop attractive to wildlife	0	0
Wildland	40.8	15
Wildland (cut in October)	7.6	7.6
Coastal marsh	180.4	99.7
Natural	60.6	0
Pasture	14.9	0
Grassland	115.1	20.2
Wildlife habitat enhancements	57.2 (46 ha according to DUC, 2014)	5
Abandoned	0	0
Canola	0	0
Soybean	15.6	0
Corn	89.1	0
TOTAL (ha)	695.5	176.1

The agricultural plots maintained by the CWS include cultivated lands, wildlands (dominated by umbellifers, compound flowers and biennial flowers such as the daisy, goldenrod, bedstraw and milkweed)—some of which are periodically cut mechanically in order to maintain open habitats for wildlife— and wildlife habitat enhancements (S. Bourbeau, CWS, pers. comm., 2016). The role of the plots can change over the years, i.e. a plot of land cultivated by a farmer may be converted into land managed by the CWS from a wildlife conservation perspective, and vice versa. Occasionally, certain plots of agricultural land under the responsibility of the CWS are converted to attractive crops intended to provide feeding sites for geese and other waterfowl species that stop over in the region during migration. The companion plants that subsequently grow form a cover suitable for the nesting and foraging of grassland birds, in addition to providing feeding areas for the greater snow goose and attracting insects such as bees and the monarch butterfly (*Danaus plexippus*).

In addition, studies examining the landscape dynamics of the NWA indicate an intensification of agricultural practices within the NWA between 1969 and 1999. During this period, perennial crops decreased by half, while annual crops (especially corn and soya) tripled (Maheu-Giroux, 2006). Since the crops in the NWA are constantly changing, the situation has changed and several parcels of land are currently planted to perennial crops (S. Turgeon, CWS, pers. comm., 2016).

2.1.4 Forested Areas

The agricultural plain gives way in turn to forested areas, which extend from the Laurentian forest in the lowlands to the boreal forest in the mountains**.** In 1997, Lehoux et al. estimated that forests covered 40% of the area of the NWA and counted 21 types of forest stands. As one moves from northeast to southwest across the NWA, the boreal forest transitioned to deciduous forest, resulting in a large diversity of stands (Claude 1980 in Lehoux et al., 1997). Sugar maple stands with tolerant hardwoods [i.e. shade- or partial-shade-tolerant] dominated the landscape. The main stand types surveyed were maple (primarily maple-beech), birch, spruce, alder, pine, fir, cedar, aspen and poplar stands. Two stand types, namely red spruce and hemlock stands, were particularly noteworthy because of their relative rarity in the region (Lehoux et al., 1997).

Comparative studies carried out on the forest stands of the NWA between 1969 and 1999 indicate a significant increase in hardwood-dominated forests and a slight decrease in softwood-dominated forests (Maheu-Giroux, 2006).

In addition to the intertidal marsh and the coastal swamp, Cap Tourmente National Wildlife Area contains other aquatic environments used by several waterbird species during the migration and breeding periods.

2.1.5 Other Habitats

Enhanced wetlands, rills, streams and drainage channels provide additional aquatic habitat for the NWA's wildlife species (Lehoux et al., 1997). Four main wildlife habitat enhancements (marshes) were carried out by Ducks Unlimited in the coastal plain, namely the Marais de la Petite Ferme (marsh) (including the Marais du Carouge, remains of a pre-existing enhancement), the Marais de la Grande Ferme, Marais du Cap and Marais des Graves. These enhancements represent 31.6 ha of marshes and 14.4 ha of surrounding uplands (DUC, 2014) that provide high-quality habitats for waterfowl and waterbirds during migration and the breeding season. In addition, the NWA is crossed by several watercourses, the main ones being, from east to west, Ruisseau Rouge, Ruisseau de la Friponne, Ruisseau du Petit Sault, Ruisseau des Graves, Ruisseau Marsolet and Ruisseau Blondelle (or Rivière Blondelle, which runs along the

western boundary of the NWA). The Ruisseau de la Friponne, which originates on Cape Tourmente mountain and flows through the NWA for a little more than 5 km before reaching the St. Lawrence River, is an important habitat for several wildlife species.

2.2 WILDLIFE

2.2.1 Invertebrates

Aquatic Invertebrates

Nematodes and annelids are the dominant species surveyed in the mud of the intertidal marsh, followed by gastropods, bivalves, leeches and amphipods (Mercier et al., 1986).

Three species of molluscs and crustaceans are likely to colonize the sediments adjacent to the NWA, within a 1-km radius, namely the razor clam (*Ensis directus* or *Siliqua patula*), the sand shrimp (*Crangon septemspinosa*) and the rock crab (*Cancer irroratus*) (DFO-FHAMIS, 2002 in CWS, 2003).

Insects and Spiders

There is little data on insects in the NWA. The monarch butterfly, which has the status of species of special concern in Canada, has been monitored since the summer of 2016 (see 2.3 Species at risk). In addition, a survey of odonates (dragonflies) conducted in the NWA in 2013 found evidence of 38 species in this order of insects (Lemelin, 2013).

In addition, a survey of spiders conducted in 2003 by an amateur enthusiast found 105 species of spiders belonging to 19 families (Simard, 2004). This work showed that the NWA is home to rare species, some of which may possibly be at the northern limit of their range, as well as one Eurasian species (*Neriene montana*) (Simard, 2004).

2.2.2 Fish

The streams, rills, ditches and ponds of the NWA provide suitable spawning and rearing habitats for several fish species (Mercier et al., 1986). In 1986, numerous white suckers (*Catostomus commersonii*) spawned in the Ruisseau de la Friponne (Mercier et al., 1986). At that time, yellow perches (*Perca flavescens*) were also observed in the spring in the Ruisseau des Graves, as well as a number of brook trouts (*Salvelinus fontinalis*) in the Ruisseau du Petit Sault and Ruisseau de la Friponne. They were feeding in particular on threespine sticklebacks (*Gasterosteus aculeatus*). In addition, ninespine sticklebacks (*Pungitius pungitius*) were seen in the Ruisseau de la Friponne. Spawning American brook lampreys (*Lampetra appendix*) were also observed in coldwater streams and small rivers. The fine-scale dace (*Phoxinus neogaeus*), creek chub (*Semotilus atromaculatus*), mottled

sculpin (*Cottus bairdi*) and slimy sculpin (*Cottus cognatus*) as well as brown trout (*Salmo trutta*) were also present in the watercourses that flow through the NWA (Mercier et al., 1986). In 1991, the spawning of the longnose sucker (*Catostomus catostomus*) and the white sucker was reported in the spring at the mouth of Ruisseau Blondelle and Ruisseau Marsolet located at the western end of the NWA (Therrien et al., 1991 in CWS, 2003).

In September 2004, a few fish species were surveyed in certain managed streams and marshes of the NWA (D. Labonté and D. Côté, CWS, unpublished data, 2004). The fathead minnow (*Pimephales promelas*), observed almost exclusively in the Marais de la Petite-Ferme, had the largest number of individuals, followed by the brook stickleback (*Culaea inconstans*). The white sucker, brook trout, longnose sucker and American brook lamprey were also observed.

In addition, the presence of a number of fish species has been documented in the fluvial portion of the NWA, including the rainbow smelt (*Osmerus mordax*), Atlantic tomcod (*Microgadus tomcod*), American shad (*Alosa sapidissima*), lake sturgeon (*Acipenser fulvescens*), Atlantic sturgeon (*Acipenser oxyrinchus*) (see details on the last three species in section 2.3 Species at risk), banded killifish (*Fundulus diaphanus*), American eel (*Anguilla rostrata*) (see 2.3 Species at risk), smooth flounder (*Liopsetta putnami*), blackspotted stickleback (*Gasterosteus wheatlandi*), sauger (*Sander canadensis*), lake whitefish (*Coregonus clupeaformis*) and alewife (*Alosa pseudoharengus*) (DFO-FHAMIS, 2002 in CWS, 2003).

2.2.3 Amphibians and Reptiles

Between 1997 and 2002, annual monitoring of anurans was carried out in the NWA. In addition, in 2004, targeted surveys of amphibians and reptiles were conducted. Six species of anurans were identified during these studies: the northern spring peeper (*Pseudacris crucifer*), American toad (*Anaxyrus americanus*), wood frog (*Lithobates sylvaticus*), leopard frog (*Lithobates pipiens*), green frog (*Lithobates clamitans*) and mink frog (*Lithobates septentrionalis*). Monitoring and survey data indicate that the northern spring peeper was very common, and the American toad and the wood frog were generally widely distributed in the area. The green frog appears to be moderately represented and the leopard frog was relatively uncommon [currently very abundant according to S. Turgeon, CWS, pers. comm., 2016], like the mink frog, found only at a few breeding sites (Pouliot et al., 2015.)

Although the bullfrog (*Lithobates catesbeianus*) and the gray tree frog (*Hyla versicolor*) have previously been reported in the NWA (St. Lawrence Valley Natural History Society, 2002 in CWS, 2003), these two species were not detected between 1997 and 2002 during the annual

anuran monitoring using listening stations, nor during the surveys in 2004 (Pouliot et al., 2015), which indicates that these could be identification errors (CWS, 2003).

The surveys in 2004 also documented the presence of four species of urodeles in the NWA: the northern two-lined salamander (*Eurycea bislineata*), the red-backed salamander (*Plethodon cinereus*), the spotted salamander (*Ambystoma maculatum*) and the northern dusky salamander (*Desmognathus fuscus*) (see 2.3 Species at risk). The northern two-lined salamander was indeed present in the NWA and was observed in the two watercourses studied. The red-backed salamander is probably well distributed in forest environments. The spotted salamander was also observed during surveys targeting the blue-spotted salamander (*Ambystoma laterale*) carried out by the NWA team in 2005 and 2006 (S. Bourbeau and S. Turgeon, CWS, unpublished data, 2005 and 2006). However, no signs of the blue-spotted salamander were found during these surveys, although it was present during the surveys conducted in 1971.

Cap Tourmente National Wildlife Area is home to at least two species of snakes. The common garter snake (*Thamnophis sirtalis*) was observed during surveys conducted in the NWA in 2004. The species was fairly common and well distributed throughout the NWA (Pouliot et al., 2015). The ring-necked snake (*Diadophis punctatus*) (see 2.3 Species at risk) was recently observed in this protected area and in the immediate vicinity (S. Boudreau, CWS, pers. comm. 2016). Finally, although the presence of the red-bellied snake (*Storeria occipitomaculata*) has previously been reported in the NWA (St. Lawrence Valley Natural History Society, 2001 in CWS, 2003), there are no recent reports of this species.

No turtles were reported during the surveys in 2004. There appear to be few potential turtle habitats in the NWA (Pouliot et al., 2015). However, a painted turtle (*Chrysemis picta*) was observed in the NWA in June 2012 (S. Bourbeau, CWS, pers. comm., 2017) and in May 2013 (V. Dufresne, pers. comm., 2013). This protected area is located at the northeastern limit of the turtles' range in Quebec. The presence of painted turtles, snapping turtles (*Chelydra serpentina*) and northern map turtles (*Graptemys geographica*) has been reported in the Quebec City area (CDPNQ, 2004 in Pouliot et al., 2015).

2.2.4 Birds

Owing to its great diversity of habitats, Cap Tourmente National Wildlife Area is a popular site for avifauna. Since 1973, 326 bird species have been surveyed in the NWA. In addition, some 180 bird species use this protected area every year, including 120 breeding species, 60 non-breeding species and 17 species at risk.

In addition, the NWA is part of an Important Bird Area (Cap Tourmente IBA). It is also home to some 20 species of ducks and geese, including the greater snow goose, tens of thousands of which stop over in the NWA during the migration period, as well as 10 raptor species and a wide variety of songbirds, including some 20 species of warblers.

Migration

The largest numbers of greater snow geese and dabbling ducks at Cap Tourmente National Wildlife Area are observed in the fall (Lehoux et al., 1997 and CWS, unpublished data). Apart from geese, tens of thousands of ducks can be seen in the intertidal marsh, the main species being the green-winged teal (*Anas crecca*), mallard (*Anas platyrhynchos*) and American black duck.

The NWA provides resting habitat for migrating shorebirds, including the Wilson's snipe (*Gallinago delicata*). Between 1976 and 1998, it served as an important staging area for the least sandpiper (*Calidris minutilla*) in the fall, and was a well-known migration site for the American woodcock (*Scolopax minor*) in the spring (Aubry and Cotter, 2007). During the last decade, the species of shorebirds most often mentioned by birders are the greater yellowlegs (*Tringa melanoleuca*), Wilson's snipe and lesser yellowlegs (*Tringa flavipes*), while the most abundant species are the greater yellowlegs, followed by the semipalmated sandpiper (*Calidris pusilla*) and the least sandpiper (Larivée, 2014: EPOQ database, 2003–2012 compilation of birders' checklists).

Large numbers of passerines stop over at the NWA during their migration (Mercier et al., 1986; Larivée, 2014). In the spring, warblers are particularly abundant. Yellow-rumped warblers (*Setophaga coronata*), Nashville warblers (*Leiothlypis ruficapilla*), black-throated blue warblers (*Setophaga caerulescens*) and common yellowthroats (*Geothlypis trichas*) are among the most abundant warblers with the largest number of reports between 2003 and 2012 for this season (Larivée, 2014).

Diurnal and nocturnal birds of prey are very well represented during migration (Larivée, 2014; Mercier et al., 1986). The site's importance to migrating raptors is likely due to its location at the junction of the St. Lawrence Lowlands and the Laurentian Mountains and to the presence of islands, which facilitate the birds' crossing of the St. Lawrence River (Mercier et al., 1986). The red-tailed hawk (*Buteo jamaicensis*), rough-legged hawk (*Buteo lagopus*), American kestrel (*Falco sparverius*), northern harrier (*Circus hudsonius*), peregrine falcon (*Falco peregrinus*), bald eagle (*Haliaeetus leucocephalus*) (Larivée, 2014; Mercier et al., 1986) and sharp-shinned hawk (*Accipiter striatus*) (C. Lepire, CWS, pers. comm., 2016; Larivée, 2014) are among the species observed. In addition, a few species of owls use the NWA, particularly the barred owl (*Strix*

varia), northern saw-whet owl (*Aegolius acadicus*) and great horned owl (*Bubo virginianus*) (Pouliot et al., 2015; C. Lepire, CWS, pers. comm., 2016) as well as the great gray owl (*Strix nebulosa*) (Larivée, 2014).

Greater snow goose

Cap Tourmente NWA is recognized as one of the most important and spectacular greater snow goose staging areas along the St. Lawrence River during spring and fall migration. Its bulrush marsh constitutes an important habitat of this subspecies, which feeds on the rhizomes of bulrush. Indeed, it was in order to protect this marsh and the greater snow goose population that the NWA was created in 1978.

A hundred years ago, the global population of greater snow geese was approximately 3,000 individuals (see 1.2.2 History – Greater snow goose). Since 1965, the CWS has conducted an aerial photographic survey of this population every year during its spring stopover in southern Quebec. The population has gradually risen from approximately 25,400 individuals in 1965 to a peak of 1,008 000 individuals in 1999. Following the implementation of special conservation measures, the number of geese has varied between 718,000 and 1,009,000 individuals, and was estimated at approximately 915,000 individuals in the spring of 2017 (Lefebvre, 2017; Lefebvre et al., 2017a; Lefebvre et al., 2017b). This increase in the global population is probably attributable to the increased use of agricultural fields by the geese, to the implementation of conservation measures (e.g. establishment of bird sanctuaries, habitat protection) and to hunting restrictions (Lefebvre et al., 2017a; Calvert et al., 2007).

In recent decades, the feeding habits and spring and fall feeding areas of geese in the St. Lawrence Valley and in Cap Tourmente NWA have changed. Indeed, the geese no longer feed exclusively in the bulrush marsh, but also feed in agricultural fields. In addition, while they previously congregated only in the St. Lawrence Upper Estuary, they began to extend their staging areas eastward in the early 1970s. Today, they are also found further west, in the fluvial portion of the St. Lawrence and all across southern Quebec (Lefebvre et al., 2017).

Since 1976, the CWS has conducted monitoring studies of the greater snow goose in the NWA during the spring and fall migrations (S. Bourbeau, CWS, unpublished data). During the spring, from 1999 to 2013, maximum daily numbers of 16,000 to 55,700 individuals were counted. During the fall, from 2007 to 2016, maximum daily numbers of 45,000 to 66,500 individuals were recorded (S. Bourbeau, CWS, unpublished data). Although these data have not been the subject of a detailed analysis, we see that the daily numbers of geese are lower than in the past (e.g. we no longer observe 100,000 or even 135,000 geese at a time as in 1985 and 1990), but that they are constant until the end of November. Hence, considered over the entire

season, it appears that the number of geese that use the NWA is just as high if not higher than in the past (S. Bourbeau, CWS, pers. comm., 2016).

Breeding

Landbirds

The NWA is home to approximately 120 species of breeding birds. A listening point count survey carried out in 1995-1996 found more than 114 species in the various areas of the NWA (Turgeon et al., 1995-1996 and Lehoux et al., 1997). These surveys recorded the presence of nearly 70 species of songbirds in forest habitats; five species were particularly abundant: the red-eyed vireo (*Vireo olivaceus*), veerie (*Catharus fuscescens*), ovenbird (*Seiurus aurocapilla*), Blackburnian warbler (*Setophaga fusca*) and American redstart (*Setophaga ruticilla*) (Lehoux et al., 1997). The most abundant landbird species in the coastal swamp in the summer period were the red-winged blackbird (*Agelaius phoeniceus*), swamp sparrow (*Melospiza georgiana*), yellow warbler (*Setophaga petechia*), bobolink (*Dolichonyx oryzivorus*) (see 2.3 Species at risk), song sparrow (*Melospiza melodia*), common yellow-throat and alder flycatcher (*Empidonax alnorum*) (Lehoux et al., 1997). In addition, 69 landbird species were counted on the agricultural plain as a whole between 1995 and 1996. Eight species were particularly abundant: in decreasing order of importance, the red-winged blackbird, alder flycatcher, yellow warbler, song sparrow, bobolink, savannah sparrow (*Passerculus sandwichensis*), common yellow-throat and American black duck (Lehoux et al., 1997). In addition, at least four species of swallows occur in the NWA: the tree swallow (*Tachycineta bicolor)*, the cliff swallow (*Petrochelidon pyrrhonota*) and barn swallow (*Hirundo rustica*), which breed there, as well as the bank swallow (*Riparia riparia*) (C. Lepire and S. Bourbeau, CWS, pers. comm., 2019). The barn swallow nesting in the NWA was confirmed in 2019. Two nests were counted in the nesting box built in the Marais de la Petite-Ferme (S. Turgeon, CWS, pers. comm., 2020). This species and the bank swallow are listed as threatened under SARA (see 2.3 Species at risk).

Since 1998, annual surveys of some 20 species of breeding grassland birds in precarious status or whose populations are in significant decline has been carried out in the agricultural plain and the coastal swamp (the 1998-2003 results of this monitoring implemented by S. Turgeon and J.-P. Savard are presented in CWS, 2003). This monitoring provides more detailed data on the abundance and distribution of these species in the area in order to guide conservation actions in relation to human activities and agricultural practices within the NWA. Of the species monitored during the last decade, the bobolink is by far the most abundant, followed by the gray catbird (*Dumetella carolinensis*). The indigo bunting (*Passerina cyanea*), the Nelson's sparrow (*Ammospiza nelsoni*), the American bittern (*Botaurus lentiginosus,* a

waterbird*)* as well as the marsh wren (*Cistothorus palustris*) are also among the most abundant species observed during these monitoring studies (S. Bourbeau and S. Turgeon, CWS, unpublished data, 2019).

Waterfowl

During the breeding season, the mallard duck is by far the most abundant duck species in the NWA (Larivée, 2014; S. Bourbeau, CWS, pers. comm., 2016). Aerial surveys carried out in the spring of 2004, 2005, 2008 and 2009 recorded the presence of nine species of dabbling ducks as well as three to five species of diving ducks in the surveyed area of the NWA. Dabbling ducks formed the more diversified and abundant group (Pouliot et al., 2015). Among these, the American black duck was the most abundant (total numbers and indicated pairs), followed by the mallard. The wood duck (*Aix sponsa*), the northern shoveler (*Spatula clypeata*), the gadwall (*Mareca strepera*) and the blue-winged teal (*Spatula discors*), observed in small numbers, have all previously nested in this protected area (CWS, 2003; Lehoux et al., 1997; Raymond, 2013; Pouliot et al., 2015) and were confirmed breeders during the work of the *Second Atlas of the Breeding Birds of Southern Québec* (Robert et al., 2019). The green-winged teal is a possible breeder in the NWA. The northern pintail (*Anas acuta*) and the American wigeon (*Anas americana*) are also possible breeders in the NWA (Pouliot et al., 2015) for which at least one nest has previously been observed (Lehoux et al., 1997). In the case of diving ducks, only the ring-necked duck (*Aythya collaris*) and the hooded merganser (*Lophodytes cucullatus*) are possible breeders in the NWA (Pouliot et al., 2015; Larivée, 2014).

The abundance of terrestrial predators reduces the reproductive success of breeding waterfowl in the NWA. Predator control was instituted in 1996 with the goal of increasing the reproductive success of dabbling ducks. This control is aimed specifically at reducing nest predation (CWS, 2003).

Waterbirds

According to *Québec's Waterbird Conservation Plan* (Chapdelaine and Rail, 2004), Cap Tourmente NWA is an important breeding area for waterbirds in Bird Conservation Region 13 (BCR 13) (which corresponds essentially to the St. Lawrence Lowlands). This protected area is considered a potential nesting site for several species of waterbirds such as the pied-billed grebe (*Podilymbus podiceps*), the American bittern, the Virginia rail (*Rallus limicola*), the sora (*Porzana carolina*), the common gallinule (*Gallinula galeata*) and the American coot (*Fulica americana*), but use of the NWA by these species during the breeding season is not well documented (CWS, 2003).

Colonial Birds

No breeding of colonial bird species is reported in the NWA (BIOMQ, 2015).

Birds of Prey

The peregrine falcon has been present in the NWA at least since 1964 (CDPNQ, 2019) and has nested there every year since 1986 (see 2.3 Species at risk). A survey of Strigidae (owls) carried out in the NWA during the winter of 2009 indicated the presence of the barred owl and the northern saw-whet owl (Pouliot et al., 2015). In addition, the barred owl has been confirmed as a breeder, particularly during the work of the *Second Atlas of the Breeding Birds of Southern Québec* conducted between 2010 and 2014 (Robert et al., 2019). This species is resident in the NWA (C. Lepire, CWS, pers. comm., 2016). The eastern screech owl (*Megascops asio*) was not observed during the 2009 survey. The last sighting of the species in the NWA dates back to the mid-1970s. Other species likely to breed in the NWA include the great horned owl, the long-eared owl (*Asio otus*) and the short-eared owl (*Asio flammeus*) (Pouliot et al., 2015). The great horned owl is a probable breeder and resident in the NWA. Notably, juveniles of this species were observed in the NWA in July 2004 and in May 2012. In addition, certain areas of the NWA may represent suitable habitat for the long-eared owl, which was confirmed as a breeder (presence of young) in one of the survey squares of the *Second Atlas of the Breeding Birds of Southern Québec* adjacent to the NWA (Robert et al., 2019). The short-eared owl was observed in the NWA between 2016 and 2018 (S. Bourbeau, CWS, pers. comm., 2019) (see 2.3 Species at risk).

2.2.5 Mammals

Of the approximately 45 species of mammals likely to be present in Cap Tourmente National Wildlife Area (CWS, 2003), 35 species are observed in the NWA fairly regularly (CWS, unpublished data, 2019; Pouliot et al., 2015).

Small Mammals

Small mammal surveys were carried out as part of the wildlife surveys conducted in 2004 by the CWS (Pouliot et al., 2015). In total, eight species of small mammals were captured: the northern short-tailed shrew (*Blarina brevicauda*), masked shrew (*Sorex cinereus*), smoky shrew (*Sorex fumeus*), woodland jumping mouse (*Napaeozapus insignis*), meadow jumping mouse (*Zapus hudsonius*), southern red-backed vole (*Myodes gapperi*), meadow vole (*Microtus pennsylvanicus*) and deer mouse (*Peromyscus maniculatus*). The deer mouse was found throughout the NWA and represented 59% of all captures. The northern short-tailed shrew was

the most common of the three species of shrews observed. The smoky shrew appeared to be much rarer, since only one individual was captured.

The star-nosed mole (*Condylura cristata*) was not observed during this survey, but the presence of this species has often been reported in the NWA, mainly in the lowlands area. In addition, a dead hairy-tailed mole (*Parascalops breweri*) was seen in the NWA in 2006 (Pouliot et al., 2015).

Bats

Bat surveys conducted in the NWA in 2004 indicated the presence of at least three bat species (Pouliot et al., 2015). The hoary bat (*Lasiurus cinereus*) and the big brown bat (*Eptesicus fuscus*) are the two species identified with certainty. The hoary bat (see 2.3 Species at risk) is the species that has been observed in greater numbers. Other reports have identified individuals of the *Myotis* genus. These bats could be the little brown myotis (*Myotis lucifugus*) or the northern myotis (*Myotis septentrionalis*) (Pouliot et al., 2015), two endangered species (see 2.3 Species at risk). In addition, a brief bat survey carried out in 2005 confirmed the presence of the big brown bat and the hoary bat in the NWA, but in particular revealed the presence of the eastern red bat (*Lasiurus borealis*) (S. Gagnon and A. Derosiers, CWS, unpublished data, 2005) (see 2.3 Species at risk). Only one individual of the latter species was identified. Ten years ago, a nursery bat house was installed near the interpretation centre. Since 2018, the Quebec Department of Forests, Wildlife and Parks (MFFP) has been acoustically monitoring the nursery. Individuals of the *Myotis* genus have been recorded as well as individuals of the big brown bat/ silver-haired bat (*Lasionycteris noctivagans*) complex and the big brown bat/hoary bat complex. In 2019, 13 bats frequented the nursery before the calving period, some of which pertained to the *Myotis* genus (S. Turgeon, CWS, pers. comm., 2020).

Medium-Sized and Large Mammals

Since 1996, staff of Cap Tourmente National Wildlife Area have compiled the observations of mammals made in the NWA. These are qualitative data concerning the abundance and distribution of the various species of medium-sized and small mammals (S. Turgeon and S. Boubeau, CWS, pers. comm. in Pouliot et al., 2015). According to this database, the white-tailed deer, black bear, red fox (*Vulpes vulpes*), raccoon (*Procyon lotor*), short-tailed weasel (*Mustela erminea*), striped skunk (*Mephitis mephitis*), eastern gray squirrel (*Sciurus carolinensis*), red squirrel (*Tamiasciurus hudsonicus*) and eastern chipmunk (*Tamias striatus*) are abundant species that are well distributed throughout the NWA. The moose (*Alces americanus*) and the coyote (*Canis latrans*) are occasionally observed in the NWA (C. Lepire,

CWS, pers. comm., 2016). The snowshoe hare (*Lepus americanus*) and the North American porcupine (*Erethizon dorsatum*) are abundant in forested areas, and the northern flying squirrel (*Glaucomys sabrinus*) is present and probably abundant there (Pouliot et al., 2015). The American mink (*Neovison vison*) is abundant throughout the hydrographic system of the NWA, while the muskrat is present in large numbers in the wetlands and on the banks. The American marten (*Martes americana*) and the Canada lynx (*Lynx canadensis*) are occasionally observed in forested areas in the northeastern section of the NWA, and the river otter (*Lontra canadensis*) is sometimes observed in rivers and streams. In addition, the American beaver (*Castor canadensis*) is occasionally present in the agricultural plain, while the long-tailed weasel (*Mustela frenata*) is sometimes observed throughout the NWA (Pouliot et al., 2015). Finally, the woodchuck (*Marmota monax*) is abundant in agricultural environments (C. Lepire, CWS, pers. comm., 2016).

Gray wolves (*Canis lupus*) are sometimes observed in the NWA. These could be individuals from one of the packs of the Seigneurie de Beaupré [Terres du Séminaire]. The southern limits of the range of this species are located less than 10 km from the NWA. These could also be solitary individuals travelling through or exploring the area (Pouliot et al., 2015).

In addition, a significant increase in black bear sightings has been reported in the NWA from the 2000s onward. It is foreseeable that the population in the NWA may increase slightly or stabilize. In order to manage this large population while ensuring public safety, the CWS has developed a black bear management plan for this protected area (Turgeon, 2008).

2.3 SPECIES AT RISK

Cap Tourmente National Wildlife Area is home to at least 37 species of animals and plants that are designated at risk under the federal *Species at Risk Act* (SARA) or the Quebec *Act Respecting Threatened or Vulnerable Species* (LEMV) or that are likely to be so designated (Table 4). It should be noted that three species are listed in Table 4, but not named because they are vulnerable to harvest.

2.3.1 Birds

Seventeen bird species at risk (SARA, COSEWIC or LEMV) or in precarious status occur in the NWA.

The bobolink and the Nelson's sparrow are among the species most frequently observed during the last decade from among the some 20 species targeted by the grassland birds monitoring efforts begun in 1998 by the CWS in the NWA's agricultural plain and coastal swamp (S. Bourbeau et S. Turgeon, CWS, unpublished data). The bobolink, a species listed as

threatened under SARA, has suffered a significant decline since the late 1960s, which has continued during the last decade, particularly in eastern Canada (Species at Risk Public Registry, 2019a). Despite the reduction of its population in Canada, the species remains relatively common in the NWA, where its presence is well documented. In addition, it is a confirmed breeder in the NWA: there were several breeding pairs in 2018 (S. Turgeon and S. Bourbeau, CWS, pers. comm., 2019). The Nelson's sparrow, which is likely to be designated threatened or vulnerable under LEMV, is a regular breeder that is observed every year in the NWA (SOS-POP, 2019).

The least bittern (*Ixobrychus exilis*), a species listed as threatened under SARA and vulnerable under LEMV, is present in the NWA during the breeding season. The presence of the species has been reported several times in this protected area between 1973 and 2020 (SOS-POP, 2020). The yellow rail (*Coturnicops noveboracensis*), a species designated as special concern in Canada and threatened in Quebec, is occasionally observed in the NWA. Its presence has been reported several times there between 1965 and 2019 (SOS-POP, 2020; Larivée, 2014).

The chimney swift (*Chaetura pelagica*), a species listed as threatened under SARA, is frequently observed in the spring and summer in this protected area (Larivée, 2014). The species used a known nest site (a chimney) in the NWA in the late 1980s (SOS-POP, 2019), but it no longer nests there, since the chimney is no longer suitable for nesting. However, it nests in the Grande-Ferme Area (at a site outside the NWA) and in the village of Saint-Joachim (C. Maurice, CWS, pers. comm., 2016).

The sedge wren (*Cistothorus platensis*) has been observed on a few occasions in the NWA between 1971 and 2008 (SOS-POP, 2020; eBird, 2020). Since the early 2000s, the species was reported in 2004 on the flats of the Pointe aux Prêtres, in 2008 (SOS-POP, 2020) and in 2017 again in the Pointe aux Prêtres area (S. Bourbeau, CWS, pers. comm., 2019). The Canada warbler (*Cardellina canadensis*), designated a threatened species under SARA, is frequently observed in this protected area (Larivée, 2014). Its breeding is confirmed in the vicinity of the NWA according to the *Second Atlas of the Breeding Birds of Southern Québec* (Robert et al., 2019). The olive-sided flycatcher (*Contopus cooperi*) is considered a possible breeder in the NWA (Robert et al., 2019). One individual was heard there in 2013 (SOS-POP, 2019) and another was seen and heard near the interpretation centre in 2016, 2017 and 2018 (in migration) (S. Bourbeau, CWS, pers. comm., 2019). The wood thrush (*Hylocichla mustelina*) is regularly observed in the NWA in the spring and summer (Larivée, 2014). The species is a

confirmed breeder in the NWA (S. Bourbeau, CWS, pers. comm., 2019) and in the surrounding area (Robert et al., 2019).

The loggerhead shrike (*Lanius ludovicianus migrans*), listed as endangered under SARA and threatened under LEMV, was observed in the NWA between 1942 and 2000, but there have been no recent sightings of this species in the area according to the CDPNQ (2019). However, one individual wearing an antenna transmitter was observed in the vicinity of the Marais des Graves in 2017 (eBird Québec, 2020). The barn swallow, listed as threatened under SARA, was previously a breeder commonly observed in the spring and summer in this protected area according to Raymond (2013). However, since the species had not bred there for several years, the NWA team decided to install three giant nesting boxes in order to encourage its nesting. The initiative was successful since two nests were counted there in 2019 (S. Turgeon, CWS, pers. comm., 2020). The bank swallow (*Riparia riparia*) does not breed in the NWA, but is regularly sighted there (eBird, 2020; Larivée, 2014). In April 2019, a nesting structure bordered by natural sand and capable of holding up to 90 nests was installed for the species, but it has not yet nested there (S. Turgeon, CWS, pers. comm., 2020).

The rusty blackbird (*Euphagus carolinus*) is frequently observed in the NWA in the spring and fall during the migration period (S. Bourbeau, CWS, pers. comm., 2019; Larivée, 2014; Raymond, 2013).

It seems that the eastern meadowlark (*Sturnella magna*) was previously a common species and a regular breeder in the NWA (Raymond, 2013), but this is no longer the case (S. Bourbeau, CWS, pers. comm., 2019). The species is regularly observed there, but rarely more than one or two individuals at a time (Larivée, 2014; eBird, 2020).

In terms of raptors, the peregrine falcon, a species of special concern under SARA, is of particular importance in the NWA since a pair has bred there without interruption since 1986. It should be noted that releases of 20 falconets raised in captivity were carried out in this protected area in 1982, 1983 and 1984 (Laporte and Giroux, 1983; Mercier et al., 1986). More than 80 falconets have been born on the cliffs in the NWA since 1986 (CWS, unpublished data, 2019). The species is frequently observed in the spring and summer, and occasionally in the fall (Larivée, 2014). In addition, the short-eared owl, a species listed as special concern under SARA, is occasionally present in the NWA. The species was observed in the area in 2016, 2017 and 2018, in front of the house of La Petite Ferme and in the vicinity of the Marais de la Grande Ferme and the Marais des Graves (marshes) (S. Bourbeau, CWS, pers. comm., 2019). In addition, there were a few reports in the vicinity of the NWA in May 2003 (CDPNQ, 2019) as well as in 2004, 2008 and 2011 (Larivée, 2014). Finally, the bald eagle, a species designated as

vulnerable under LEMV, is often observed (young and adults) in this protected area from the spring to the fall (Larivée, 2014; S. Bourbeau, CWS, pers. comm., 2019). The species exhibited breeding behaviour on several occasions in the vicinity of the NWA in 2013 (CDPNQ, 2019).

2.3.2 Mammals

The NWA is home to at least three bat species at risk.

The bat surveys conducted in 2004 (Pouliot et al., 2015) in the NWA revealed the presence of the hoary bat, the most abundant species found during these surveys. Other bat survey recordings identified individuals of the genus *Myotis*. These bats could be the little brown myotis or the northern myotis, resident species in Quebec, but given the overlapping acoustic characteristics of the two species, it was impossible to distinguish them with certainty. However, considering the species' ecological preferences, it is more likely that the individuals identified were little brown myotis, although the presence of the northern myotis is not formally excluded (Pouliot et al., 2015). These two species were recently added to Schedule 1 of SARA as endangered species. White-nose syndrome, a fungal infection discovered in 2009 in Canada, has reportedly caused a decline of approximately 94% in bat populations of the genus *Myotis* (Species at Risk Public Registry, 2019b). A brief bat survey carried out in 2005 confirmed the presence of the hoary bat in the NWA and identified one eastern red bat (*Lasiurus borealis*) (S. Gagnon and A. Derosiers, CWS, unpublished data, 2005). These two species are likely to be designated threatened or vulnerable under LEMV. They are among the three species of migratory bats in Quebec (the third being the silver-haired bat). Ten years ago, a nursery bat house was installed near the interpretation centre in order to promote the reproduction of these mammals. Since 2018, the Quebec Department of Forests, Wildlife and Parks (MFFP) has been acoustically monitoring the nursery. In 2019, 13 bats frequented it before the calving period, some of which pertained to the *Myotis* genus (S. Turgeon, CWS, pers. comm., 2020).

2.3.3 Amphibians and Reptiles

The NWA is home to one amphibian species and one reptile species likely to be designated threatened or vulnerable under LEMV.

The northern dusky salamander was observed for the first time in the NWA in 2002 during a survey targeting this species. It has subsequently been observed at least once in almost all the streams visited (Banville, 2002). In 2004, surveys confirmed the presence of this salamander in the NWA. This protected area represents the eastern limit of the distribution of the species on the north shore of the St. Lawrence River (Pouliot et al., 2015).

The ring-necked snake, which is likely to be designated threatened or vulnerable in Quebec under LEMV, was not observed during wildlife surveys conducted in 2004 by Pouliot

et al. (2015), but has been observed recently in the NWA and the vicinity (S. Boudreau, CWS, pers. comm., 2016).

2.3.4 Fish

Four fish species at risk were observed in 2002 in the fluvial portion of the NWA: the American shad, American eel, lake sturgeon and Atlantic sturgeon (DFO-FHAMIS, 2002 in CWS, 2003). The American shad is a species designated as vulnerable under LEMV. The American eel and the Atlantic sturgeon (St. Lawrence population) have been assessed as threatened by COSEWIC. In the case of the lake sturgeon, the Great Lakes–Upper St. Lawrence population has been designated threatened by COSEWIC (Species at Risk Public Registry, 2020). However, it is not specified whether lake sturgeons in the Upper Estuary are part of this population. These last three species are likely to be designated threatened or vulnerable in Quebec.

2.3.5 Insects

This protected area is home to at least one species of insect at risk.

The monarch butterfly, a species listed as special concern under SARA and assessed as endangered by COSEWIC, is the subject of monitoring begun in the NWA in the summer of 2016. During the first year of monitoring, three caterpillars of this butterfly were observed (Figure 16). In 2017, 14 eggs, 89 caterpillars and 1 chrysalis were reported, and in 2018, 182 eggs, 187 caterpillars and 12 chrysalises were counted, which confirms the breeding of the species in the NWA (CWS, unpublished data, 2019). The larvae of this butterfly feed mainly on the common milkweed (*Asclepias syriaca*) in the NWA.

2.3.6 Plants

Cap Tourmente National Wildlife Area is home to 10 plant species at risk (CDPNQ, 2019).

These plants include the butternut (*Juglans cinereus*), which is listed as endangered under SARA, and the Victorin's water-hemlock (*Cicuta maculata* var*. victorinii*), which is designated special concern under SARA.

In the fall of 2014, a survey of butternut populations and of a canker disease that affects this species was carried out in the NWA (Nadeau Foresterie urbaine, 2014). The canker, believed to be an exotic disease caused by the fungus *Ophiognomonia clavigignenti-juglandacearum* (see 2.4 Invasive species), is the main cause of the decline of this tree throughout its natural range. The surveys conducted in the NWA identified 367 butternuts. Approximately 82% of the individuals surveyed presented canker symptoms. Phytosanitary work

was carried out during the winters of 2011 and 2018 in order to remove the affected trees and prevent the spread of the canker disease to healthy trees (Nadeau Foresterie urbaine, 2014; S. Bourbeau, CWS, pers. comm., 2019). This study indicates that the population of butternut trees in the NWA may have genetic features that make it more resistant to this fungus than other natural populations.

Monitoring of Victorin's water-hemlock carried out in the NWA between 2009 and 2012 indicates that the population is generally stable (Gilbert, 2013). In addition, surveys conducted in the NWA in 2002 (Bourbeau et al, 2002 in CWS, 2003) and 2004 (Sabourin, 2004) also identified several threatened or vulnerable plant species or species likely to be designated so. The 2004 surveys, in particular, included observation of the Eaton's beggarticks (*Bidens eatonii*) for the first time in this protected area. In addition, the estuarine wild rice (*Zizania aquatica* var. *brevis*) was abundant and codominant in the intertidal marsh. Rough water-horehound (*Lycopus asper*) was common in the coastal swamp and the coastal prairie [plain]; this is probably the largest population of this species in Quebec (Sabourin, 2004). In 2020, the latter three plants were removed from the list of plant species likely to be designated threatened or vulnerable in Quebec.

Table 4 Species at risk in Cap Tourmente National Wildlife Area

Species common and scientific names	Status			Presence in the NWA[6]
	Canada		Quebec	
	SARA[1]	COSEWIC[2]	LEMV[3]	
Birds				
Nelson's Sparrow *Ammospiza nelsoni*	No status	Not at risk	SLDTV[4]	Regular breeder observed every year (SOS-POP, 2019).
Peregrine falcon *Falco peregrinus (anatum/tundrius)*	Special concern* Schedule 1	Not at risk*	Vulnerable** or SLDTV[4]***	Regular breeder since 1986 (CWS, unpublished data, 2019).
Bobolink *Dolichonyx oryzivorus*	Threatened Schedule 1	Threatened	No status	Fairly common species and a breeder in the NWA (S. Turgeon and S. Bourbeau, CWS, pers. comm., 2019).
Wood thrush *Hylocichla mustelina*	Threatened Schedule 1	Threatened	No status	Regularly observed in the spring and summer (Larivée, 2014). A confirmed breeder in the NWA (S. Bourbeau, CWS, pers. comm., 2019) and adjoining areas (Robert et al., 2019).

Table 4 Species at risk in Cap Tourmente National Wildlife Area

Species common and scientific names	Status			Presence in the NWA[6]
	Canada		Quebec	
	SARA[1]	COSEWIC[2]	LEMV[3]	
Short-eared owl *Asio flammeus*	Special concern Schedule 1	Special concern	SLDTV[4]	Occasional presence. Observed in 2016, 2017 and 2018 (S. Bourbeau, CWS, pers. comm., 2019). A few records of the species in the vicinity of the NWA in 2003 (CDPNQ, 2019) and in 2004, 2008 and 2011 (Larivée, 2014).
Bank swallow *Riparia*	Threatened Schedule 1	Threatened	No status	Observed in the NWA (Larivée, 2014), but does not breed there (S. Bourbeau, CWS, pers. comm., 2019). A nesting structure was installed for the species in 2019.
Barn swallow *Hirundo rustica*	Threatened	Threatened	No status	Observed in the NWA, but didn't breed there during several years. In 2019, two couples nested in giant nesting boxes installed for the species (S. Turgeon, CWS, pers. comm., 2019).
Chimney swift *Chaetura pelagica*	Threatened Schedule 1	Threatened	SLDTV[4]	Observed in the spring and summer in the NWA. Last breeding report in the NWA in the 1980s (SOS-POP, 2015) (there are no longer any suitable chimneys). Breeds in the Grande-Ferme Area, outside the NWA (C. Maurice, CWS, pers. comm., 2016).
Olive-sided flycatcher *Contopus cooperi*	Threatened Schedule 1	Special concern	SLDTV[4]	Possible breeder (Robert et al., 2019) in the NWA. One individual heard in 2013 (SOS-POP, 2019) and in 2016, 2017 and 2018 (S. Bourbeau, CWS, pers. comm., 2019).

Table 4 Species at risk in Cap Tourmente National Wildlife Area

Species common and scientific names	Status			Presence in the NWA[6]
	Canada		Quebec	
	SARA[1]	COSEWIC[2]	LEMV[3]	
Canada warbler *Cardellina canadensis*	Threatened Schedule 1	Threatened	SLDTV[4]	Frequently observed (Larivée, 2014). Breeding confirmed in the vicinity of the NWA (Robert et al., 2019).
Least bittern *Ixobrychus exilis*	Threatened Schedule 1	Threatened	Vulnerable	Present in the NWA in the breeding season. Observed on several occasions between 1973 and 2020 (SOS-POP, 2020).
Loggerhead shrike *Lanius ludovicianus migrans*	Endangered Schedule 1	Non-active	Threatened	Observed between 1942 and 2000 (CDPNQ, 2015). No recent sightings, except one individual with a transmitter observed in the Marais des Graves in 2017 (eBird Québec, 2020).
Bald eagle *Haliaeetus leucocephalus*	No status	Not at risk	Vulnerable	Often observed (young and adults) in the NWA from the spring to the fall (Larivée, 2014; S. Bourbeau, CWS, pers. comm., 2019). Several instances of breeding behaviour observed in the vicinity of the NWA in 2013 (CDPNQ, 2019).
Rusty blackbird *Euphagus carolinus*	Special concern Schedule 1	Special concern	SLDTV[4]	Frequent in the spring and fall during the migration period (Larivée, 2014; S. Bourbeau, CWS, pers. comm., 2019).
Yellow rail *Coturnicops noveboracensis*	Special concern Schedule 1	Special concern	Threatened	Observed on several occasions between 1965 and 2019 (SOS-POP, 2020; Larivée, 2014).

Table 4 Species at risk in Cap Tourmente National Wildlife Area

Species common and scientific names	Status			Presence in the NWA[6]
	Canada		Quebec	
	SARA[1]	COSEWIC[2]	LEMV[3]	
Eastern meadowlark *Sturnella magna*	Threatened Schedule 1	Threatened	No status	The species has once bred in the NWA, where it was common (Raymond, 2013). Fairly regularly observed, but rarely more than one or two individuals at a time (eBird, 2020; Larivée, 2014).
Sedge wren *Cistothorus platensis*	No status	Not at risk	SLDTV[4]	Occasional presence. A few mentions between 1971 and 2008 (SOS-POP, 2020). Since the early 2000s, reported in the NWA in 2004, 2008 (SOS-POP, 2020) and 2017 (S. Bourbeau, CWS, pers. comm., 2019).
Mammals				
Hoary bat *Lasiurus cinereus*	No status	No status	SLDTV[4]	Present during the CWS 2004 surveys (Pouliot et al., 2015) and 2005 surveys (S. Gagnon and A. Desrosiers, CWS, unpublished data, 2005). Migratory species in Quebec.
Eastern red bat *Lasiurus borealis*	No status	No status	SLDTV[4]	One recording in the NWA by the CWS in 2005 (S. Gagnon S. and A. Desrosiers, CWS, unpublished data, 2005). Migratory species in Quebec.
Myotis sp. (little brown myotis, *M. lucifugus,* **and/or** northern myotis, *M. septentrionalis*)	Endangered Schedule 1	Endangered	No status	Individuals recorded in the NWA in 2004. Identification not confirmed: more likely little brown myotis (Pouliot et al., 2015). Resident species in Quebec. In 2019, probable breeding of the *Myotis* genus in a nursery installed in the NWA (S. Turgeon, CWS, pers. comm., 2020).

Table 4 Species at risk in Cap Tourmente National Wildlife Area

Species common and scientific names	Status			Presence in the NWA[6]
	Canada		Quebec	
	SARA[1]	COSEWIC[2]	LEMV[3]	
Reptiles				
Ring-necked snake *Diadophis punctatus*	No status	No status	SLDTV[4]	Recent sightings in the NWA and adjacent areas (S. Boudreau, CWS, pers. comm., 2016).
Amphibians				
Northern dusky salamander *Desmognathus fuscus*	No status	Not at risk	SLDTV[4]	Species confirmed present during surveys conducted in 2002 (Banville, 2002) and 2004 (Pouliot et al., 2015).
Fish				
American shad *Alosa sapidissima*	No status	No status	Vulnerable	Present in the fluvial sector of the NWA in 2002 (DFO-FHAMIS, 2002 in CWS, 2003).
American eel *Anguilla rostrata*	Not on Schedule 1	Threatened	SLDTV[4]	Present in the fluvial sector of the NWA in 2002 (DFO-FHAMIS, 2002 in CWS, 2003).
Lake sturgeon *Acipenser fulvescens*	Not on Schedule 1[T]	Threatened[T]	SLDTV[4]	Present in the fluvial sector of the NWA in 2002 (DFO-FHAMIS, 2002 in CWS, 2003).
Atlantic sturgeon *Acipenser oxyrinchus* St-Lawrence populations	Not on Schedule 1	Threatened	SLDTV[4]	Present in the fluvial sector of the NWA in 2002 (DFO-FHAMIS, 2002 in CWS, 2003).
Insects				
Monarch butterfly *Danaus plexippus*	Special concern Schedule 1	Endangered	No status	Eggs, caterpillars and chrysalises observed in 2018 (CWS, unpublished data, 2019).
Vascular plants				
Victorin's water-hemlock *Cicuta maculata* var. *victorinii*	Special concern Schedule 1	Special concern	Threatened	Sizeable population in one sector of the NWA in 2012 (Gilbert, 2013).
Downy rattlesnake plantain *Goodyera pubescens*	No status	No status	Vulnerable	Two sites observed in 2002 (Bourbeau et al., 2002).
Butternut *Juglans cinerea*	Endangered Schedule 1	Endangered	SLDTV[5]	367 individuals counted in the NWA (Nadeau foresterie urbaine, 2014).
Showy orchid *Galearis spectabilis*	No status	No status	SLDTV[5]	Last report in 1977 (CDPNQ, 2015).

Table 4 Species at risk in Cap Tourmente National Wildlife Area

Species common and scientific names	Status			Presence in the NWA[6]
	Canada		Quebec	
	SARA[1]	COSEWIC[2]	LEMV[3]	
Purple-stemmed cliffbrake *Pellaea atropurpurea*	No status	No status	Threatened	Sizeable population in one particular area in 2001 (CDPNQ, 2015). 16 plants in 2002 (Bourbeau et al., 2002).
Greater round-leaved orchid *Platanthera macrophylla*	No status	No status	SLDTV[5]	Historical occurrence; last observation in 1977 (CDPNQ, 2015).
Plant at risk (name withheld)	No status	No status	Vulnerable	Yes
Plant at risk (name withheld)	No status	No status	Vulnerable to harvest	Yes
Plant at risk (name withheld)	No status	No status	Vulnerable to harvest	Yes
Non-vascular plants (bryophyte)				
Serrated earth moss *Ephemerum serratum*	No status	No status	SLDTV[5]	Species observed in 2008 (CDPNQ, 2015).

1 Federal *Species at Risk Act* (Species at Risk Public Registry, 2020)
2 Committee on the Status of Endangered Wildlife in Canada (Species at Risk Public Registry, 2020)
3 *Loi sur les espèces menacées ou vulnérables* du Québec (MFFP, 2020b)
4 Wildlife species likely to be designated threatened or vulnerable in Quebec; SLDTV (MFFP, 2020b)
5 Plant species likely to be designated threatened or vulnerable in Quebec (MELCC, 2020)
* Status assigned to the two subspecies *anatum/tundrius* taken together
** Status assigned to the *anatum* subspecies
*** *Tundrius* subspecies
Ŧ Status of the Great Lakes–Upper St. Lawrence populations. It is not specified whether lake sturgeon in the upper estuary belong to these populations.

2.4 INVASIVE SPECIES

Twenty-one wild species are currently considered problematic or potentially problematic in Cap Tourmente National Wildlife Area, i.e. 20 plant species (19 exotic species and one native species) and one probably exotic fungus species (Natural Resources Canada, 2016).

Of the 19 exotic plant species identified, nine are considered invasive and of concern, six are considered invasive but not of concern, and four are considered non-invasive (Gilbert et al., 2016).

The nine invasive species of concern include five ubiquitous or very abundant species which pose more of a threat than the others in this protected area: the wild chervil (*Anthriscus sylvestris*), smooth bedstraw (*Galium mollugo*), common reed (*Phragmites australis*), rough mannagrass (*Glyceria maxima*) and Japanese knotweed (*Reynoutria japonica*). The wild chervil can be harmful to both native flora and agricultural crops. It invades cut fields, where it is able to

maintain itself and propagate. The smooth bedstraw, ubiquitous in the dry or moderately dry fields of the NWA, can reduce plant diversity. Several colonies of the common reed have been identified in the wetlands of the NWA. The extremely dense colonies threaten biodiversity and disrupt hydrological regimes. Control measures against this species were undertaken in 2012. The rough mannagrass is so common (about 60 colonies) in all the wetlands of the NWA that it would be pointless to try to control it. It can eliminate native plants and adversely affect native wildlife in addition to modifying habitat. Finally, the Japanese knotweed forms large colonies in the NWA or nearby. This species can inhibit the growth of native plants and prevent their establishment in addition to reducing the density of invertebrates and the diversity of vertebrates (Gilbert et al., 2016).

The four other invasive alien species of concern identified by Gilbert et al. (2016) are the Jerusalem artichoke (*Helianthus tuberosus*), garden yellow loosestrife (*Lysimachia vulgaris*), common valerian (*Valeriana officinalis*) and creeping yellow loosestrife (*Lysimachia nummularia*). Although of concern, these species are less worrisome than the five other species, mainly owing to their minor impact on the environment and the fairly small area that they occupy in the NWA.

The common scouring-rush (*Equisetum hyemale*) is a native plant that could become problematic in the NWA. During a plant survey conducted in 2002 (Bourbeau et al., 2002 in CWS, 2003), this plant was very abundant in the coastal swamp of the NWA.

The fungus *Ophiognomonia clavigignenti-juglandacearum*, or butternut canker, is the main cause of the decline of the butternut, a tree that is fairly widespread in the NWA and is considered endangered under SARA (see 2.3 Species at risk) (Nadeau foresterie urbaine, 2014). There are several hypotheses concerning the origin of this canker (P. DesRochers, Laurentian Forestry Centre, Canadian Forest Service, Natural Resources Canada, pers. comm., 2019): “[translation] It is generally assumed that this is an introduced pathogen, as Furnier et al. suggest (1999). However, according to a more recent study (Broders et al., 2012), it could also be a mutation in a minor pathogen found on other plant species in North America. Given the significant time lag between the first report of butternut canker in the United States (1967) and Canada (1990), the pathogen can be considered an alien disease introduced into Canada from the United States. Moreover, Sambaraju et al. (2018) identified a decreasing latitudinal gradient in the severity of trunk damage between southern and northern Quebec; this finding supports the hypothesis that the pathogen was introduced from the south, i.e. from the United States.”

In 2001, 13 alien species were identified in the wetlands of the NWA (Jean et al., 2002 in CWS, 2003). Four of these species were also observed by Gilbert et al. (2016). The most

common species in 2001 was the purple loosestrife. The reed canarygrass (*Phalaris arundinacea*)—occurring in the wild both as native and exotic forms that can only be distinguished based on a molecular analysis (Lavoie et al., 2019) — was also common and the other species were of lesser significance. The purple loosestrife is still present, but is now considered a non-invasive species (Gilbert et al., 2016; in fact, it has virtually disappeared according to S. Turgeon, CWS, pers. comm., 2016), while the reed canarygrass is considered an invasive species but is not of concern. The queen-of-the-meadow (*Filipendula ulmaria*. Var. *denudata*) and the Manitoba maple (*Acer negundo*) were present in the NWA in 2001, but were rated as of low significance (Jean et al., 2002 in CWS, 2003). These two species are now considered invasive alien species not of concern (Gilbert et al., 2016). The nine other species of alien plants identified in 2001 are no longer considered invasive (Gilbert et al., 2016).

In addition, the emerald ash borer (*Agrilus planiplennis*), an alien insect pest that destroys ash stands and therefore has significant ecological and economic impacts, was detected in the Montreal area in 2011 and in the Québec area in the past years. It should be monitored to prevent infestations in the NWA (P. Desrochers, Natural Resources Canada, pers. comm., 2016).

Finally, in certain wetlands on the north shore of the St. Lawrence River, the Chinese mitten crab (*Eriocheir sinensis)* and the round goby (*Neogobius melanostomus*)*,* two invasive alien species, can have an impact on certain populations of native crustaceans or fish (DUC, 2008).

3 MANAGEMENT CHALLENGES AND THREATS

Cap Tourmente National Wildlife Area is a protected area of great ecological importance and of high value for many local residents, ornithologists and visitors. However, the multiple recreational, agricultural and hunting uses of the NWA can constitute management challenges and threats to this protected area of exceptional biodiversity. These various management challenges and threats are, specifically, human presence and disturbance, agriculture, biological resource use (hunting), pollution (risk of accidental spills), invasive or otherwise problematic species, diseases and genes, transportation and service corridors (roads and railroads) as well as climate change and extreme weather events. This protected area also faces management challenges related to the interpretation services offered to visitors, natural resource conservation, collaboration among governments, local stakeholders and residents in conservation efforts as well as scientific knowledge gaps. These management challenges and threats are described below in order of relative importance based on current knowledge and established on the basis of an analysis tool created by the CWS (Baril, 2014). The threats nomenclature and classification and the assessment of their significance are based on the Threats Classification System of the International Union for the Conservation of Nature (IUCN, 2015; see also Salafsky et al., 2008).

3.1 HUMAN PRESENCE AND DISTURBANCE

3.1.1 Recreational Activities

The recreational activities carried out in the NWA (hiking, nature observation, photography) by tens of thousands of visitors in all seasons pose a considerable management challenge. Disturbances caused by visitors can affect animal and plant communities and promote the establishment of undesirable plant species on the edge of heavily used areas (CWS, 2003). For example, visitors may disturb the animals, particularly greater snow geese gathered in feeding and resting areas, sites that are vital for this subspecies which migrates over long distances. Users of the NWA who leave the established trails can trample the vegetation and destroy bird nests. Some visitors even gather plants, which disturbs the habitat in addition to being illegal. Finally, photographers and ornithologists may use bird recordings to attract certain bird species, which modifies the birds' behaviour in addition to being a source of stress for them. Other visitors use fragile sites or areas that constitute critical habitat for certain species at risk. Under the "Connecting Canadians with Nature" program, the number of visitors to the NWA was expected to increase from about 35,000 a year in 2015 to 40,000 a year in 2020 as a result of new infrastructure (e.g. new trails and scenic lookouts) and new services (e.g. renewal of the

exhibits, new geocaching routes) (Environment Canada, 2014). This objective was met: as of October 27, 2020, the NWA had received 41,431 people since the beginning of the year. Such an increase in the number of visitors must take place in a manner consistent with conservation objectives so as to avoid adversely affecting the ecological health and biodiversity of this NWA.

3.2 AGRICULTURE

3.2.1 Annual and Perennial Crops

Agriculture has been an integral part of Cap Tourmente National Wildlife Area and of the region for nearly 400 years. Agriculture practised for the purposes of wildlife management contributes to the maintainance of open habitats (grasslands, wildlands) in addition to promoting the protection of grassland bird species and creating feeding areas for greater snow geese and waterfowl. Obviously, agricultural activities (ploughing, cutting/mowing, chemical application) have modified and continue to modify the original animal and plant communities (CWS, 2003). In addition, agriculture can cause the contamination of water and soil, reduce biodiversity, destroy habitats and disturb the breeding of grassland birds. However, the integrated management of agricultural activities by the Canadian Wildlife Service team makes it possible to reduce these impacts.

Moreover, the NWA team is confronted with new realities which affect both the agricultural lands leased to farmers and those managed by the Department. Indeed, the pattern of agriculture in the region is changing (shift from cereal grains to corn production) as well as the type of farm operation (from small dairy producers to large dairy enterprises). In addition, the number of farmers is decreasing. The staff of the NWA have more and more responsibilities and less and less time to devote to agriculture. Managing agricultural land requires considerable time and entails significant costs. Since managers must deal with increasing constraints (e.g. incidental takes associated with agriculture, management of pesticides), it becomes difficult to effectively monitor the practices used by farmers who lease land in the NWA.

3.3 BIOLOGICAL RESOURCE USE

3.3.1 Hunting and Collecting Terrestrial Animals

Hunting

There is an authorized fall hunt of greater snow geese and waterfowl in designated areas of the NWA. The purpose of this hunting program is to control the goose population and prevent overuse of the bulrush marsh and fields in the NWA or adjacent fields. However, this controlled hunt can also result in harvesting of individuals from fragile populations, the trampling of vegetation in marshes and along the shore and the presence of waste in the hunting areas (e.g.

cartridges, plastic bags). In addition, NWA managers must now deal with the problems posed by the new behaviour of the geese (which are more distrustful and have changed their use of the area), the limited ability to attract geese by means of agriculture and the need for staff to maintain hunting in this protected area.

Incidental Takes

Although there is a risk of incidental takes of waterbirds and shorebirds and even of species at risk, such as the least bittern, during hunting activities, no incidental takes have been reported in the NWA for many years.

3.4 INVASIVE OR OTHERWISE PROBLEMATIC SPECIES, DISEASES AND GENES

The significant presence of invasive plants in the NWA poses a serious threat to the NWA. Plant surveys conducted in this protected area in 2000 and 2001 identified 13 alien plant species, most of which had a patchy distribution, while a few covered large areas (Jean et al., 2002 in CWS, 2003). At the time, these species posed a moderate threat to the ecological integrity [or health] of the NWA (CWS, 2003). Since then, the situation has become much more problematic. Indeed, new species of highly invasive plants, such as the common reed and the Japanese knotweed, have appeared in the NWA. On the advice of scientific experts, methods to control these species have been developed and applied beginning in 2011 in order to prevent these plants from occupying and transforming the natural habitats of the NWA and reducing biodiversity. In 2015, a comprehensive study was conducted on invasive plants in the NWA in order to determine their distribution and implement control measures (Gilbert et al., 2016; see 2.4 Invasive species). This study revealed the presence of 19 plant species potentially problematic in the NWA, some of which need to be targeted for control measures in the short term in order to prevent their rapid expansion and alteration of the natural integrity of the ecosystems. Nine of these plants are considered invasive and of concern and five are particularly problematic: the cow parsley, hedge bedstraw and reed mannagrass, which are ubiquitous, as well as the common reed and the Japanese knotweed, which are among the most threatening invasive species in the NWA. These plants threaten the habitats and biodiversity of this protected area, especially the diversity of the native flora and the integrity of the ecosystems, including wetlands and fields.

In addition, an invasive and probably alien fungus (originating in the United States) (Broders et al., 2012) is affecting more than 80% of the butternut trees in the NWA (Nadeau foresterie urbaine, 2014).

Furthermore, the presence of invasive animal species is not documented in the NWA.

3.5 CLIMATE CHANGE AND EXTREME WEATHER EVENTS

3.5.1 Coastal Erosion

Cap Tourmente NWA is affected by coastal erosion, which appears to be related to climate change and extreme weather events. The considerable exposure of the NWA's shorelines to wave action, the large tidal range, the frequency and intensity of storms, and sea level rise are all factors contributing to coastal erosion. Monitoring studies carried out in the NWA between 2007 and 2014 have shown an average erosion rate of 1.07 m/year (Bernatchez et al., 2015). Coastal erosion results in land loss and infrastructure damage in the NWA, which generates expenses. For example, after the severe storms that occurred during the winter of 2015, water and ice from the St. Lawrence moved and broke up part of the observatory and the boardwalk of the Bois-Sent-Bon trail, which required major repairs (S. Turgeon, CWS, pers. comm., 2015). To combat this damage, a stone dike built in 2006-2007 was raised in 2016 in order to serve as a breakwater and prevent land loss. In addition, more frequent severe storms in the past few years have resulted in the breakage and uprooting of numerous trees.

3.6 POLLUTION

3.6.1 Accidental Spills

There is a significant volume of marine traffic on the St. Lawrence River. Indeed, in the early 2000s, more than 15,000 cargo ships transited through the St. Lawrence Seaway every year and more than 15 million tonnes of petroleum products were transported by ships that pass by the NWA (CWS, 2003). An accidental spill of hydrocarbons or other chemical substances by these ships could have serious ecological consequences for the intertidal marsh and on the tens of thousands of geese, ducks and shorebirds that use this protected area. The grounding in November 1999 of a cargo ship transporting 25,000 tonnes of clinker (a substance that is non-toxic to the environment) off the shores of the NWA, which fortunately did not have serious environmental consequences, highlighted the risks and possible impacts on the integrity of the NWA (CWS, 2003). Environment and Climate Change Canada and its partners have adopted an emergency response plan (ERP) that sets out minimum bird protection measures to be implemented in the event of an oil spill.

3.7 TRANSPORTATION AND SERVICE CORRIDORS

3.7.1 Roads and Railroads

The NWA is fragmented by one road (the chemin du Cap-Tourmente) and a railroad. These corridors can reduce the connectivity of ecosystems and negatively impact their natural dynamics. This fragmentation can also hinder the free movement of animals with a large home

range (e.g. the moose, white-tailed deer, black bear, red fox). The trains and road vehicules can result in accidental mortality of birds and mammals due to collisions. In addition, the road and the railroad provide an entry route for invasive species into the NWA. Finally, train noises (horns and motors) are a source of disturbance for wildlife and visitors.

3.8 RAISING PUBLIC AWARENESS ABOUT CONSERVATION OF THE NWA

Raising public awareness about the NWA conservation is essential to encourage the numerous visitors to abide by the regulations and to adopt behaviour that minimizes their impact on the environment. However, owing to the operational constraints in ECCC's protected areas, it is sometimes difficult to offer a complete interpretation program that is effective in raising the awareness of the majority of users . Some visitors contravene the regulations because they are not familiar with the mission and the regulations of the NWA and do not know how to contribute to its protection. Local residents also have an interest in Cap Tourmente NWA, but may not truly understand its purpose and its ecological and historical importance or how to participate in its conservation. Many Canadians are not familiar with the country's network of National Wildlife Areas, their crucial role in the protection of biodiversity and the opportunities that these protected areas offer to discover and appreciate nature.

The new ECCC initiative to connect Canadians with nature and engage them in activities aimed at the conservation, discovery and enhancement of the environment should encourage visitors to follow best practices for protecting the environment and to feel a sense of belonging in Cap Tourmente NWA and ECCC's network of National Wildlife Areas.

3.9 COLLABORATION AMONG GOVERNMENTS, LOCAL STAKEHOLDERS AND RESIDENTS IN CONSERVATION EFFORTS

Collaboration of the Canadian Wildlife Service with various government bodies, local stakeholders and residents to promote the conservation of Cap Tourmente National Wildlife Area sometimes present challenges. Since the NWA is an ecologically and historically significant site in a dynamic region, a number of actors from various specialty fields (conservation, tourism, hunting, agriculture, ornithology) interact with the NWA in different ways. It can be challenging to establish and maintain ties with these various parties, to stay informed of their activities and to explain to them the mission of the NWA and the activities necessary to protect it. It is therefore important to develop a common vision with these organizations and to draw on their expertise in a coordinated, complementary and collaborative manner.

3.10 SCIENTIFIC KNOWLEDGE GAPS

Knowledge concerning many of the natural resources of the NWA is insufficient and should be updated, particularly with respect to the bulrush marsh, vascular plants and forest communities, shorebirds, large mammals, predators, the effects of coastal erosion and climate change events as well as the presence of certain species at risk. Enhancing knowledge would make it possible to better assess the ecological health of this protected area and would facilitate management decision making.

4 GOALS AND OBJECTIVES

4.1 VISION

Cap Tourmente National Wildlife Area protects important habitats for species at risk, priority bird species and other wildlife species. Priority bird species are those identified in the *Bird Conservation Strategy for Bird Conservation Region 13 in Québec Region: Lower Great Lakes/St. Lawrence Plain* (Environment Canada, 2013).

4.2 GOALS AND OBJECTIVES

The following goals and objectives are intended to define the vision of the management plan, taking into account the threats and management challenges. These goals and objectives will be achieved through the actions set out in Table 5 (Management approaches for Cap Tourmente National Wildlife Area), which will be implemented depending on the available resources.

Goal 1: Protect and enhance important habitats for the greater snow goose and other waterfowl species, species at risk, priority bird species and other wildlife species.

Objectives

1.1. Protect the bulrush marsh, an important habitat for the greater snow goose during migration, and monitor its status, particularly in order to determine the effects of overuse by this population.

1.2. Preserve, enhance and maintain waterfowl habitats.

1.3. Protect the priority bird species of the NWA and their habitats, including the greater snow goose and other waterfowl species, grassland birds and forest birds.

1.4. Maintain populations of species at risk and their habitats by implementing the recommendations and actions outlined in federal and provincial recovery documents.

1.5. Develop protection measures for critical habitat of species at risk, giving priority to the most vulnerable species in the NWA.

1.6. Identify and preserve the most important and representative habitats for conservation in the NWA.

1.7. Prevent and control the spread of invasive species.

1.8. Reduce the effects of coastal erosion and extreme weather events on the habitats and restore the habitats if possible.

1.9. Maintain the key populations of wildlife species representing various trophic levels (e.g. large predators, large herbivores) and their habitats in the ecosystems of the NWA.

1.10. Make Cap Tourmente NWA a demonstration (model) site for natural resource conservation practices.

Goal 2: Reduce the impact of human activities on the NWA.

Objectives:

2.1. Update and complete the existing signage according to the new signage standards, mark the boundaries of the NWA and post the regulations in effect in order to protect wildlife and plants from the impact of human activities.

2.2. Raise regional population's awareness of the mission of the NWA and the regulations in effect, secure the population's collaboration in preserving this protected area and encourage its sense of belonging in the NWA.

2.3. Conduct regular annual monitoring of the NWA in order to reduce the number of incidents of non-compliance with rules and regulations.

2.4. Assess the possible effects of certain human activities in the NWA as well as ways of mitigating them, and develop a balanced approach that reconciles human uses and resource conservation.

2.5. Minimize the impacts of infrastructure and trail construction and maintenance work on the ecosystems of the NWA.

Goal 3: Adopt an integrated agricultural approach aiming to conserve the habitats of the greater snow goose, other waterfowl species and grassland birds at risk, to sustain practice of the controlled goose hunt and to respect the historical agricultural character and rural landscapes of the NWA;

Objectives

3.1. Develop and institute an integrated management strategy for agricultural land.

3.2. Minimize the adverse environmental impacts of agriculture in the NWA.

3.3. Evaluate and optimize the effectiveness of the agricultural mosaic for the greater snow goose, other waterfowl species, grassland birds at risk and other wildlife species.

3.4. Use agriculture to maintain and improve the quality of the greater snow goose controlled hunt in the NWA.

3.5. Rationalize the efforts and the funds devoted to agriculture in the NWA.
3.6. Make Cap Tourmente NWA a demonstration (model) site for conservation-based agricultural practices.

Goal 4: Review the greater snow goose controlled hunt program, taking into account behavioural changes in this population, the *Snow Geese in Québec: 2013-2018 Action Plan* as well as the conservation of the species and habitats, and harmonize it with the other activities offered to visitors.

Objectives

4.1. Develop a new greater snow goose controlled hunt program in the NWA that is adapted to the new behaviour of this population and to the conservation needs of the population and its habitats in collaboration with hunting experts and managers from the Beaupré and Montmagny regions.
4.2. Participate in the review of regulatory approaches and optimize the administrative and operational procedures of the greater snow goose controlled hunting program in the NWA.
4.3. Make Cap Tourmente NWA a demonstration (model) site in terms of management of migratory bird hunting practices.

Goal 5: In cooperation with outside collaborators, reduce pressures to the NWA and its area of influence in order to promote regional biodiversity, the conservation of natural habitats in adjacent areas, connectivity between habitats, and better ecological conditions.

Objectives

5.1. Determine the regional area of influence around the NWA and the management measures aimed at preserving regional biodiversity.
5.2. Participate in the concerted efforts of stakeholders in support of environmental protection and regional land management, and identify threats to the biodiversity of the NWA and its regional area of influence as well as actions aimed at mitigating or eliminating these threats.
5.3. Identify the lands in proximity to the NWA that have significant conservation potential and develop an acquisition or conservation strategy of these lands if necessary.
5.4. Integrate adjacent federal land having ecological value into the NWA.

Goal 6: Consolidate and implement the NWA's interpretation program in order to promote public and local communities' awareness of the conservation of this protected area, wildlife species and their habitats.

Objectives

6.1 Update, renew and apply the interpretation plan of Cap Tourmente National Wildlife Area and convey to the public the important messages related to the mandate of this protected area.

6.2 Develop and implement modern and innovative interpretation activities related to the priority themes.

6.3 Encourage the public to understand and appreciate the importance of Canada's network of National Wildlife Areas.

6.4 Ensure that visitor reception facilities, infrastructure and buildings are in good condition, safe and adapted to the various target audiences.

6.5 Promote collaboration and communication with outside partners in order to enhance expertise in interpretation in Cap Tourmente NWA.

6.6 Make Cap Tourmente NWA a demonstration (model) site for the delivery of interpretation services within the network of National Wildlife Areas.

Goal 7: Work with and obtain support from local communities to protect the NWA's habitats and species.

Objectives

7.1 Encourage new collaborations with local communities in support of management and protection of the NWA.

7.2 Communicate information concerning the NWA to the local and regional population in order to encourage its interest and participation in the protection of this protected area.

Goal 8: Conduct ecological monitoring of the NWA and improve knowledge of wildlife species and their habitats.

Objectives

8.1 Develop and implement an ecological monitoring plan.

8.2 Identify scientific knowledge gaps and fill those considered a priority.

Goal 9: Preserve and highlight the NWA's historical and cultural heritage.

Objectives

9.1 Preserve and maintain the historical buildings present in the NWA while respecting their cultural integrity.

9.2 Recognize and emphasize the great historical importance of Cap Tourmente National Wildlife Area.

9.3 Encourage the development of activities by outside collaborators to raise public awareness of the historical and cultural heritage of the NWA.

4.3 EVALUATION

An annual review of the actions implemented and the results achieved will be conducted depending on the availability of financial and human resources. This review will help identify future priorities for action and resource investment. The management plan itself will be reviewed five years after its initial approval, and reviewed and updated every 10 years thereafter.

Table 5 Management approaches for Cap Tourmente National Wildlife Area

Goals	Objectives	Actions (priority level[1])
Goal 1: Protect and enhance important habitats for the greater snow goose and other waterfowl, species at risk, priority bird species and other wildlife species **Threats and challenges:** • Human presence and disturbance • Agriculture • Biological resource use • Invasive or otherwise problematic species, diseases and genes • Climate change and extreme weather events • Accidental spills • Scientific knowledge gaps	**Objective 1.1:** Protect the bulrush marsh, an important habitat for the greater snow goose during migration, and monitor its status, particularly in order to determine the effects of overuse by this population.	• Update the data on the bulrush marsh. **(1)** • Renew the program for simplified monitoring of the bulrush marsh to assess its use by greater snow geese. **(1)** • Determine the carrying capacity of the bulrush marsh for greater snow geese. **(2)** • Implement the measures required to protect the bulrush marsh in relation to its use by greater snow geese. **(2)**
	Objective 1.2: Preserve, enhance and maintain waterfowl habitats.	• Identify current waterfowl use of the NWA, including the coastal swamp, fields and wildlife enhancements, the condition of these habitats and ways to preserve and enhance them. **(1)** • Implement measures to confirm the main habitats used by waterfowl and to enhance them. **(2)** • Restore and maintain Ducks Unlimited wildlife enhancements to increase the quality of waterfowl habitats. **(2,3)**
	Objective 1.3: Protect the priority bird species of the NWA and their habitats, including the greater snow goose and other waterfowl species, grassland birds and forest birds.	• Continue annual monitoring of the greater snow goose population in the NWA and inform CWS managers accordingly. **(1)** • Consider the results of the greater snow goose population status monitoring in Quebec with a view to management of the population in the NWA. **(1)** • Where necessary, adjust the bag limit for the greater snow goose controlled hunt in the NWA in accordance with regulatory requirements and the advice of CWS experts in charge of managing the population. **(1)** • Adapt greater snow goose management measures in the NWA in keeping with the current Snow Goose Action Plan. **(1)** • Continue monitoring of grassland bird species at risk and implement the necessary measures to protect nests from agricultural impacts and visitor activities. **(1)** • Continue biennial predator control as needed to ensure the recruitment of breeding waterfowl. **(1)** • Carry out periodic inventories (e.g. every 5 years) of nesting waterfowl in the NWA to assess the status of the populations. **(2)** • Monitor vulnerable forest bird species in the NWA. **(3)** • Evaluate wildlife species' needs with respect to use forest habitats. **(3)**

Table 5 Management approaches for Cap Tourmente National Wildlife Area

Goals	Objectives	Actions (priority level[1])
	Objective 1.4: Maintain populations of species at risk and their habitats by implementing the recommendations and actions outlined in federal and provincial recovery documents.	• Determine needs related to the protection and enhancement of habitats used by species at risk such as the least bittern, yellow rail, Canada warbler and Victorin's water-hemlock. **(1)** • In response to the recommendations set out in recovery documents, publish critical habitat descriptions for species at risk found in the NWA in the *Canada Gazette*. **(2)** • Ensure long-term protection of plant and animal species at risk (e.g. the Victorin's water-hemlock, butternut, least bittern) in collaboration with federal and provincial authorities, as needed. **(2)** • Following the gazetting of the critical habitat descriptions for species at risk, develop and implement critical habitat protection measures. **(3)**
	Objective 1.5: Develop protection measures for critical habitat of species at risk, giving priority to the most vulnerable species in the NWA.	• Assess the species at risk and rank them on the basis of the conservation priorities. **(2)** • Test innovative measures for protecting critical habitat of species at risk. **(2)**
	Objective 1.6: Identify and preserve the most important and representative habitats for conservation in the NWA**.**	• Establish conservation priorities for the NWA, taking into account the most important ecosystems and habitats from a biodiversity perspective. **(1)** • Produce a map of sensitive elements and habitats in order to facilitate their protection in the event of an accidental spill of toxic substances on land or in water. **(1)** • Implement the habitat conservation and restoration priorities, including maintenance and restoration of the bulrush marsh. **(2)**
	Objective 1.7: Prevent and control the spread of invasive species.	• Develop and implement an integrated action plan to combat invasive species. **(1)** • Carry out targeted interventions to control invasive species, such as the common reed, the Japanese knotweed and species having the most rapid impacts on the environment. **(1)** • Periodically monitor the effect that control measures have on invasive species. **(1)** • Monitor certain forest diseases or insect outbreaks that affect trees (e.g. the emerald ash borer). **(3)**

Table 5 Management approaches for Cap Tourmente National Wildlife Area

Goals	Objectives	Actions (priority level[1])
	Objective 1.8: Reduce the effects of coastal erosion and extreme weather events on the habitats and restore the habitats if possible.	• Collaborate on the coastal erosion monitoring that is carried out in the NWA by the coastal zone dynamics and integrated coastal zone management laboratory at the Université du Québec à Rimouski. **(2)** • Assess the effects of coastal erosion due to climate change and extreme weather events on the bulrush marsh in the NWA and explore measures for minimizing their ecological impacts. **(2)** • Assess the effectiveness of the erosion control dike installed adjacent to the Bois-Sent-Bon trail. **(2)** • Perform erosion control predictions in Cap Tourmente NWA. **(2)** • Identify potential erosion control measures to halt the loss of land or infrastructure damage. **(2)** • Implement suitable measures to reduce coastal erosion in the NWA. **(2, 3)**
	Objective 1.9: Maintain the key populations of wildlife species representing various trophic levels (e.g. large predators, large herbivores) and their habitats in the ecosystems of the NWA.	• Estimate the size of the black bear population and identify the habitats used by this species in the NWA as well as sectors where there is a risk of conflicts between this species and visitors. **(2)** • Inventory moose and white-tailed deer populations and their important habitats in the NWA. **(2,3)**
	Objective 1.10: Make Cap Tourmente NWA a demonstration (model) site for natural resource conservation practices.	• Inform CWS experts and outside collaborators about needs related to natural resource conservation and research of the NWA. **(2,3)** • Encourage experimentation with new resource conservation approaches in the NWA that are in keeping with its wildlife and habitat management mandate. **(2)** • Communicate the results of this experimentation and the conservation practices used in Cap Tourmente NWA. **(2,3)**
Goal 2: Reduce the impact of human activities on the NWA. **Threats and challenges:** • Human presence and disturbance	**Objective 2.1:** Update and complete the existing signage according to the new signage standards, mark the boundaries of the NWA and post the regulations in effect in order to protect wildlife and plants from the impact of human activities.	• If necessary, review the cadastral boundaries of the NWA. **(1)** • Install comprehensive signage and complete the posting of information on the boundaries of the NWA and the applicable regulations. **(1)** • Produce self-interpretive panels to raise users' awareness of various themes. **(3)**

Table 5 Management approaches for Cap Tourmente National Wildlife Area

Goals	Objectives	Actions (priority level[1])
• Biological resource use	**Objective 2.2:** Raise regional population's awareness of the mission of the NWA and the regulations in effect, secure the population's collaboration in preserving this protected area and encourage its sense of belonging in the NWA.	• Publish public notices related to the regulations in newspapers. **(1)** • Promote the development of NWA information and outreach tools (e.g. brochure, visitor's guide, discovery guide). **(2)**
	Objective 2.3: Conduct regular annual monitoring of the NWA in order to reduce the number of incidents of non-compliance with rules and regulations.	• Identify needs related to monitoring the NWA and enforcement of regulations pertaining to off-road vehicle use, harvesting of plant and animal resources, as well as vandalism, and ensure compliance. **(1)** • Inform and provide support to Wildlife Enforcement Division (WED) officers and provincial conservation officers for monitoring in the NWA. **(1)** • Encourage public compliance with NWA guidelines (best practices) and regulations through promotional efforts by NWA staff. **(1)**
	Objective 2.4: Assess the possible effects of certain human activities in the NWA as well as ways of mitigating them, and develop a balanced approach that reconciles human uses and resource conservation.	• Use the evaluation grid for recreational activities to assess requests for new activities in the NWA. **(2)** • Conduct an environmental assessment of any proposed recreational activity with a view to testing or implementing it in the NWA. **(2)** • Assess the carrying capacity of the NWA for certain activities and the possibility of accommodating potentially conflicting activities (e.g. wildlife observation, hunting, hiking, and others activities). **(3)** • Assess the effects of landscape fragmentation on the ecosystems and wildlife in the NWA and possible approaches for reducing this phenomenon. **(3)**
	Objective 2.5: Minimize the impacts of infrastructure and trail construction and maintenance work on the ecosystems of the NWA.	• Carry out environmental assessments of various projects such as the construction of infrastructure and trails in the NWA. **(1, 2, 3)**

Table 5 Management approaches for Cap Tourmente National Wildlife Area

Goals	Objectives	Actions (priority level[1])
Goal 3: Adopt an integrated agricultural approach aiming to conserve the habitats of the greater snow goose, other waterfowl species and grassland birds at risk, to sustain practice of the controlled goose hunt and to respect the historical agricultural character and rural landscapes of the NWA. **Threats and challenges:** • Agriculture • Human presence and disturbance • Residential and commercial development • Biological resource use	**Objective 3.1:** Develop and institute an integrated management strategy for agricultural land.	• In collaboration with agronomy and wildlife management experts, develop a management plan for the agricultural land in the NWA that takes into account needs related to enhancement of habitat for the greater snow goose, grassland birds at risk and wildlife (e.g. the monarch butterfly), needs related to hunting, respect for agricultural landscapes and rationalization of the efforts and the funds devoted to agriculture in the NWA. **(1)** • Communicate with managers of wildlife reserves in the United States to learn about the management methods they use in relation to the greater snow goose population that overwinters there and populations of other bird species. **(1)** • Implement the measures proposed in the management plan for the agricultural land in the NWA in co-operation with experts, evaluate the results and adjust management approaches as necessary. **(2)**
	Objective 3.2: Minimize the adverse environmental impacts of agriculture in the NWA.	• Establish an agricultural best practices guide for the NWA. (**1**) • Raise awareness of and ensure that the agricultural best practices guide is adhered to by NWA staff and local farmers. **(1)** • Periodically monitor the application of fertilizers and pesticides and minimize the use of these products in the NWA. **(2)** • Reduce the proportion of annual cultures (corn, soya) and increase perennial cultures so as to help grassland birds (e.g. the bobolink, the eastern meadowlark). **(2)** • Have an expert assess the environmental compliance of agricultural practices in the NWA periodically (every 5 years). **(3)**
	Objective 3.3: Evaluate and optimize the effectiveness of the agricultural mosaic for the greater snow goose, other waterfowl species, grassland birds at risk and other wildlife species.	• Assess the greater snow goose occupation and use of the agricultural mosaic. **(1)** • Analyze annual monitoring data acquired on grassland birds and land use. **(2)** • Determine the needs of waterfowl and other wildlife species in relation to agriculture. **(2)** • Maximize the positive effects of agriculture on wildlife, particularly by planting trees in riparian buffers and windbreaks, convertingcertain lands in pastures and seeding grasses at strategic sites. **(3)**

Table 5 Management approaches for Cap Tourmente National Wildlife Area

Goals	Objectives	Actions (priority level[1])
	Objective 3.4: Use agriculture to maintain and improve the quality of the greater snow goose controlled hunt in the NWA.	• With the help of experts, evaluate measures that could be implemented as a complement to the management plan for agricultural land in the NWA in order to improve the quality of migratory bird hunting (e.g. crops attractive to wildlife, grain fields, resting areas), taking into account the associated cost and impacts on other species that use the same habitats. **(2)**
	Objective 3.5: Rationalize the efforts and the funds devoted to agriculture in the NWA.	• Assess the efforts and budget currently devoted to agriculture and the implementation of the management plan for agricultural land in the NWA. **(1)** • Examine the possibility of allocating a fixed annual budget to agriculture, obtaining outside funding and reducing and delegating certain agricultural activities in the NWA. **(1)** • Demonstrate the importance of agriculture to the management of wildlife, particularly grassland bird species at risk, in order to obtain support for recurring agricultural activities. **(1)** • Encourage experienced local farmers and young farmers to grow crops in the NWA and, if necessary, use MAPAQ's land bank to target farmers who might be interested. **(2)**
	Objective 3.6: Make Cap Tourmente NWA a demonstration (model) site for conservation-based agricultural practices.	• Raise awareness among CWS experts and outside collaborators of needs related to agriculture and testing of agricultural practices. **(2)** • Establish collaborations with local farmers, agriculture schools, stakeholder networks (MAPAQ, Agriculture Canada), agri-environmental advisory groups, agricultural advisors and other experts with a view to implementing new agricultural practices. **(2)** • Encourage testing of new approaches and crops or agricultural events in the NWA that are in keeping with the wildlife and habitat management mandate. **(2)** • Inform CWS managers and scientists about the results of testing of approaches and agricultural practices in Cap Tourmente NWA. **(3)**

Table 5 Management approaches for Cap Tourmente National Wildlife Area

Goals	Objectives	Actions (priority level[1])
Goal 4: Review the greater snow goose controlled hunt program, taking into account behavioural changes in this population, the *Snow Geese in Québec: 2013-2018 Action Plan* as well as the conservation of the species and habitats, and harmonize it with the other activities offered to visitors. **Threats and challenges:** • Human presence and disturbance • Biological resource use • Agriculture	**Objective 4.1**: Develop a new greater snow goose controlled hunting program in the NWA that is adapted to the new behaviour of this population and to the conservation needs of the population and its habitats in collaboration with hunting experts and managers from the Beaupré and Montmagny region.	• Restructure the migratory bird hunting program in the NWA with the aim of reducing hunting pressure, adjusting hunting fees and giving hunters the opportunity to access better hunting areas so as to permit enhanced hunting success. **(1)** • Integrate the measures set out in the current action plan on the snow goose in Québec into the new controlled greater snow goose hunting program in Cap Tourmente NWA. **(1)** • Examine the various tools available for optimizing snow goose hunting (e.g. crops attractive to wildlife, staging areas, rotation of hunting zones, reduction of hunting pressure, guides with dogs) as well as conservation needs related to other species (other species of waterfowl, mammals and herpetofauna) and their habitats. **(1)** • Develop and implement the new greater snow goose controlled hunting program in Cap Tourmente NWA by consulting CWS staff with expertise related to the snow goose and other waterfowl as well as other hunting outfitters in the region, in order to adopt an optimized and collaborative approach. **(1)** • At regular intervals after the new hunting program is implemented, assess its performance and its impact on hunting success. **(2)** • Adopt a collaborative approach with the other stakeholders in the estuary region to maintain significant numbers of geese in the region in order to stabilize or increase the amount of time geese spend in the area. **(2)**
	Objective 4.2: Participate in the review of regulatory approaches and optimize the administrative and operational procedures of the greater snow goose controlled hunting program in the NWA.	• Study the possibility of amending the *Wildlife Area Regulations* in order to adjust hunting conditions and fees in the Cap Tourmente NWA. **(1)** • Take steps to set up online registration for the hunting program at Cap Tourmente NWA. **(2)** • Review staff requirements with regard to hunting guide service delivery. **(1)** • Hold “Waterfowler Heritage Days” to attract adolescents from hunting associations in the region and from the Huron-Wendat community of Wendake who have taken the mandatory provincial hunting safety course(s) (e.g. valid hunter’s certificate for the corresponding hunting device). **(1)** • Explore the possibility of recovering the wings of geese and other hunted migratory game birds and giving them to artisans and artists from the Huron-Wendat community of Wendake. **(1)**

Table 5 Management approaches for Cap Tourmente National Wildlife Area

Goals	Objectives	Actions (priority level[1])
	Objective 4.3: Make Cap Tourmente NWA a demonstration (model) site in terms of management of migratory bird hunting practices.	• Inform CWS experts and outside collaborators about needs related to management of hunting and testing of practices. **(2)** • Establish collaborations with hunting outfitters in the region and with experts in the management of the greater snow goose and other waterfowl, with a view to testing new approaches. **(2)** • Encourage experimentation with new hunting management approaches that are in keeping with the mandate related to management of hunting and conservation of wildlife and habitats. **(2)** • Communicate the results of such experimentation and hunting management practices in the NWA. **(3)**
Goal 5: In cooperation with outside collaborators, reduce pressures to the NWA and its area of influence in order to promote regional biodiversity, the conservation of natural habitats in adjacent areas, connectivity between habitats and better ecological conditions. **Threats and challenges:** • Human presence and disturbance • Transportation and service corridors	**Objective 5.1:** Determine the regional area of influence around the NWA and the management measures aimed at preserving regional biodiversity.	• Carry out a study to delineate and describe the regional area of influence (broad ecosystem) around the NWA, to define the threats it faces, and to identify the management and collaboration measures required to preserve the NWA and regional biodiversity. **(1)**
	Objective 5.2: Participate in the concerted efforts of stakeholders in support of environmental protection and regional land management, and identify threats to the biodiversity of the NWA and its regional area of influence as well as actions aimed at mitigating or eliminating these threats.	• Hold a workshop on the ecological health of the NWA for stakeholders and experts so that they can discuss the boundaries of the regional area of influence around the NWA, the threats it faces and collaboration measures aimed at preserving biodiversity in the NWA and the regional area of influence. **(2)** • Participate in regional consultation processes bringing together managers of nearby lands with the aim of harmonizing management approaches. **(2)** • Promote the NWA as an ecological asset for the regional area of influence and inform managers of adjacent lands and scientists about the conservation issues and the results of research carried out in the NWA. **(3)**
	Objective 5.3: Identify the lands in proximity to the NWA that have significant conservation potential and develop an acquisition or conservation strategy of these lands if necessary.	• Carry out landscape analyses to identify deficiencies and possibilities related to habitat conservation as well as to establish a conservation strategy. **(2)** • Assess the ecological value and the conservation potential of habitats and species at risk on lands adjacent to the NWA that have conservation value. **(3)**

Table 5 Management approaches for Cap Tourmente National Wildlife Area

Goals	Objectives	Actions (priority level[1])
	Objective 5.4: Integrate adjacent federal land having ecological value into the NWA.	• Take the necessary steps to integrate into the NWA adjacent federal land of ecological value. **(2)** • Consolidate the territory of the NWA by annexing adjacent lands in order to conserve important habitats for species at risk and biodiversity at large. **(3)** • Review the legal description of the NWA if applicable. **(3)**
Goal 6: Consolidate and implement the NWA's interpretation program in order to promote public and local communities' awareness of the conservation of this protected area, wildlife species and their habitats. **Threats and challenges:** • Human presence and disturbance • Awareness of conservation of the NWA	**Objective 6.1:** Update, renew and apply the interpretation plan of Cap Tourmente National Wildlife Area and convey to the public the important messages related to the mandate of this protected area.	• Update the NWA's interpretation program by taking into account national directions and new realities affecting the NWA and by identifying priority clienteles. **(1)** • Develop important messages concerning the NWA to be communicated to the public. **(1)** • Develop a five-year public communication plan and implement it. **(1)**
	Objective 6.2: Develop and implement modern and innovative interpretation activities related to the priority themes.	• Create a renewed program of interpretation activities and visitor experiences (e.g. stories, leisure activities, local and Indigenous art, nature and culture, special activities such as observation of large mammals, nocturnal life, plays, Indigenous heritage, history, suppers). **(1)** • Integrate priority themes (e.g. the greater snow goose; conservation of habitats, migratory birds, species at risk and biodiversity; conservation and management of the NWA; NWA network; culture and history of local and aboriginal communities) into the new exhibit at the interpretation centre. **(1).** • Study the possibility of incorporating an interactive discovery module into the interpretation centre's new exhibit. **(1)** • Promote interpretation activities, recreational activities and visitor experiences by harnessing ECCC's communication and marketing programs, which are very limited at present. **(1,2)** • Analyze the human resource requirements related to delivering services to the public. **(1)** • Modernize the ways to collect payments. **(2)**

Table 5 Management approaches for Cap Tourmente National Wildlife Area

Goals	Objectives	Actions (priority level[1])
	Objective 6.3: Encourage the public to understand and appreciate the importance of Canada's network of National Wildlife Areas.	• Collaborate with national headquarters to develop a plan for communication with Canada's network of National Wildlife Areas. **(1)** • For the interpretation centre, develop an exhibit module on the network of NWAs that could be used in other NWAs or at promotional sites (e.g. portable module). **(2)** • Carry out awareness activities at Cap Tourmente NWA concerning the Canadian network of NWAs by emphasizing their importance, the activities that can be carried out there and the protection measures implemented. **(2)**
	Objective 6.4: Ensure that visitor reception facilities, infrastructure and buildings are in good condition, safe and adapted to the various target audiences.	• Implement the recommendations set out in the building assessment report (RSB) 2013 for the construction of buildings and infrastructure and upgrading of related standards. **(1)** • Periodically assess the condition of facilities, infrastructure and trails under the NWA's annual maintenance program. **(1)** • Ensure routine maintenance and repair of facilities, infrastructure and trails. **(1)** • Provide safe and attractive facilities, infrastructure and trails that are tailored to visitors (children, elderly persons, handicapped). **(2)** • Update the public safety plan. **(1)**
	Objective 6.5: Promote collaboration and communication with outside partners in order to enhance expertise in interpretation in Cap Tourmente NWA.	• Establish collaborations with interpretation experts working at sites dedicated to the environment, with a view to testing new approaches. **(2)**
	Objective 6.6: Make Cap Tourmente NWA a demonstration (model) site for the delivery of interpretation services within the network of National Wildlife Areas.	• Inform outside collaborators about needs related to testing interpretation practices. **(2)** • Encourage pilot projects and testing of interpretation techniques. **(2)** • Communicate the results of experimental interpretation approaches implemented in the NWA. **(3)**
Goal 7: Work with and obtain support from local communities to protect the NWA's habitats and species.	**Objective 7.1:** Encourage new collaborations with local communities in support of management and protection of the NWA.	• Hold regular meetings with associations interested in the conservation, management and development of the NWA and the activities carried out there. **(1)** • Encourage initiatives aimed at the conservation and development of the NWA. **(3)**

Table 5 Management approaches for Cap Tourmente National Wildlife Area

Goals	Objectives	Actions (priority level[1])
Threats and challenges: • Human presence and disturbance • Awareness of the conservation of the NWA	**Objective 7.2:** Communicate information concerning the NWA to the local and regional population in order to encourage its interest and participation in the protection of this protected area.	• Plan regular (e.g. annual) meetings with the municipality of Saint-Joachim to discuss work that has been carried out, projects that are under way and planned activities in the NWA. **(1)** • Every year, provide the residents of Saint-Joachim with the main news concerning the NWA (new developments, activities, announcements) through local media (e.g. municipal newsletter). **(1)** • Offer seasonal activities and events to the residents of Saint-Joachim and the local and regional population (e.g. open house events, biodiversity day, festivals) to allow them to discover the NWA and its activities. **(2)**
Goal 8: Conduct ecological monitoring of the NWA and improve knowledge of wildlife species and their habitats. **Threats and challenges:** • Scientific knowledge gaps	**Objective 8.1:** Develop and implement an ecological monitoring plan.	• Identify indicators and monitoring methodologies for the ecological monitoring program. **(1)** • Implement the ecological monitoring plan. **(2)**
	Objective 8.2: Identify scientific knowledge gaps and fill those considered a priority.	• Update the knowledge acquisition plan taking into account the NWA's conservation plan and recent plant and animal inventories. **(1)** • Establish and communicate research priorities to promote scientific studies in the NWA. **(1)** • Promote collaborative research arrangements with educational institutions and government departments. **(2)** • Conduct priority inventories and monitoring of resources (e.g. plants, habitats, species at risk, invasive or exotic plant species, waterfowl, shorebirds, waterbirds, large mammals) in collaboration with local stakeholders and government officials. **(2)** • Promote research on the effects of coastal erosion and climate change events in the NWA. **(3)**
Goal 9: Preserve and highlight the NWA's historical and cultural heritage. **Threats and challenges:** • Scientific knowledge gaps	**Objective 9.1:** Preserve and maintain the historic buildings present in the NWA while respecting their cultural integrity.	• Ensure routine maintenance of historic buildings. **(1)** • Hire architecture experts to guide repair work on historic buildings and ensure respect of their cultural integrity. **(1)**
	Objective 9.2: Recognize and emphasize the great historical importance of Cap Tourmente National Wildlife Area.	• Promote public awareness of the designation of La Petite Ferme house as a historic national site and the reasons of this designation. **(1)** • Highlight the historical importance of Cap Tourmente National Wildlife Area in the new exhibit at the NWA interpretation centre. **(2)**

Table 5 Management approaches for Cap Tourmente National Wildlife Area

Goals	Objectives	Actions (priority level[1])
	Objective 9.3: Encourage the development of activities by outside collaborators to raise public awareness of the historical and cultural heritage of the NWA.	• Review, update and increase access to the self-guided historical tour in the NWA. **(1)** • Foster the implementation of activities that showcase Indigenous history and culture at Cap Tourmente NWA according to projects proposed by the Huron-Wendat community of Wendake (Iroquois presence, Indigenous culture, local and regional toponymy). **(1) (2)** • Promote the staging of historical and cultural activities (local and Indigenous) in the NWA (e.g. theme day, historical interpretation with characters, rallies, corporate dinners) in co-operation with various collaborators and cultural organizations. **(2)**

1. **Implementation timeline:** 1 (0 to 3 years), 2 (4 to 6 years), 3 (7 to 10 years or more)

Note: The priority level assigned to the actions refers to the implementation timeline and not to their importance in terms of resource conservation. Priority level may change depending on the context and available resources.

5 MANAGEMENT APPROACHES

This section summarizes the approaches and actions that are presented in Table 5 and are likely to be used in managing Cap Tourmente National Wildlife Area. Management measures will nonetheless be identified during the annual planning process and will be implemented according to the available financial and human resources and the approaches described below.

5.1 NATURAL RESOURCE CONSERVATION

Extensive and complex measures are required to manage the Cap Tourmente NWA given the diversity of its ecosystems and the vast area it covers. It will therefore be necessary to properly target conservation efforts over the coming years and to implement the new conservation directions and actions defined in the current management plan.These efforts will be targeted according to available resources. Natural resource conservation in the NWA will focus on the preservation of habitats and wildlife species, including the greater snow goose, priority migratory birds and species at risk. An integrated approach combining management of natural resources, agriculture, the greater snow goose controlled hunt, recreational activities and interpretation services for the public needs to be adopted. Collaborations with outside stakeholders will be encouraged in various areas such as knowledge acquisition in the NWA, ecological monitoring and resource conservation. One of the objectives is to make Cap Tourmente NWA a demonstration (model) site for conservation practices (species at risk, agriculture, hunting, incidental takes) in National Wildlife Areas.

5.2 HABITAT MANAGEMENT

Habitat management will focus on the conservation of habitats that are important to the greater snow goose and other waterfowl species, such as the green-winged teal, and on the preservation of priority bird species and other wildlife species as well as the recovery of critical habitat of species at risk such as the least bittern, butternut and monarch butterfly. The studies and inventories undertaken will help to increase knowledge of forest communities, identify habitats of conservation interest, and define the measures required for habitat protection.

Efforts will also be made to monitor and control invasive plant species and to better document and reduce, if possible, the environmental impacts of coastal erosion and climate change as well as disturbances from human activities. Monitoring the NWA and promoting compliance with the existing guidelines (best practices) and regulations will help limit the number of incidents of non-compliance with these guidelines and regulations and will support the conservation of habitats and species within the NWA. Finally, the CWS will increase

collaboration with managers of land adjacent to the NWA to gain a better understanding of the regional area of influence of Cap Tourmente NWA, assess threats to the region and identify the conservation measures that are required, in order to harmonize land management approaches at the regional scale.

5.3 WILDLIFE MANAGEMENT

Wildlife management will be based on the knowledge acquired from inventories and various studies; this knowledge will be useful in taking stock of various aspects of the biodiversity of the NWA. Monitoring efforts will be devoted to learning more about and managing the populations of the greater snow goose and other waterfowl species as well as populations of vulnerable grassland and forest bird species. To this end, annual monitoring of the greater snow goose population and of grassland bird species in the NWA will be continued, and a five-year inventory of waterfowl will be undertaken. Annual or biennial predator control will be continued as necessary to minimize predation of nests of waterfowl and grassland birds. Monitoring of populations of forest birds, amphibians and reptiles will also be carried out under the ecological monitoring program. Furthermore, inventories of the black bear, white-tailed deer and moose will be undertaken to learn more about and preserve the populations of these species. Various studies will be carried out to assess populations of wildlife species at risk such as the least bittern, yellow rail and Canada warbler. In addition, collaboration with various experts from government and academe on research or monitoring projects will be given priority in order to provide the best possible protection for species at risk. Recommendations set out in recovery strategies for species at risk will help guide the identification and protection of critical habitat in the NWA and the surrounding area.

5.4 MANAGEMENT OF AGRICULTURE

Management of agriculture in Cap Tourmente National Wildlife Area will include habitat enhancement for the greater snow goose, other waterfowl species, at-risk grassland birds and wildlife populations, sustainable controlled greater snow goose hunting and respect for the historical agricultural character and landscapes of this protected area. A management plan for agricultural land will be developed in order to define wildlife requirements in relation to agriculture and priority measures. Environmental impacts will be minimized through adherence to best agricultural practices. Agriculture will continue to play a strategic role in enhancing the quality of migratory bird hunting activities. Cap Tourmente National Wildlife Area will become a demonstration (model) site for best agricultural practices where research and collaboration with experts, established local farmers and new farmers is encouraged.

5.5 MANAGEMENT OF HUNTING

A renewed migratory bird hunting program will allow to continue offering high quality hunting services, to adapt to changes in the behaviour of the greater snow goose and to harmonize the various activities offered to visitors in the NWA. A number of tools will be used (e.g. crops attractive to wildlife, staging areas) to optimize hunting success in the NWA. The administrative framework for the hunting program will be reviewed to improve service delivery to hunters. Cap Tourmente NWA will also serve as a demonstration (model) site for hunting management approaches. Various collaborative initiatives will be encouraged to that end.

5.6 MONITORING

The implementation of an ecological monitoring program over the next five years is planned in order to assess the ecological status and ecological integrity of the NWA and to gather information that will be useful for management decision making. This program will be based on biological monitoring conducted by the NWA and monitoring carried out in collaboration with regional and provincial stakeholders. Ecological monitoring efforts may focus on plants, habitats, forest birds, waterfowl, shorebirds and species at risk as well as on ecological and human stresses to which the protected area is exposed (e.g. coastal erosion, invasive species, human activities). Activities could be carried out in collaboration with various local stakeholders to increase the effectiveness and sustainability of the monitoring program.

5.7 RESEARCH

Knowledge acquisition and research needs have been established for various plant and animal groups and for the management challenges and threats associated with Cap Tourmente National Wildlife Area. In this regard, an update of the knowledge acquisition plan based on the NWA's 2003 conservation plan (CWS, 2003) and on the inventories and studies carried out since the plan was drafted is being considered. One of the priorities is to gain more knowledge of habitats, forest stands, large mammals and predators as well as the presence and ecology of certain species at risk such as the least bittern, Canada warbler, barn swallow and species of plants vulnerable to harvest. It is very important to have a better understanding of the magnitude of the ecological threats that may affect the NWA, such as coastal erosion, agriculture and human activities.

To obtain a permit to conduct research in Cap Tourmente National Wildlife Area and to receive instructions concerning guidelines for a research proposal, please contact:

National Wildlife Area – Permit application
Environment and Climate Change Canada – Canadian Wildlife Service
801-1550 avenue d'Estimauville
Quebec City QC G1J 0C3
Email: ec.permisscfquebec-cwsquebecpermit.ec@canada.ca

5.8 PUBLIC INFORMATION AND OUTREACH

The public interpretation program at Cap Tourmente NWA will be renewed to increase visitor awareness of the conservation of the NWA, its habitats and its species. This program will be improved and based on clear national policy directions in order to optimize services to the public. It will include modern and innovative interpretation activities and new experiences for visitors. Cap Tourmente NWA will play a leading role in increasing public understanding and appreciation of Canada's network of National Wildlife Areas. Specific activities will help give the local and regional population a better understanding of the NWA and opportunity to take part in its protection. This protected area will be a demonstration (model) site for the interpretation services offered in NWAs. In this regard, the NWA team will collaborate with various specialists and organizations to improve the visitor experience. The new exhibit at the interpretation centre, scheduled to open to the public in 2021, will certainly help to achieve these goals.

5.9 PROTECTION AND PRESENTATION OF HISTORICAL AND CULTURAL HERITAGE

The Cap Tourmente NWA team will continue to preserve and maintain the historical buildings. Efforts will be directed towards raising awareness of the significant historical importance of this protected area, including actions to highlight the recent NWA's designation as a national historic site by the Parks Canada Agency. In addition, a variety of outreach activities focusing on the NWA's historical and cultural heritage (e.g. theme day, local and Indigenous culture, historical interpretation with characters, rallies, corporate dinners) will be promoted in collaboration with local, regional and outside stakeholders.

5.10 COLLABORATION WITH STAKEHOLDERS

Collaboration with local and regional stakeholders will be encouraged in order to protect Cap Tourmente NWA in its regional area of influence. To this end, it will be necessary to determine the boundaries of the NWA's area of influence, its natural resources, the threats it faces, and means of protection, in consultation with managers of adjacent land. Collaboration with representatives of local and regional communities will also be encouraged to facilitate information sharing and to promote a sense of belonging among the population and foster conservation of the NWA.

6 AUTHORIZATIONS AND PROHIBITIONS

For the benefit of wildlife and its environment, human activities are controlled and their impact minimized through the implementation of the *Wildlife Area Regulations.* These regulations set out activities that are prohibited (subsection 3[1]) in NWAs and provide the Minister of Environment and Climate Change with mechanisms for authorizing certain activities that are normally prohibited. The regulations also provide authority to the Minister to prohibit entry into NWAs.

Activities in a National Wildlife Area are authorized where notices have been posted at the entrance to or boundary of the area, or published in local newspapers; they are subject to the terms of the notice (see Appendix 1). However, the Minister can issue a permit authorizing certain activities.

6.1 PROHIBITION OF ENTRY

Under the *Wildlife Area Regulations*, the Minister may publish a notice in a local newspaper or post notices at the entrance of any wildlife area or on the boundary of any part thereof prohibiting entry to any wildlife area or part thereof (see Appendix I). These notices can be posted when the Minister is of the opinion that entry is a public health and safety concern or may disturb wildlife and their habitat.

For Cap Tourmente NWA, notices prohibiting entry would be posted in the interpretation centre and the information shelters as well as at the entrance to the site (entrance kiosk).

Cap Tourmente NWA is open to the public almost year-round, but opening times and periods vary according to the season. Fees apply when visitor services are provided. Access is prohibited outside these opening times and periods. The NWA may be closed without notice. Access is restricted to designated areas, unless otherwise indicated in notices published in local newspapers or posted at the entrance to or along the boundaries of the NWA.

In addition, holders of migratory game bird hunting permits (controlled greater snow goose hunt) can access the hunting zones in the NWA in October, in accordance with the applicable regulations. Permits are allocated through a draw. Access may be restricted to the locations indicated on signs posted at the site. Visitors must comply with all other restrictions unless they have a permit issued by the Minister.

Access to Cap Tourmente NWA is prohibited in the following situations:

- outside of the opening times and periods indicated on signs;
- off established trails;
- by snowmobile or other motor vehicle and bicycle elsewhere than on access roads open to the public.

6.2 AUTHORIZED ACTIVITIES

The following activities are compatible with the conservation goals and objectives set out in this management plan and are therefore authorized in the NWA: hiking, nature observation and photography on trails, picnicking in designated locations as well as farming and migratory bird hunting with a permit in the designated areas.

Hiking, Nature Observation, Photography and Picnicking

These activities are authorized only on established trails and in facilities and infrastructure designed for this purpose, such as lookouts and service areas. Hiking with pets (cats and dogs only) is authorized on trails only, during the hours of operation of the NWA. Pets must be kept on a leash. Picnicking is authorized at designated sites, namely benches, tables and lookouts. In winter, snowshoeing is permitted only on the trails of the bird feeder network.

Agriculture With Permit on Designated Parcels of Land

Under the *Wildlife Area Regulations*, the Canadian Wildlife Service issues permits to local producers authorizing agricultural activities on certain parcels of land in the NWA (about 250 ha in 2015-2016 out of 695 ha of agricultural plain) (Figure 3). The permits can be renewed annually for up to five years, depending on the needs of the producers and the CWS. The holders of agricultural permits must meet certain requirements relating to the timing of tilling, mowing and harvesting, particularly in wildlife breeding and migration areas, as well as to the production of crops that are attractive to wildlife or grasslands managed for nesting. They are also required to meet provincial standards respecting solid and liquid manure application and storage, pesticide use, livestock grazing, and the maintenance of herbaceous strips along ditches and streams.

Greater Snow Goose Controlled Hunting

The greater snow goose controlled hunt is a traditional activity that has been carried out for many decades in Cap Tourmente NWA. Registration for the hunt takes place between January and April, and a draw is held in May. Individuals who are successful in the draw are allowed to participate. Hunting is authorized in the NWA provided the regulatory requirements respecting time periods, conditions, locations (Figure 15) and hunting gears are met.

The NWA has an area where migratory bird hunting is prohibited (Zone d'interdiction de chasse or ZIC Cap-Tourmente). It includes an aquatic portion between the Sainte-Anne River and Cape Brûlé and a terrestrial portion, which includes the railroad right-of-way and the municipal highway. This provincially designated area, which preserves resting and feeding areas for waterfowl and other waterbirds, was created under the *Migratory Birds Convention Act, 1994*.

A notice listing activities that are permitted in the NWA is posted in the interpretation centre, at the entrance to the site, and at the information shelters. This notice is similar to that published in local newspapers (see Appendix I).

If there is a discrepancy between the information provided in the present document and the notice, the latter will take precedence as a legal instrument authorizing the activity.

All other activities are prohibited in this NWA, including small and large game hunting, snaring and trapping, fishing, use of motorized vehicles off official access roads and parking lots (e.g., all-terrain vehicles, motorcycles, snowmobiles), camping, cycling and cross-country skiing.

6.3 AUTHORIZATIONS

Permits and notices authorizing an activity may be issued only if the Minister is of the opinion that the activity is scientific research relating to wildlife or habitat conservation, benefits wildlife and its habitats or will contribute to wildlife conservation, or is otherwise consistent with the purpose for which the National Wildlife Area was established as specified in the most recent management plan.

The Minister may also add terms and conditions to permits in order to minimize the impact of an activity on wildlife and wildlife habitat and to protect them.

For further information, please consult the "Policy when Considering Permitting or Authorizing Prohibited Activities in Protected Areas Designated Under the *Canada Wildlife Act* and *Migratory Birds Convention Act, 1994"* (December 2011). This Environment and Climate Change Canada policy document is available on the Protected Areas website at **https://www.canada.ca/en/environment-climate-change/services/national-wildlife-areas/protected-area-reference-documents/policy-guidelines.html**

All requests for permits or authorizations must be made in writing to the following address:

Environment and Climate Change Canada – Canadian Wildlife Service
Quebec Region
801-1550 avenue d'Estimauville
Quebec City QC G1J 0C3
Email: ec.permisscfquebec-cwsquebecpermit.ec@canada.ca

6.4 EXCEPTIONS

The following activities will be exempt from the requirements for permitting and authorizations:

- activities related to public safety, health or national security that are authorized by or under another Act of Parliament or activities under the *Health of Animals Act* and the *Plant Protection Act* for the health of animals and plants;
- activities related to routine maintenance of NWAs and to the implementation of management plans, and enforcement activities conducted by an officer or employee of Environment Canada.

6.5 OTHER FEDERAL AND PROVINCIAL AUTHORIZATIONS

Depending on the type of activity, other federal or provincial permits or authorizations may be required to undertake an activity in this NWA.

For further information, please contact the regional office of the appropriate federal or provincial authority.

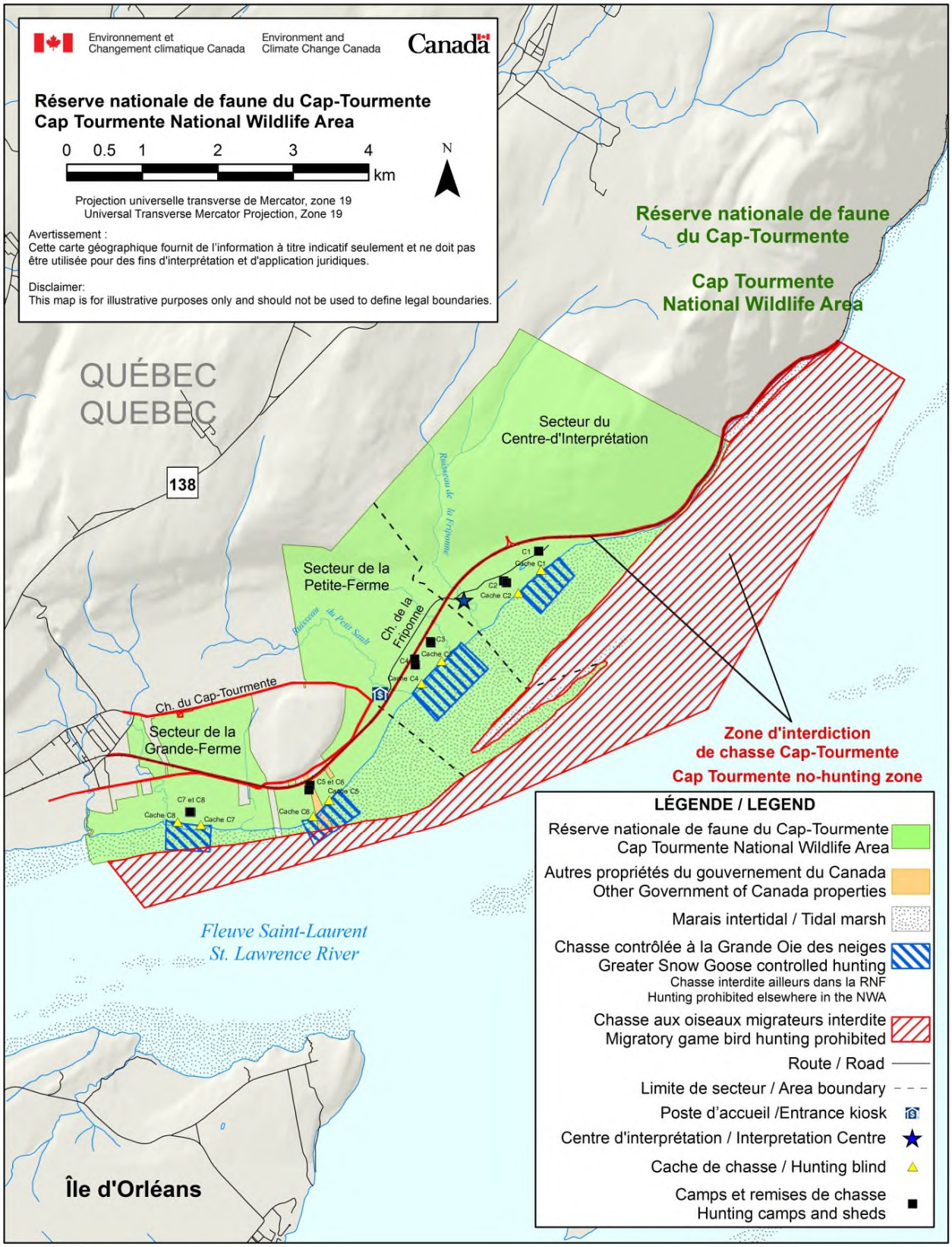

Figure 15 Area where migratory bird hunting is authorized in Cap Tourmente National Wildlife Area

7 HEALTH AND SAFETY

All reasonable efforts will be made to protect the health and safety of the public, including adequately informing visitors of any known or anticipated hazards or risks. Furthermore, Environment and Climate Change Canada staff will take all reasonable and necessary precautions to assure their own health and safety and that of their co-workers. However, visitors (including researchers and contractors) must make all reasonable efforts to inform themselves of risks and hazards and must be prepared and self-sufficient. Natural areas contain some inherent dangers, and visitors must take proper precautions to ensure their own safety. Environment and Climate Change Canada plans to update the public safety plan (1997) to limit the risk of incidents and to ensure public safety in the NWA. This plan will take into account the provisions of the NWA's black bear management plan (*Plan de gestion de l'ours noir*) (Turgeon, 2008).

Incidents or emergency situations can be reported to:

- **Environmental emergency:** ECCC's Canadian Environmental Emergencies Notification System at 514-283-2333 or 1-866-283-2333, or Ministère de l'Environnement et de la Lutte contre les changements climatiques du Québec (Quebec Department of Environment and the Fight Against Climate Change) at 1-866-694-5454
- Regulatory non-compliance and poaching: Enviro-info at 819-938-3860 or 1-800-668-6767
- SOS-Poaching: 1-800-463-2191
- Maritime Rescue (Canadian Coast Guard): 1-800-463-4393/cell: *16
- Sûreté du Québec: 310-4141/cell: *4141
- Civil Protection: 1-866-776-8345/cell: 911
- Forest fires: SOPFEU: 1-800-463-FEUX (3389)
- Local authorities (police or fire department): 911

8 ENFORCEMENT

The management of NWAs is based on three acts and the regulations thereunder:

- the *Migratory Birds Convention Act, 1994,* and the *Migratory Birds Regulations*;
- the *Canada Wildlife Act* and the *Wildlife Area Regulations*;
- the *Species at Risk Act*.

Environment Canada's wildlife enforcement officers have the mandate to monitor statutory and regulatory compliance on an ongoing basis and to initiate investigations, as required.

Below are examples of activities that, if carried out in National Wildlife Areas without authorization, may constitute an offence:

- entering the site;
- straying from established trails;
- following and harassing animals in order to take photographs of them;
- destroying or disturbing migratory birds, their nests or eggs;
- possessing a weapon or other instrument that could be used for hunting;
- picnicking or engaging in any other recreational activities outside the areas designated to that end;
- camping;
- lighting a fire;
- removing or damaging any natural artifact, building, fence, poster, sign or other structure;
- dumping or depositing any waste material or substance that would degrade or alter the quality of the environment;
- allowing any domestic animal to run at large.

9 PLAN IMPLEMENTATION

The management plan will be implemented over a 10-year period. Annual work plans will be developed in accordance with priorities and budgets. Depending on available resources and opportunities, some actions could be brought forward, postponed or cancelled. Environment and Climate Change Canada will favour an adaptive management approach. Implementation of the plan will be evaluated five years after it is published and on the basis of the actions set out in Table 5.

10 COLLABORATORS

Collaboration with local agencies and organizations will be encouraged to contribute to the protection and conservation of wildlife species and their habitats in Cap Tourmente National Wildlife Area. For instance, collaborations could be developed or pursued with universities and research centres to fill scientific knowledge gaps, with the province to implement species at risk recovery measures, particularly for species under provincial jurisdiction, and with non-governmental organizations and municipal authorities to increase public awareness of the objectives of the NWA.

The main organizations likely to collaborate on the mission and activities of Cap Tourmente National Wildlife Area are listed below.

Agriculture and Agri-Food Canada
2560 boulevard Hochelaga
Quebec City QC G1V 2J3
Geneviève Levasseur, Associate Director, Research, Development and Technology (RDT)
Telephone: 418-210-5002
Email: genevieve.levasseur@agr.gc.ca

Association de chasse et pêche de la Côte-de-Beaupré
11121 avenue Royale
Beaupré QC G0A 1E0
Telephone: 418-827-6244

Association des sauvaginiers de la grande région de Québec
P.O. Box 8972, Sainte-Foy Station
Quebec City QC G1V 4N8
Email: info@asgrq.com

Canyon Sainte-Anne
206 route 138
Beaupré QC G0A 1E0
Telephone: 418-827-4057
Email: canyon@canyon.qc.ca

Centre d'excellence des milieux humides de la Côte-de-Beaupré
École secondaire Mont-Sainte-Anne
10975 boulevard Sainte-Anne
Beaupré QC G0A 1E0
Telephone: 418-821-8053
Email: simon.mainville@csdps.qc.ca

Centre d'initiation au Patrimoine – La Grande-Ferme
800 chemin du Cap-Tourmente
Saint-Joachim QC G0A 3X0
Telephone: 418-827-4608
Email: info@lagrandeferme.qc.ca

Centre d'interprétation de la Côte-de-Beaupré
7976 avenue royale
Château-Richer QC G0A 1N0
Telephone: 418-824-3677
Email: info@histoire-cotedebeaupre.org

Club des ornithologues de Québec Inc.
Domaine de Maizerets
2000 boulevard Montmorency
Quebec City QC G1J 5E7
Telephone: 418-847-7645
Email: coq@coq.qc.ca

Corporation du sentier des caps de Charlevoix
2 rue Leclerc
Saint-Tite-des-Caps QC G0A 4J0
Telephone: 418-823-1117
Toll-free number: 1-866-823-1117
Email: info@sentierdescaps.com

Développement Côte-de-Beaupré
30 rue Sainte-Marguerite
Beaupré QC G0A 1E0
Telephone: 418-827-5256
Fax: 418-827-5065
Email: info@developpementcdb.com

Ducks Unlimited Canada
710 rue Bouvier, Suite 260
Quebec City QC G2J 1C2
Telephone: 418-623-1650
Toll-free-number: 1-800-565-1650
Fax: 418-623-0420
Email: ci_quebec@canards.ca

Environment Canada
Wildlife Enforcement Directorate (WED) – Quebec City Office
801-1550 avenue d'Estimauville, 2nd floor
Quebec City QC G1J 0C3
Telephone: 418-649-6471
Email: yves.raymond@canada.ca

Fédération québécoise de la marche
4545 avenue Pierre-De Coubertin
Montreal QC H1V 0B2
Telephone: 514-252-3157
Toll-free number: 1-866-252-2065
Fax: 514-252-5137
Email: infomarche@fqmarche.qc.ca

Fédération québécoise des chasseurs et pêcheurs
162 rue du Brome
Saint-Augustin-de-Desmaures QC G3A 2P5
Telephone: 418-878-8901
Toll-free number: 1-888-523-2863
Fax: 418-878-8980
Email: info@fedecp.qc.ca

Ferme Mario Duchesne
7 rue de la Seigneurie
Beaupré QC G0A 1E0
Telephone: 418-440-8618

Fondation québécoise pour la protection du patrimoine naturel (FQPPN)
P.O. Box 42
Saint-Augustin-de-Desmaures QC G3A 1V9
Telephone: 418-655-9399
Email: fondation.patrimoine@globetrotter.net

Huron-Wendat Nation
255 Place Chef Michel-Laprise
Wendake QC G0A 4V0
Telephone: 418 843-3767
Toll-free number: 1-877-712-3767
Fax: 418-842-1108
Email: louis.lesage@cnhw.qc.ca

Les Viandes biologiques de Charlevoix
125 St-Édouard
Saint-Urbain QC G0A 4K0
Telephone: 418-639-1111
Toll-free number: 1-888-435-6785
Fax: 418-639-9938
Email: viandesbio@charlevoix.net

Ministère de l'Agriculture, des Pêcheries et de l'Alimentation du Québec (MAPAQ)
Direction régionale de la Capitale Nationale
1685 boulevard Wilfrid-Hamel Ouest, Suite 140
Quebec City QC G1N 3Y7
Telephone: 418-643-0033
Fax: 418-644-8263
Email: Mustapha.eddib@mapaq.gouv.qc.ca

Ministère de l'Environnement et de la Lutte
contre les changements climatiques (MELCC)
Bureau régional de la Capitale nationale et de la Chaudière-Appalaches
1175 boulevard Lebourgneuf, Suite 100
Quebec City QC G2K 0B7
Telephone: 418-644-8844
Fax: 418-646-1214
Email: capitale-nationale@environnement.gouv.qc.ca

Ministère de l'Environnement et de la Lutte
contre les changements climatiques (MELCC)
Coordination des espèces floristiques exotiques envahissantes
Direction de l'expertise en biodiversité
Direction générale de l'écologie et de la conservation
675 boulevard René-Lévesque Est, P.O. Box 21
Quebec City QC G1R 5V7
Telephone: 418-521-3907
Fax: 418-646-6169
Email: Marie-Eve.Tousignant@environnement.gouv.qc.ca; Yann.Arlen-Pouliot@environnement.gouv.qc.ca

Ministère des Forêts, de la Faune et des Parcs (MFFP)
Bureau régional de la Capitale nationale et de la Chaudière-Appalaches
1300 rue du Blizzard, bureau 100
Quebec City QC G2K 0G9
Telephone: 418-643-4680
Fax: 418-644-8960
Email: capitale-nationale.foret@mffp.gouv.qc.ca

Ministère des Forêts, de la Faune et des Parcs (MFFP)
Direction de la protection de la faune de la Capitale-Nationale et de la Chaudière-Appalaches
Bureau local de La Malbaie
1915 boul. de Comporté
La Malbaie QC G5A 1N9
Telephone: 418-665-6485
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Email: michel.guay4@mffp.gouv.qc.ca

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Fax: 418-827-3121
Email: info@mont-sainte-anne.com

Montreal Biodome
4777 avenue Pierre-De-Coubertin
Montreal QC H1V 1B3
Telephone: 514-868-3000

Montreal Biosphere
160 Chemin Tour-de-l'Isle, Île Sainte-Hélène
Montreal QC H3C 4G8
Telephone: 514-283-5000
Toll-free number: 1-855-773-8200
Fax: 514-283-5021
Email: info.biosphere@ec.gc.ca

Municipalité de Saint-Joachim-de-Montmorency
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Fax: 1-418-827-8574
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Fax: 418-823-2527
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Municipalité régionale de comté (MRC) de La Côte-de-Beaupré
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Fax: 418-824-3917
Email: info@mrccotedebeaupre.qc.ca

Natural Resources Canada
Laurentian Forestry Centre
1055 rue du P.E.P.S
P.O. Box 10380, Sainte-Foy Station
Quebec City QC G1V 4C7

Daniel Plourde, in charge of plantations in Cap Tourmente NWA
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Pierre Desrochers, Scientist Emeritus
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Nature Conservancy of Canada
Quebec City Office
870 av. de Salaberry, Suite R26
Quebec City QC G1R 2T9
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Observatoire d'oiseaux de Tadoussac (OOT)
Pascal Côté, Director
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Les Bergeronnes QC G0T 1G0
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Fax: 418-232-6558
Email: explos@explosnature.ca

Office du tourisme de Québec (OTQ)
399 rue Saint-Joseph Est
Quebec City QC G1K 8E2
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Toll-free number: 1-877-783-1608
Fax: 418-522-0830

Parks Canada Agency
Protected Areas Establishment and Conservation Directorate
Natural Resource Conservation Branch
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11 LITERATURE CITED

Allard, M., R.A. Fournier, M. Grenier, J. Lefebvre and J.-F. Giroux. 2012. “Forty years of change in the bulrush marshes of the St. Lawrence Estuary and the impact of the Greater Snow Goose.” Wetlands 32(6): 1175-1188.

Aparicio, C., D. Blouin, A. Borie, L. Goesel and A. Kish. 2001. Proposition d’une zone-modèle de conservation pour la Réserve nationale de faune du cap Tourmente. Essai présenté à la Faculté d’aménagement, d’architecture et des arts visuels de l’Université Laval pour l’obtention du grade de maître en aménagement du territoire et développement régional, Québec, 79 p.

Aubry, Y. and R. Cotter. 2007. Quebec Shorebird Conservation Plan, Environment Canada, Canadian Wildlife Service, Quebec Region, Sainte‑Foy, xvi + 196 p.

Banville, D. 2002. Observations d’amphibiens et reptiles sur la réserve nationale de faune du cap Tourmente le 28 août 2002. 3 p.

Baril, A. 2014. Outil de gestion pour les réserves nationales de faune. Two documents : 1) Guide d’utilisation (10 p.); 2) Grille d’analyse des menaces et défis de gestion et actions correspondantes (Excel). Tool based on the IUCN guide on threat classification: Dec_2012_Guidance_Threats_Classification_Scheme.pdf (see also IUCN, 2015). Prepared for Luc Bélanger, Manager, Ecosystem Conservation, Environmental Stewardship Branch, Canadian Wildlife Service, Quebec Region, April 2014.

Batt, B.D.J. 1998. The Greater Snow Goose: Report of the Arctic Goose Habitat Working Group, special publication of the Arctic Goose Joint Venture, U.S. Fish and Wildlife Service and Canadian Wildlife Service, Washington D.C. and Ottawa, Ontario.

Bernatchez, P., R. Guevremont and S. Duguas. 2015. Suivi de l’érosion des berges dans la réserve nationale de faune du Cap-Tourmente (2007 to 2014). Report submitted to Environment Canada. Under the direction of Pascal Bernatchez of the Laboratoire de dynamique et de gestion intégrée, Research Chair in Coastal Geoscience, UQAR, June 2015, 8 p.

BIOMQ (Banque informatisée des oiseaux marins du Québec). 2015. Database, Canadian Wildlife Service, Environment Canada, Quebec Region [updated June 18, 2015]. This database can also be consulted on the St. Lawrence Global Observatory website [http://www.ogsl.ca/bio].

Bourbeau, S., C. Roy and S. Turgeon. 2002. Recherche, inventaire et dénombrement des différentes plantes rares susceptibles de se retrouver sur le territoire de la RNF du cap Tourmente. Work in progress. Canadian Wildlife Service, Quebec.

BPH environnement. 2010. L’agriculture sur la réserve nationale de faune du Cap-Tourmente. Report prepared for the Canadian Wildlife Service, Environment Canada, Quebec, 94 p.

Broders, K.D., A. Boraks, A.M. Sanchez and G.J. Boland. 2012. “Population structure of the butternut canker fungus, *Ophiognomonia clavigignenti-juglandacearum*, in North American forests.” Ecol. Evol. 2:2114-2127.

Brouillet, L., F. Coursol, S.J. Meades, M. Favreau, M. Anions, P. Bélisle and P. Desmet. 2010+. VASCAN, Database of Vascular Plants of Canada. http://data.canadensys.net/vascan/search [accessed March 25, 2015 and October 26, 2020 for the name of plants].

Calvert, A.M., G. Gauthier, E.T. Reed, L. Bélanger, J.-F. Giroux, J.-F. Gobeil, M. Huang, J. Lefebvre and A. Reed. 2007. Temporal changes in harvest. p. 5-6, in Evaluation of the special conservation measures for Greater Snow Geese: Report of the Greater Snow Goose Working Group. Edited by E.T. Reed and A.M. Calvert. Arctic Goose Joint Venture Special Publication, Canadian Wildlife Service, Sainte-Foy, Quebec.

Campagna, J., A. Deragon, C. Leclerc, É. Ntaninda, J. Ouellet and I. Sergerie. 2001. Les retombées économiques régionales et locales de la Réserve nationale de faune du cap Tourmente. Essai-laboratoire réalisé dans le cadre du programme de maîtrise en aménagement du territoire et développement régional de l'Université Laval, Sainte-Foy, Quebec, 72 p.

CDPNQ (Centre de données sur le patrimoine naturel du Québec). 2019. Extractions du système de données pour le territoire de la réserve nationale de faune du Cap-Tourmente (mars 2019). Ministère de l’Environnement et de la Lutte contre les changements climatiques et Ministère des Forêts, de la Faune et des Parcs, Québec.

Chapdelaine, G. and J.-F. Rail. 2004. Québec’s Waterbird Conservation Plan. Migratory Bird Division, Canadian Wildlife Service, Quebec Region, Environment Canada, Sainte-Foy, Quebec, 99 p.

CTQ (Commission de toponymie du Québec). 2016. www.toponymie.gouv.qc.ca/ct/ToposWeb/recherche.aspx?s=cap+tourmente&x=0&y=0 [accessed December 2016].

CWS (Canadian Wildlife Service). 2003. Plan de conservation de la Réserve nationale de faune du cap Tourmente. Environment Canada, Canadian Wildlife Service, Quebec Region, 64 p. + appendices.

De Repentigny, L.-G. 1992. Éphémérides relatives aux fermes du Séminaire de Québec à Saint-Joachim. Unpublished report, Canadian Wildlife Service, Quebec Region, 15 p.

De Repentigny, L.-G. 1989. La ferme d’en bas du cap Tourmente. La Petite-Ferme et la Réserve nationale de faune du cap Tourmente : occupation humaine des origines à 1763. Canadian Wildlife Service, Quebec Region, 282 p.

De Repentigny, L.-G. 1979. La Petite-Ferme du cap Tourmente. Environnement Canada, gestion faune, Sainte-Foy, Quebec, 35 p.

DUC (Ducks Unlimited Canada). 2014. Évaluation de l'état des aménagements fauniques sur les terres appartenant ou sous la gestion d'Environnement Canada dans la région de Québec. In-house document prepared for Environment Canada, March 2014, 256 p. + appendices.

DUC (Ducks Unlimited Canada). 2008. Plan de conservation des milieux humides et de leurs terres hautes adjacentes de la région administrative de la Capitale-Nationale, 88 p.

eBird Québec (Regroupement QuébecOiseaux, Études d'oiseaux Canada, Cornell Lab of Ornithology). 2020. http://www.ebird.quebec [accessed October 26, 2020].

eBird Québec (Regroupement QuébecOiseaux, Études d'oiseaux Canada, Cornell Lab of Ornithology). 2019. http://www.ebird.quebec [accessed March 19, 2019].

ECCC (Environment and Climate Change Canada). 2016. Découpage des parcelles agricoles de la réserve nationale de faune du Cap-Tourmente par photo-interprétation [ArcGIS 10.2 data, unpublished], developed by the Canadian Wildlife Service, Quebec Region [updated July 2016].

Environment Canada. 2014. National Conservation Plan – Connecting Canadians to Nature Initiative. Project Plan 2015-2020, Environment Canada, Canadian Wildlife Service, June 2014, 19 p.

Environment Canada. 2013. Bird conservation strategy for Bird Conservation Region 13 in Québec Region: Lower Great Lakes/St. Lawrence Plain. Canadian Wildlife Service, Environment Canada, Quebec City, Quebec, 161 p. + appendices.

Environment Canada. 2005. Protected Areas Manual (Draft). Appendix 5: Selection Criteria for Candidate Areas – National Wildlife Reserves, and Appendix 8: Policy on Establishing and Managing Environment Canada's Protected Areas (Protected Area Classification System). Prepared by Environment Canada protected area practitioners (Canadian Wildlife Service), December 2005.

Fondation Les Oiseleurs du Québec inc. 2000. Les oiseaux à statut précaire de la Réserve nationale du cap Tourmente. Rapport d'inventaire de la faune aviaire, 18 p.

Furnier, G.R., A.M. Stolz, R.M. Mustaphi and M.E. Ostry. 1999. Genetic evidence that butternut canker was recently introduced into North America. Can. J. Bot. 77:783-785.

Gauthier, G., J-F. Giroux, A. Reed, A. Béchet and L. Bélanger. 2005. Interactions between land use, habitat use, and population increase in Greater Snow Geese: what are the consequences for natural wetlands? Global Change Biology 11:856-868.

Gilbert, H. 2013. "Suivi de 3 plantes rares de l'estuaire d'eau douce du Saint-Laurent." Le Naturaliste canadien 137(2):12-20. La Société Provancher d'histoire naturelle du Canada, ISSN: 0028-0798 (print), 1929-3208 (digital), DOI: 10.7202/1015512ar.

Gilbert, H., F. Langlois-Paradis and J. Bélanger. 2016. Inventaire des plantes envahissantes dans la réserve nationale de faune du Cap-Tourmente. Report prepared for Environment and Climate Change Canada, 75 p + appendices.

Girard, M. 2009. Impact de la grande oie des neiges sur les marais à scirpe de l'estuaire du Saint-Laurent, Québec. Master's thesis, Université du Québec à Montréal, 80 p.

Guimont, J. 1996. La Petite-Ferme du cap Tourmente. De la ferme de Champlain aux grandes volées d'oies. Les éditions du Septentrion, Québec, 230 p.

IUCN (International Union for Conservation of Nature). 2015. Threats Classification Scheme (Version 3.2). [www.iucnredlist.org/technical-documents/classification-schemes/threats-classification-scheme] (Site accessed September 2, 2019.)

IUCN (International Union for Conservation of Nature; Dudley, N., editor). 2008. Guidelines for applying protected area management categories. Gland Switzerland: International Union for Conservation of Nature, x + 86 p.

Laporte, P. and M. Giroux. 1983. Lâcher de Faucon pèlerin à cap Tourmente. Rapport nº 3655. Canadian Wildlife Service, Québec.

Larivée, J. 2014. Étude des populations d'oiseaux du Québec (2003-2012 data; extraction on March 26, 2014) [database]. Rimouski, Québec: Regroupement QuébecOiseaux.

Lavoie, C. 2019. 50 plantes envahissantes — Protéger la nature et l'agriculture. Québec. Les publications du Québec, 415 p.

Lefebvre, J. 2017. Estimation de la population printanière de la Grande Oie des neiges dans le sud du Québec en 2017. Preliminary report, Canadian Wildlife Service, Quebec Region, 3 p.

Lefebvre, J., G. Gauthier, J.-F. Giroux, A. Reed, E.T. Reed and L. Bélanger. 2017a. "The greater snow goose *Anser caerulescens atlanticus*: Managing an overabundant population." Ambio 4:262-274.

Lefebvre, J., G. Gauthier and M.-C. Cadieux. 2017b. Population and productivity surveys of Greater Snow Geese in 2016. A report to the USFWS and Atlantic Flyway technical section. Canadian Wildlife Service, Environment and Climate Change Canada, Quebec, Canada, 6 p.

Lefebvre, J. and R. Cotter, 2002. Suivi de la végétation du marais à scirpe de la Réserve nationale de faune du Cap Tourmente. Canadian Wildlife Service, Environment Canada, Quebec, Canada, 12 p.

Lehoux, D., J. Landry and C. Grenier. 1997. Plan d'aménagement de la Réserve nationale de faune du cap Tourmente (Plan quinquennal). Environment Canada, Canadian Wildlife Service, Quebec Region, 110 p. + appendices.

Lemelin, G. 2013. Inventaire d'odonates dans la Réserve nationale de faune du cap Tourmente. Prepared as part of an initiative to compile an atlas of dragonflies of Quebec, preliminary report, Lévis, December 2013, 17 p.

Lepage, C. and L.-G de Repentigny. 2004. Le passé se dévoile…circuit autonome à saveur historique. Canadian Wildlife Service, 43 p.

Maheu-Giroux M., S. de Blois and B. Jobin. 2006. Dynamique des paysages de quatre réserves nationales de faune du Québec : suivi des habitats et des pressions périphériques. McGill University, Plant Sciences Department and Environment Canada, Canadian Wildlife Service, Quebec Region, 67 p. + appendices.

MELCC (Ministère de l'Environnement et de la Lutte contre les changements climatiques - Gouvernement du Québec). 2020. Listes des espèces floristiques menacées; Listes des espèces floristiques vulnérables; Listes des espèces floristiques vulnérables à la récolte; Listes des espèces floristiques susceptibles d'être désignées menacées ou vulnérables. http://www.environnement.gouv.qc.ca/biodiversite/especes/ [accessed October 26, 2020].

Mercier, Y., L.-G. de Repentigny and I. Ringuet. 1986. Plan de gestion de la Réserve nationale de faune du cap Tourmente. Canadian Wildlife Service, 51 p. + annexe.

MFFP (Ministère des Forêts, de la Faune et des Parcs – Gouvernement du Québec). 2020a. Liste de la faune vertébrée du Québec. www3.mffp.gouv.qc.ca/faune/vertebree/recherche/index.asp [accessed October 26, 2020].

MFFP (Ministère des Forêts, de la Faune et des Parcs – Gouvernement du Québec). 2020b. Liste des espèces de la faune désignées menacées; Liste des espèces de la faune vulnérables; Liste des espèces de la faune susceptibles d'être désignées menacées ou vulnérables. http://www3.mffp.gouv.qc.ca/faune/especes/menacees/liste.asp [accessed October 26, 2020].

MRC (Municipalité régionale de comté) de La Côte-de-Beaupré. 2019. https://www.mrccotedebeaupre.com/portrait_soci-economique.shtml [accessed March 14, 2019].

MRC (Municipalité régionale de comté) de La Côte-de-Beaupré. 2011. Planification stratégique de développement durable. Diagnostic factuel, enjeux et défis. IBI/DAA. Fédération canadienne des municipalités, 110 p.

MRNF (Ministère des Ressources naturelles et de la Faune – Gouvernement du Québec). 2005. Forêt ancienne de Sault-au-Cochon, 2 p. https://mffp.gouv.qc.ca/publications/forets/connaissances/ecosystemes-Sault-au-Cochon.pdf [accessed March 14, 2019].

Municipalité de Saint-Joachim, 2019. https://www.saintjoachim.qc.ca/portrait-municipal/profil-municipal [accessed March 14, 2019].

Nadeau Foresterie urbaine. 2014. Inventaire des populations de noyer cendré et évaluation de son chancre - Réserves nationales de faune du cap tourmente, du lac saint-françois et des îles de la paix. Study prepared for Environment Canada, 59 p. + appendices.

Natural Resources Canada. 2016. https://www.nrcan.gc.ca/forests/fire-insects-disturbances/top-insects/13375 [accessed December 2016].

Pintal, J.-Y. and V. Lambert. 2014. Réserve nationale de faune du Cap-Tourmente - (CgEq-6) - Interventions archéologiques 2014 - Rapport final. Réalisé par les archéologues consultants Jean-Yves Pintal et Vincent Lambert pour Travaux publics et Services gouvernementaux Canada, Québec, December 2014, 65 p. + annex.

Pouliot, D., A. Rivard and S. Giguère. 2015. Bilan des inventaires fauniques à la Réserve nationale de faune du cap Tourmente, 2004, 2005, 2006, 2008 et 2009. Environment Canada, Canadian Wildlife Service, Quebec Region, Quebec City, 43 p. + appendices.

PWGSC (Public Works and Government Services Canada). 2013. Rapport d'état d'immeuble – Sommaire exécutif – Réserve nationale de faune du Cap-Tourmente. Services techniques et entretien, Travaux publics et Services gouvernementaux Canada, Quebec Region, February 2013, 12 volumes.

PWGSC (Public Works and Government Services Canada). 2007. Rapport d'état d'immeuble — Réserve nationale faunique de Cap Tourmente. Édifice du gouverment du Canada, Environnement Canada. Prepared by R. Matta, C. Langlois, B. Leclerc, P. Beaudoin, J.E.Y. Déry, January 2007.

RAMSAR. 2016. Country profile; Canada: Cap Tourmente. www.ramsar.org/wetland/canada [accessed December 1, 2016].

Raymond, M. 2013. Les oiseaux de la Réserve Nationale de faune du cap-Tourmente. Liste annotée 2013. Mise à jour à partir de la liste des oiseaux de la Réserve nationale de faune du cap Tourmente 2009.

Robert, M., M.-H. Hachey, D. Lepage and A.R. Couturier (eds.). 2019. Second Atlas of the Breeding Birds of Southern Québec. Regroupement QuébecOiseaux, Canadian Wildlife Service (Environment and Climate Change Canada) and Bird Studies Canada, Montreal, xxv + 694 p.

Sabourin, A. 2004. Inventaire des plantes vasculaires menacées ou vulnérables de la réserve nationale de faune du Cap-Tourmente. Final report prepared for Environment Canada. Environment Canada, 2004, 10 p. + annex.

Salafsky, N., D. Salzer, A.J. Stattersfield, C. Hilton-Taylor, R. Neugarten, S.H.M Butchart, B. Collen, N. Cox, L.L. Master, S. O'Connor and D. Wilkie. 2008. "A Standard Lexicon for Biodiversity Conservation: Unified Classifications of Threats and Actions." Contributed Paper. Conservation Biology 22(4):897-911. http://onlinelibrary.wiley.com/doi/10.1111/j.1523-1739.2008.00937.x/full.

Sambaraju, K.R., P. DesRochers and D. Rioux. 2018. "Factors influencing the regional dynamics of a deadly disease of butternut."Plant Disease 102:743-752.

Sépaq (Société des établissement de plein air du Québec). 2016. https://www.sepaq.com/destinations/parc-chute-montmorency/index.dot?language_id=1 [accessed December 14, 2016].

Simard, 2004. “Araignées du Cap Tourmente.” Nouv’Ailes, le bulletin de nouvelles de l’Association des entomologistes amateurs du Québec 14(1), 12 p.

SOS-POP. 2020. Banque de données sur les populations d’oiseaux en situation précaire au Québec (version from April 16, 2020). Regroupement QuébecOiseaux, Montréal, Québec.

SOS-POP. 2019. Banque de données sur les populations d’oiseaux en situation précaire au Québec (version from January 31, 2019). Regroupement QuébecOiseaux, Montréal, Québec.

Species at Risk Public Registry (Government of Canada). 2020. https://species-registry.canada.ca/index-en.html#/species?sortBy=commonNameSort&sortDirection=asc&pageSize=10 [accessed October 26, 2020].

Species at Risk Public Registry (Government of Canada). 2019a. Species Profile – Bobolink. https://wildlife-species.canada.ca/species-risk-registry/species/speciesDetails_e.cfm?sid=1087 [accessed March 14, 2019].

Species at Risk Public Registry (Government of Canada). 2019b. Species Profile – Little Brown Myotis (*Myotis lucifugus*). https://wildlife-species.canada.ca/species-risk-registry/species/speciesDetails_e.cfm?sid=1173 [accessed March 14, 2019].

Turgeon, S. 2008. Plan de gestion de l’ours noir – Réserve nationale de faune du Cap-Tourmente. Canadian Wildlife Service, Environment Canada, Quebec Region, March 2008, 23 p. + appendices.

Turgeon, S., J.-P. Savard and G. Falardeau. 1995-1996. Inventaire par points d’écoute. Canadian Wildlife Service, Québec, unpublished report.

APPENDIX I: PUBLIC NOTICE PUBLISHED BY ENVIRONMENT CANADA IN 2013

Environnement Canada Environment Canada

Canada

Avis d'Environnement Canada

Environnement Canada désire informer le public que la Réserve nationale de faune (RNF) du cap Tourmente, située dans la municipalité de Saint-Joachim, est un territoire protégé. Depuis sa création en 1978, la RNF a pour but de protéger les oiseaux migrateurs, la faune et leurs habitats, ainsi que plusieurs espèces en péril.

Afin de protéger ce territoire, le Ministère informe également les personnes qui circulent dans la RNF de leur obligation de se conformer aux règles dictées par la *Loi sur les espèces sauvages du Canada* et le *Règlement sur les réserves d'espèces sauvages*. Toute personne qui omet de se conformer à la réglementation est passible d'une amende et de poursuites.

Les activités autorisées sans permis mais avec droit d'accès dans les zones aménagées à ces fins (sentiers, postes d'observation, aires de repos et de pique-nique) sont : la randonnée pédestre, l'observation de la nature, la photographie et le pique-nique. Le pique-nique est autorisé seulement sur les bancs, tables et dans les postes d'observation. En hiver, la raquette est autorisée seulement dans les sentiers balisés ouverts.

À moins de détenir un permis délivré par le ministre qui spécifie les activités autorisées, il est interdit à quiconque se trouve sur la Réserve :

- de marcher hors des sentiers aménagés et des chemins d'accès carrossables;
- d'utiliser tout moyen de transport; la circulation en motoneige est par exemple interdite sur tout le territoire de la Réserve;
- d'endommager, de détruire ou d'enlever un végétal;
- de laisser un animal domestique en liberté;
- de jeter ou de laisser des détritus ou des substances susceptibles de diminuer la qualité de l'environnement naturel;
- de pratiquer une activité récréative;
- de camper, d'allumer ou d'entretenir un feu.

Pour obtenir l'information complète concernant la règlementation qui s'applique, veuillez consulter le *Règlement sur les réserves d'espèces sauvages* (**www.laws-lois.justice.gc.ca**) ou le site Web d'Environnement Canada (**www.ec.gc.ca**).

Pour formuler une plainte ou dénoncer des actes illégaux, veuillez communiquer avec Environnement Canada par téléphone au 1-800-668-6767 ou par courriel à l'adresse **enviroinfo@ec.gc.ca**.

Rien dans le présent avis ne porte atteinte aux droits ancestraux ni à ceux issus de traités autochtones.

Environment Canada Notice

Environment Canada would like to inform the public that the Cap Tourmente National Wildlife Area (NWA), located in the Municipality of Saint-Joachim, is a protected area. Established in 1978, the purpose of the NWA is to protect migratory birds, wildlife and their habitats, as well as several species at risk.

To protect this area, the Department would also like to inform people circulating in the NWA of their obligation to comply with the rules of the *Canada Wildlife Act* and the *Wildlife Area Regulations*. Failure to comply with the regulations may result in a fine or prosecution.

Activities allowed without a permit but with a right of access in designated developed areas (trails, observation areas, as well as resting and picnic areas) are: hiking, nature observation, photography and picnics. Picnics are permitted only on benches, tables and in observation areas. During winter, snowshoeing is permitted only on open marked trails.

Without a permit issued by the Minister specifying the authorized activities, the following are prohibited in the NWA:

- Walking off developed trails and access roads;
- Using any means of transportation; for example, snowmobiling is prohibited across the NWA;
- Damaging, destroying or removing a plant;
- Having a domestic animal without a leash;
- Dumping or depositing any garbage or substance that would degrade or alter the quality of the environment;
- Engaging in recreational activities;
- Camping, or starting or maintaining a fire.

For complete information about the applicable regulations, please consult the Wildlife Area Regulations (**www.laws-lois.justice.gc.ca**) or the Environment Canada website (**www.ec.gc.ca**).

To file a complaint or report illegal activities, please contact Environment Canada by phone at 1-800-668-6767 or by email at **enviroinfo@ec.gc.ca**.

Nothing in this notice infringes on ancestral rights or Aboriginal treaty rights.

APPENDIX 2 MANAGEMENT OF CAP TOURMENTE NATIONAL WILDLIFE AREA AND REPORT ON NWA PROGRAMS AND ACTIVITIES SINCE 1986

1 NWA TEAM

Since its creation in 1978, Cap Tourmente National Wildlife Area (NWA) has been administered by a permanent, on-site team that is responsible for visitor services, monitoring and maintaining the protected area, as well as managing and implementing activities and programs. This NWA, which protects a vast area of extraordinary ecological and historical importance and has received many visitors over the centuries, is considered a model for Canada's network of National Wildlife Areas. For nearly four decades, despite personnel reductions, the team at Cap Tourmente NWA has been carrying out the broad mandate for this protected area, which includes conservation, controlled hunting, agriculture and enhancement. In 2019, a team of seven permanent employees and four seasonal employees along with casual employees was responsible for natural resource conservation, agricultural activities, the greater snow goose controlled hunt, interpretation and visitor services, and grounds and building maintenance. The team reports to the Protected Areas Section of the Canadian Wildlife Service, Quebec Region.

The following sections describe the programs and activities implemented by the NWA and summarize the achievements since the last (and first) management plan was published in 1986 (Mercier et al.).

2 PROGRAMS AND ACTIVITIES

A number of programs and activities are carried out in Cap Tourmente NWA to fulfill Environment and Climate Change Canada's mandate for biodiversity conservation and to meet the requirements imposed by the NWA's high visitor traffic. Implementing the NWA's various programs is an ongoing challenge for the small on-site team. The main activities undertaken at present are conservation of natural resources (e.g. monitoring of the greater snow goose and species at risk), agriculture (management of land to support wildlife and leasing of parcels of land to local producers), the greater snow goose controlled hunt program (packages offered to hunters, management of hunting) and the interpretation program (interpretation centre services, personalized interpretation services, groups including school groups as well as self-interpretive services (e.g. BioKit, geocaching, historical trail). Activities complementing the NWA's mandate are also undertaken, including management of buildings, infrastructure and land, public safety,

environmental management (compliance with environmental standards) and environmental assessments.

3 HISTORY, ACHIEVEMENTS AND FINDINGS, BY PROGRAM OR ACTIVITY

3.1 Natural Resource Conservation

History

Various natural resource conservation projects have been carried out in the NWA since its creation in 1978. Between 1986 and 1995, although the focus was on developing infrastructure for visitor services, a variety of conservation activities were undertaken, including inventories and studies on waterfowl, waterfowl habitat enhancements put in place by Ducks Unlimited Canada and various initiatives related to the greater snow goose controlled hunting program. Between 1996 and 2006, the first songbird inventories were carried out and a survey protocol for grassland birds was implemented; it is still in use today. With the enactment of the *Species at Risk Act* in 2002, inventories of species at risk have been conducted in spite of the small staff complement. In 2003, an initial conservation plan was developed for the NWA. In 2006, efforts were devoted to the monitoring of resources, including birds, agriculture, species at risk and ecosystems. Between 2007 and 2019, the number of staff was increased, making it possible to carry out inventories and research on species at risk and invasive plants and to begin developing an ecological monitoring program for the NWA.

Achievements

The key achievements related to natural resource conservation in Cap Tourmente NWA since the publication of the last management plan for this protected area in 1986 are as follows:

- active management aimed at protecting ecosystem biodiversity;
- NWA conservation plan;
- inventory of wildlife resources;
- monitoring, habitat enhancements and protection for at-risk plant and animal species;
- monitoring of birds, nest boxes and habitat enhancements for birds;
- monitoring and research carried out in the Ducks Unlimited Canada enhancements;
- monitoring of shoreline erosion;
- inventory and control of invasive species;
- population control for predators (raccoon, striped skunk) of breeding waterfowl;

- establishment of winter conservation areas for large mammals;
- establishment of a bird banding station in collaboration with the Observatoire d'oiseaux de Tadoussac;
- fitting of antenna transmitters for monitoring purposes on passerines banded at the banding station;
- creation of a bat maternity colony.

Figure 16 Inventory of monarch larvae on common milkweed plants
Photo © Environment and Climate Change Canada, Canadian Wildlife Service

Findings

Findings related to the conservation program implemented at Cap Tourmente NWA since the publication of the last management plan in 1986 include the following:

- The conservation vision, objectives and priorities need to be better defined.
- A balance must be struck between conservation and human uses (recreational activities, agriculture, hunting).
- A strategy for the protection of species at risk needs to be developed.

- Objectives for the control of invasive plant species need to be established.
- Branding for the NWA that better reflects its important role in conserving biodiversity needs to be developed.
- A comprehensive ecological monitoring program needs to be put in place.
- The conservation activities and measures for the NWA should be defined in collaboration with various organizations.
- Substantial research and knowledge acquisition requirements exist.
- The NWA can serve as a demonstration (model) site for best practices as reflected in the resource conservation program.

3.2 Agriculture

History

Agriculture has been part of the landscape of the Cap Tourmente region for nearly 400 years. In 1623, Champlain ordered the harvesting of “beach hay” there and, between 1664 and 1969, Monsignor de Laval and the Séminaire de Québec developed livestock production and other agricultural activities in the area. In 1969, after the CWS acquired most of the farmland in the Cap Tourmente region, farming operations continued. Following the creation of the NWA in 1978, the CWS had a mandate to ensure sustainable management of the protected area and balance the needs of wildlife management, biodiversity preservation and historical agricultural activities. Limited monitoring of agricultural activities was conducted back then and local agricultural producers carried out various activities to develop the land. In 1996, a thorough review of the agriculture program was undertaken with the aim of promoting integrated land use. Between 1997 and 2002, a comprehensive agricultural permit intended to cover all the producers (40 conditions) was developed with the help of Ducks Unlimited Canada. Feeding areas for the greater snow goose were developed. Beginning in 2002, the CWS assumed responsibility for the management of agricultural land, with the assistance of Ducks Unlimited experts. In 2003, 2009, 2011 and 2014, the CWS revised the agricultural permits. In 2010, various measures were implemented in the wake of a study on the agricultural practices applied in the NWA (BPH environnement, 2010). The NWA comprises some 695.5 hectares of agricultural plains (in 2015), including 435 hectares that are cultivated; approximately 250 hectares of this total are cultivated by local producers who hold a permit for that purpose. The rest of the land is dedicated to wildlife conservation and is managed by the CWS. The main crops are forages, corn and cereal grains (see Table 3).

Achievements

The main agriculture-related measures implemented in Cap Tourmente NWA since the publication of the last management plan for this protected area in 1986 are as follows:

- draining of agricultural land;
- phytosanitary monitoring of agricultural activities and pesticides used;
- monitoring of crops;
- establishment of two windbreaks and watering holes for grazing livestock;
- repairs to fencing for pastureland;
- buffer strip along certain watercourses;
- spring seeding and mowing of parcels of land by the CWS team;
- infrastructure (drainage, ditches, culverts) maintenance;
- re-cultivation of certain parcels of land;
- hay harvesting agreement with local farmers;
- negotiations with farmers holding permits on crop types and locations;
- monitoring of green manure use and permit conditions;
- definition of mowing periods for grasslands to avoid impacts on birds;
- discontinuation of neonicotinoid pesticide use;
- monitoring of grassland bird species at risk.

Findings

Findings related to the agricultural activities carried out in Cap Tourmente NWA since the publication of the last management plan in 1986 include the following:

- Only a small number of local producers are available to grow crops in the NWA.
- The agricultural approaches and types of crops grown in the region have changed.
- Managing agricultural land in the NWA is time consuming and costly.
- NWA staff have more responsibility and less time than before for managing agricultural land.
- There are more constraints on the management of agriculture (incidental takes, management of pesticides) than in the past.
- The NWA contains many problematic or potentially problematic invasive plant species.
- Managing parcels of agricultural land for wildlife conservation poses a special challenge because of the difficulty of determining the priority to be assigned to

some species relative to others (e.g. the greater snow goose vs. species at risk).

Figure 17 Creation of two windbreaks as part of the agriculture program at Cap Tourmente National Wildlife Area

Photo Benoît Roberge © Environment and Climate Change Canada, Canadian Wildlife Service

3.3 Greater Snow Goose Controlled Hunting

History

Hunting has been carried out in the Cap Tourmente NWA for many years. Evidence of Indigenous summer hunting and fishing camps dating back more than 2000 years has been found. In 1805, the Séminaire de Québec, then owner of the land, began granting hunting rights to individuals. It was not until 1908 that the Séminaire began to divest itself of its exclusive hunting rights and to lease the Cap Tourmente flats to private clubs. In 1969, the Government of Canada acquired the lands that eventually became the Cap Tourmente NWA, for conservation purposes. Migratory bird hunting was suspended from 1969 to 1972, when the Canadian Wildlife

Service implemented the greater snow goose controlled hunting program. Hunting rights were, and still are, granted through a draw. From 1972 to 2010, draft horses (traditional hunting) were used to transport hunters to hunting sites at low tide. It was during this period that the NWA was created, in 1978. In 1985, daily hunting (morning and evening) was introduced, followed by self-guided hunting (with a guide but no horses) in the Grande-Ferme area. Between 2001 and 2010, a series of changes were made to the greater snow goose controlled hunting program in the NWA. In 2016, the NWA had the capacity to accommodate up to 528 hunters, that is, 132 groups of 4 hunters. During the greater snow goose hunting period (22 days in October), 8 groups of 4 hunters could use blinds (1 guide for 2 blinds) at high tide every day.

Achievements

The key measures put in place under the greater snow goose controlled hunting program in Cap Tourmente NWA since the publication of the last management plan in 1986 are as follows:

- Restructuring of the hunting program in 2001 and 2006: The number of hunters was reduced to ensure conservation of larger contingents of geese in the NWA and thereby enhance hunting. Hunting along the edge of feeding areas was encouraged.
- Introduction of the Waterfowler Heritage Day program in 2002 to provide young hunters accompanied by mentors with an opportunity to carry out migratory game bird hunting.
- Abolition of traditional hunting at low tide in 2008 in order to reduce geese scaring in the bulrush marsh and to increase hunting success at high tide.
- Restructuring of the hunting program in 2010: Abolition of the traditional activity including transportation to hunting zones by draft horses, and analysis of inventory data and hunting statistics in relation to observations of the behaviour of geese and their distribution in the NWA.
- Information sessions on greater snow goose hunting in the NWA offered to participating hunters.
- Acquisition of new hunting equipment.
- Survey on hunter satisfaction with the Cap Tourmente NWA program.

Findings

Findings related to greater snow goose controlled hunting program at Cap Tourmente NWA since the publication of the last management plan in 1986 include the following:

- Owing to changes in greater snow geese use of the NWA during migrations, it is more difficult to maintain a satisfactory level of hunting success.
- A large proportion of the greater snow goose flock leaves the NWA in the morning and returns in the evening (foraging takes place over larger areas than in the past).
- The geese have become increasingly mistrustful.
- There has been a gradual increase in bag limits since 1976 (20 geese/hunter in 2016), which has raised expectations among hunters.
- Because of the increasing hunting pressure, it is more difficult to maintain good hunting success.
- The restructuring efforts have nonetheless maintained the quality of the hunting experience in the NWA.
- A survey of hunters carried out in 2013 showed a high level of satisfaction (81%) with the present offering, but a certain amount of disappointment with respect to hunting success.

3.4 Interpretation

History

Following the publication of the last management plan in 1986, a number of changes were made to the delivery of interpretation services to the public in Cap Tourmente NWA. From 1985 to 1995, interpretation services were managed and delivered by not-profit organizations, namely the Société Linnéenne du Québec (from 1985 to 1991) and Club Vacances Les Îles (program management from 1992 to 1995 and hiring until 2000). A variety of interpretive themes (e.g. geese, bird migration, waterfowl, anurans, peregrine falcon, birds of prey, plants, marine mammals, marsh, history) were covered using a diversity of interpretation techniques (e.g. guided hiking, talks, roving, nature rally, summer camps). Activities were offered from April to October to target clienteles (general public and school groups).

From 1996 to 2013, the CWS once again assumed responsibility for managing interpretation services but it contracted out the delivery of these services to non-governmental organizations, namely Club Vacances Les Îles and the Association des Amis du cap Tourmente (for activities related to birds of prey and bird feeders) from 1996 to 1999, and the Association

Figure 18 Waterfowler Heritage Day at Cap Tourmente National Wildlife Area
Photo Simon Bourbeau © Environment and Climate Change Canada, Canadian Wildlife Service

des Amis du cap Tourmente from 2000 to 2013. A new theme—species at risk—was added subsequently. In addition, new interpretation activities were tested (special events, quadricycle experiment). Families have been added to the NWA's target audiences thanks to the "Captou" activity, as have winter recreational groups (with reservations). During this period, the focus was on tour wholesalers.

From 2014 to 2018, interpretation services were provided by temporary employees working for the Canadian Wildlife Service. The programming of activities was simplified by limiting themes to the greater snow goose and the peregrine falcon, and offering roving activities (naturalists presenting activities in specific locations). The target audiences consisted of the general public and school groups from April to October and during the winter.

Achievements and Results

The chief results obtained and the main activities implemented in terms of interpretation services for the public in the NWA since the publication of the last management plan in 1986 are as follows:

- The CWS has created a number of promotional and interpretation tools such as the Cap Tourmente NWA website, newspaper and magazine articles on NWA activities, a trail map, the brochure titled “Nature as far as the eye can see!,” a BioKit, a geocaching activity (On the Fox’s Trail), a historical trail, Facebook and Twitter publications, and special activities (e.g. bird banding).
- Some 40,000 people visit Cap Tourmente NWA annually.
- The interpretation activities presented by naturalists are popular, and more than half of the visitors to the NWA take part in them, which is a higher percentage than that recorded for many other locations where such activities are offered.
- More than 3,000 elementary and secondary school students take part in the NWA’s activities every year.
- More than 2,000 individuals—groups of adults or seniors or recreational groups— take part in the activities every year.
- Self-interpretive tools have been developed (interpretive panels on the peregrine falcon and the snow goose, and discovery tools) in order to diversify the services offered.
- A collaborative approach involving local stakeholders was developed to present the activity titled “Wetland Centre of Excellence”.
- In a 2014 survey, excellent feedback was received from visitors regarding the interpretation services provided in Cap Tourmente NWA.

Findings

Findings from the interpretation program implemented in Cap Tourmente NWA since the publication of the last management plan in 1986 are as follows:

- National guidance for interpretation services in NWAs is desired as this would help support the development of a new interpretation program at Cap Tourmente NWA and harmonization of its themes with those presented in other NWAs in Canada.
- The resources allocated for the delivery of interpretation services in the NWA have decreased over the last few years.

- The interpretation program should be reviewed and renewed, and efforts should be devoted to identifying its target audiences and interpretation services suited to these target groups.
- Little information is available on NWA clienteles and their needs.
- There is a need to offer unique interpretation services and more experiential, less traditional activities in the Cap Tourmente NWA.
- External networking should be encouraged to promote innovative interpretation approaches and learn about new trends in the field of interpretation.

Figure 19 "On the Fox's Trail" geocaching activity – Interpretation program at Cap Tourmente National Wildlife Area

Photo © Chantal Lepire

3.5 Other Areas of Activity

Many measures have been implemented in other areas of activity within Cap Tourmente NWA.

Management of Buildings, Infrastructure and Land

In terms of management, the diversity and number of buildings (including some with historical value), infrastructure and other types of property, combined with the large area involved, pose a considerable challenge for the small team working at Cap Tourmente NWA. Despite this, over the last five years, the NWA team has made considerable efforts and invested several million dollars in the maintenance and enhancement of all this property. For example, in 2013, it commissioned a building condition report for the protected area, which identifies the repair and maintenance work to be scheduled over the coming 10 years (PWGSC, 2013). NWA staff have carried out repairs on various buildings, including several at the Petite Ferme site (house, workshop and granary) and the Maison des Français, in addition to maintenance of trails and enhancements.

Public Safety

With regard to public safety, Environment and Climate Change Canada (ECCC) must ensure the safety of the 40,000 or so people who visit Cap Tourmente NWA annually and provide first-aid services as needed. Several measures have been implemented to this end in recent years, including the development of a public safety plan, safety inspections, the procurement of defibrillators and first-aid training for staff.

Environmental Management

From an environmental management perspective, ECCC must ensure that the activities and work carried out in the NWA are in accordance with the existing regulations and have no impact on the environment. Measures implemented in this regard include inventories and disposal of products containing halocarbons, sound management of petroleum storage tanks, promotion of ecologically friendly products and recycling as well as the gradual replacement of all vehicles in the automobile fleet with hybrid vehicles.

Environmental Assessments

The various projects and work planned in Cap Tourmente NWA are subject to environmental assessments aimed at identifying potential impacts on the environment and proposing suitable mitigation measures.