

Lake St. Clair Coastal Conservation Action Plan (CAP)



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&
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Table of Contents

Plan authors.....	iv
Background & Rationale	vi
Vision.....	x
Acknowledgements.....	x
1. Conservation Context	1
i. Geographic Context.....	1
ii. Historical, Cultural and Socioeconomic Context.....	1
iii. Ecological Context.....	2
iv. Natural Cover / Ecosystem Types.....	7
v. Dominant Environmental Processes.....	8
vi. Significant Species.....	10
2. Biodiversity Targets and Associated Threats	17
i. Conservation Targets	17
ii. Threats	21
3. Conservation Objectives and Strategies.....	35
i. Conservation Objectives	35
ii. Strategic Actions and Action Steps	37
iii. Evaluation and Monitoring	43
References	45
Appendix A.....	48
Lake St. Clair Coastal CAP Mapping Methodology	48
Appendix B:	50
Natural Heritage Designations – Lake St. Clair Coastal CAP	50
Appendix C.....	52
Species-specific Threats to Lake St. Clair Coastal CAP species at risk	52

Lake St. Clair Coastal Conservation Action Plan (CAP) 2013

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Background & Rationale

Carolinian Canada Coalition's Big Picture Vision

The Lake St. Clair Coastal Conservation Action Plan (CAP) area is situated along the western fringe of Ecoregion 7E, an area extending from Toronto to Grand Bend, south to Niagara Falls and the western Lake Erie islands. This ecoregion is colloquially known as Canada's "Carolinian life zone", or simply "Carolinian Canada" because many plants and animals found in the eastern United States as far south as the Carolinas reach their northern limit in this part of Ontario. Green, healthy landscapes are essential to human quality of life and economic prosperity. Conservation efforts in the past have focused on "islands of green" on landscapes where human uses and activities prevail. In 1984 Carolinian Canada Coalition identified 38 critical natural areas across the ecoregion needing urgent action. But our scientific understanding has evolved and we now know that these "islands of green" cannot exist on their own. To remain viable they must be connected one to another in a "natural heritage system". Natural heritage systems are critical for maintaining the quality of our water and air, for species movement, and for adapting to climate change. In 2000, Carolinian Canada's "Big Picture" analysis identified such a natural heritage system of core natural areas and connecting corridors.

The "Big Picture" continues to inform and complement the natural heritage planning being done by municipalities, conservation authorities, and provincial and federal departments. Carolinian Canada is working to update the Big Picture with new information, and find ways to monitor how well we are doing to achieve this vision.

Conservation Action Planning in Canada's Carolinian Life Zone

The Carolinian life zone occupies less than 0.25% of Canada's landmass, yet it provides habitat for over 40% of Canada's plant species and an equally large proportion of vertebrate and invertebrate fauna. At the same time, one quarter of Canada's human population lives in the region, the nation's industrial and economic heartland. As a result, extensive conversion to human land uses has occurred. In southern Ontario, 94% of upland forests were cleared over the past two centuries, while more than 70% of all pre-settlement wetlands have been converted, and up to 99% of prairies and savannahs have been lost.

On a heavily-modified working landscape such as this, habitat fragmentation has reduced most natural areas to sizes much smaller than is required to maintain basic ecological functions and diverse, resilient biological communities. Overall, natural cover across the Carolinian life zone now ranges from less than 7% in some areas to below 18% in others, with the Municipality of Chatham-Kent at the low end of this spectrum at 4.4% (Lower Thames Valley Conservation Authority). These high levels of land conversion mean that many of the essential ecological processes needed for healthy soils, clean water and clean air have in many areas been severely compromised.

For these reasons, combined with the fact that many of the species found here are near the northern limits of their distribution, the ecoregion has the greatest number and concentration of Species At Risk (SAR) in Canada. At least 14 of them occur in Lake St. Clair Coastal CAP Area. More than 500 additional plant and animal species found in the zone are recognized to be at some level of risk, and many of these are just as threatened as "official" SAR but have not yet gone through the legislative process required to designate them. If historical trends continue, more and more species will end up designated as SAR, resulting in greater costs to protect them and increased regulatory demands on rural landowners.

The Carolinian Woodlands Recovery Team (CWRT), made up of representatives from various levels of government, non-government organizations, the academic research community and the private sector, was established in 2004 to address the recovery needs of the many woodland plant species that are at risk in the ecoregion. The CWRT recognized that many SAR occupy similar habitats and face similar threats. The CWRT also noted that there is an array of organisations, agencies and groups with an interest in conserving and enhancing the ecological health of the landscape of southern Ontario, and that often these organisations are working independently and not in a particularly coordinated or collaborative fashion—a situation that potentially compromises the effective utilization of limited funding and resources.

While some species face threats requiring species-specific actions, taking a broad ecosystem-based approach for Ontario’s Carolinian woodlands was considered to be the most efficient and proactive way to improve the chances of recovery of entire suites of species and their habitats. To address the need for large-scale “natural heritage system” planning, since 2000 the Carolinian Canada Coalition (CCC) has been promoting a “Big Picture” vision for the ecoregion, a map-based network of core natural areas and connecting corridors (http://www.carolinian.org/ConservationPrograms_BigPicture.htm). Between 2006 and 2008, a draft *National Recovery Strategy for Carolinian Woodland Ecosystems and Associated Species At Risk* (CWRS) was developed by the CWRT (Jalava and Mansur 2008, Jalava *et al.* 2009). Recovery goals were set at the ecosystem level in order to address the threats to the ecological processes that support biodiversity “hotspots”, SAR and their habitat, significant vegetation communities and natural areas. Restoring natural connectivity to such a network of core areas was deemed essential, as it would allow for genetic exchange between populations, adaptation and migration in response to climate change, and provide corridors for movement of wide-ranging species.

Strategies to address threats, recover habitats, and to monitor and evaluate recovery efforts were outlined in considerable detail. Ecosystem recovery would be directed along the following themes:

- refinement of the map-based template for an ecologically functioning network of core areas and corridors;
- better coordination of recovery efforts, with broad participation from agencies and stakeholders;
- improvements in databases, knowledge and understanding of Carolinian sites, SAR occurrences, and the biological needs of SAR;
- long term monitoring of sites, species and social trends;
- improvements in policy and legislation relating to conservation at all levels of government;
- net increases in overall woodland extent, average core area sizes, extent of forest interior, landscape connectivity, and extent of landscape protected through securement, easements, stewardship agreements and conservation plans;
- measurable reductions in threats to critical sites;
- improvement in population sizes, numbers of extant occurrences and habitat quality for SAR;
- significant increases in landowner participation in stewardship programs and incentives;
- municipalities applying natural heritage system design in official plans;
- enhanced public awareness and support for recovery of Carolinian ecosystems;
- community-based action plans developed for “biodiversity hotspots” to strategically implement ecosystem recovery objectives.

It was determined that The Nature Conservancy (U.S.) Conservation Action Plan (CAP) approach (<http://www.conservationgateway.org/topic/conservation-action-planning>) would best address these themes strategically and efficiently. The approach has been developed and refined over three decades throughout the world by a remarkable diversity of jurisdictions and organisations, including The Nature Conservancy of Canada (e.g., Southern Norfolk Sand Plain Natural Area Conservation Plan). CAPs are tailored to the specific characteristics and needs of ecologically-important landscapes. By applying this

approach to biodiversity “hotspots” in the Carolinian life zone, ultimately a network of linked conservation practitioners and action plans for each target landscape in the Carolinian life zone would be created. This network would:

- Address the urgent needs of priority SAR;
- Prevent increased numbers of species from being listed as SAR;
- Link SAR recovery strategies to watershed plans, official plans and a range of other key land use strategies and planning efforts;
- Heighten awareness, improve attitudes, and garner additional resources towards the recovery of species, communities and ecosystems at risk;
- Enhance community engagement in building a sustainable culture.

In 2007, a sophisticated analysis was undertaken in partnership between Carolinian Canada Coalition (CCC), the Nature Conservancy of Canada (NCC), Environment Canada (EC) and the Department of Fisheries and Oceans (DFO) to identify the “biodiversity hotspots” in southern Ontario, based on the best available information on the occurrences and concentrations of rare species and natural communities. A map was developed that identified at least fifteen such areas. This map would serve as the template for targeting efforts on areas within the life zone where the greatest return on investment would be gained.

Two of the fifteen areas (Western Erie Islands and Southern Norfolk Sand Plain) had action plans already being developed or implemented by NCC, while another (Skunks Misery) had an action plan that was being implemented by the Thames Talbot Land Trust in collaboration with the NCC. Between 2008 and 2012, the CCC initiated the development of CAPs for seven additional priority areas (Essex Forests and Wetlands; Ausable River – Pinery; Upper Thames River; Hamilton – Burlington; Short Hills; Niagara River Corridor; Elgin Greenway) with an array of local stakeholder groups, agencies and organisations, including conservation authorities, First Nations, agricultural organisations, provincial and federal government agencies, non-government organisations, naturalist clubs and municipalities.

The Chatham-Kent Shoreline Areas Community Sustainability Plan

The 2007 analysis demonstrated that three of the priority areas are in Chatham-Kent, including the Sydenham River corridor, the Walpole Island – Lake St. Clair coast, the Rondeau - Erieau area, and the lower Thames River. These areas correspond very closely with areas that the Municipality of Chatham-Kent has identified in the “Chatham-Kent Shoreline Areas Community Sustainability Plan”

(http://www.chatham-kent.ca/SiteCollectionDocuments/planning_development_services/Chatham-Kent%20Shoreline%20Areas%20%28Community%20Sustainability%20Plan%20-%20April%2011,%202011%29.pdf).

As part of an informal partnership between Chatham-Kent and the Carolinian Canada Coalition, and with the collaboration of a broad cross-section of stakeholders and sectors, CAPs for these areas of common interest represent an effort to develop and implement a realistic, action-oriented strategy that will build:

- healthier ecosystems and soils
- resilient, diverse biological communities
- cleaner water and air
- rewarding outdoor recreational experiences
- economic prosperity
- stronger communities
- improved quality of life for the communities.

The Lake St. Clair Coastal Conservation Action Plan

At the same time, additional synergies emerged in discussions between the Municipality of Chatham-Kent and CCC, in which these parties concluded that a conservation action plan (CAP) would be an ideal complement to the Chatham-Kent Shoreline Areas Community Sustainability Plan (SACSP), in that the CAP would identify and prioritize the conservation activities to be implemented within the Shoreline Areas Community Sustainability Plan context. In other words, the Chatham-Kent Shoreline Areas Community Sustainability Plan would show *where* conservation work would best be done, and the CAP would identify and prioritize *what* would best be done and by *whom*, in order for conservation work to be most effective and efficient. The CAP also provides more refined mapping on potential priority areas for habitat stewardship, ecological restoration, etc.

In addition the Chatham-Kent SACSP, the Lake St. Clair Coastal CAP will complement the ecosystem-based recovery strategy for Walpole Island that has been developed by the Walpole Island (Bkejwanong) First Nation in collaboration with expert biologists and ecologists (Bowles, 2005).

A steering committee was convened in June 2012, consisting of representatives from Municipality of Chatham-Kent, CCC, Chatham-Kent Wind Action Group, Lower Thames Valley Conservation Authority, National Wild Turkey Federation, Christian Farmers Federation - Chatham Kent, Stewardship Kent, Mitchell's Bay Association, St. Clair Region Conservation Authority / St. Clair Foundation, Sydenham Field Naturalists, Transition Town Chatham-Kent. The committee was introduced to the CAP methodology, discussed roles and levels of involvement of the organisations present, and other stakeholders that should be invited to contribute to the process. There was broad support for the initiative, and widespread agreement that the agricultural community, the major landowner and stewards of the area, needed to be actively engaged in the process.

After the initial steering committee meeting additional partners became involved (see list of contributors on page) and contributed to the development of the CAP in the meetings and workshops that ensued over the next 9 months.

This report represents the results of the nearly one year planning process, which has drawn from the expertise and knowledge of a large and diverse group of local stakeholders. The long-term benefits of this approach include:

- Mapping tools are available to guide and prioritise site stewardship and ecological restoration activities in the Municipality of Chatham-Kent.
- Resources and funding can be targeted toward the most important projects, activities and sites as identified through a consensus-based multi-stakeholder approach;
- Multiple agencies, organisations and local groups can work collaboratively and efficiently to recover and steward healthy ecosystems, particularly in the highest priority areas;
- Information on Best Management Practices for species and habitats can be widely shared, and community knowledge and capacity will be enhanced.

The Lake St. Clair Coastal Conservation Action Plan essentially provides a workbook designed to help guide conservation activities and serve the community and stakeholder groups in the following ways:

- Stewardship, restoration and site securement by conservation authorities, Canada South Land Trust, Stewardship Kent, Rural Lambton Stewardship Network and other agencies and groups, can be targeted on the areas where the greatest ecological benefits will be gained;
- Conservation and recovery activities prioritized are based on sound science combined with the best local knowledge;
- Better coordinated, collaborative project proposals and funding applications, leading to greater likelihood of funding approval;
- Reduced duplication and competition for limited resources amongst the various agencies, groups and organisations;
- Clearly identified tasks and roles (developed on the basis of collaborative expertise) in conservation projects;
- Improved ability to measure progress and monitor results thanks to a mutually agreed-upon set of priorities and tasks;
- Greater transparency in conservation effort and greater buy-in from the community due to the collaborative nature of the approach.

This long-term, multi-faceted, targeted, coordinated approach will result in more vibrant, resilient ecosystems, healthier habitats and enhanced viability of flora and fauna across the Municipality of Chatham-Kent. Recovery of the ecosystems will not only serve the needs of SAR and other imperilled species, but will contribute to climate change adaptation and enhanced ecosystem services. Healthy ecosystems correlate directly to cleaner water and air, productive soils, sustainable agriculture, and enhanced tourism and recreational opportunities. Ultimately, this initiative aims to build more prosperous communities, healthier citizens, and improved quality of life in the Municipality of Chatham-Kent and across the deep south of Ontario.

Vision

The Steering Committee developed the following vision for the Lake St. Clair Coastal CAP.

The Lake St. Clair Coastal Conservation Action Plan (CAP) aims to enhance biodiversity, resilience, and adaptation to climate change, ecosystem services, productive soils and agriculture, and tourism and recreation opportunities. This will result in more prosperous communities, healthier citizens and quality of life in Chatham-Kent. The vision will be achieved through maintaining, enhancing and protecting the natural systems of the CAP area through engaged citizens working together toward a common, mutually-beneficial cause: a healthier environment for all.

Acknowledgements

Carolinian Canada and our Ecosystem Recovery Network partners would like to thank all the many organisations and individuals who have contributed many hours of time and expertise to the development of the Lake St. Clair Coastal Conservation Action Plan. Most of those organisations and individuals are listed in the Plan Authors section of this report. We particularly wish to thank Tom Beaton and the Municipality of Chatham-Kent for partnership on this project, provision of facilities for meetings, staff

time and GIS support, and the interest in incorporating the objectives and strategies of this CAP into their municipal greening and sustainable planning initiatives. We also especially wish to thank the remarkable support of the international Conservation Coaches Network (CCNet) and The Nature Conservancy (U.S.) for their inspiration, expertise, training, information and practical support for CAP programs around the world. Finally, we wish to thank the principal funders of the development of this CAP: the Ontario Ministry of Natural Resources Species at Risk Stewardship Fund, and Environment Canada's Habitat Stewardship Program.

1. Conservation Context

i. Geographic Context

The Lake St. Clair Coastal Conservation Action Plan (CAP) area covers 47790.45 ha (477.9 km²) of land along the eastern shoreline of Lake St. Clair (northern and western boundaries of the Municipality of Chatham-Kent) (Figure 1.1). The CAP area also includes riparian corridors east of the CAP boundary. The CAP area is part of Ontario's Ecodistrict 7E-1. The CAP area boundaries were developed through GIS analyses of natural areas undertaken by the Municipality of Chatham-Kent using methodology developed by Ontario Nature (see appendix A for methodology), with the input of the CAP team and other participating organisations listed above. The CAP area includes portions of the Sydenham River, the Thames River and the Lake St. Clair Shoreline. Parts of Lambton County and Essex County are contained within a 10 km buffer that is mapped around the Lake St. Clair Coastal CAP area.

ii. Historical, Cultural and Socioeconomic Context

The CAP area is within the traditional territory of the Ojibway, Pottawatomi and Ottawa aboriginal peoples (ref). Settlements of the Odawa [Ottawa], Pottawatomi and Wyandot were present along Detroit River and Lake St. Clair, and of the Ojibwa peoples on Walpole Island in the early 1700s (London museum) along with European settlements. Between 1790 and 1827 the British government negotiated land surrenders with various First Nations communities in the area and created "reserves" for first nations at Walpole Island, Muncey and Moraviantown (London museum).

An account of a trip taken by Hennepin between Lake Erie and Huron during the La Salle-Hennepin voyage of 1697 paints a picture of a lush land in the area of the CAP (Jenks, 1912):

'After Hennepin's return to Europe he published in 1697 an account of his experiences in a book entitled "A New Discovery of a Large Country in America," and in it, after narrating the incidents of the preparation and trip through Lake Erie, and referring to the country between Lakes Erie and Huron, he says: "The country between those two lakes is very well situated and the soil very fertile. The banks of the strait are vast meadows, and the prospect is terminated with some hills covered with vineyards, trees bearing good fruit, groves and forests so well disposed that one would think nature alone could not have made, without the help of art, so charming a prospect. That country is stocked with stags, wild goats and bears, which are good for food, and not fierce, as in other countries; some think they are better than our pork. Turkey cocks and swans are there also very common; and our men brought several other beasts and birds whose names are unknown to us, but they are extraordinary relishing.

"The forests are chiefly made up of walnut trees, chestnut trees, plum trees and pear trees, loaded with their own fruit and vines. There is also abundance of timber for building; so that those who shall be so happy as to inhabit that noble country cannot but remember with gratitude those who have discovered the way, by venturing to sail upon an unknown lake for above one hundred leagues. That charming strait lies between 40 and 41 degrees of northern latitude."

This language is perhaps a little strongly colored, and it is probable that where he says wild goats, he had seen small deer, but it requires little imagination even at the present, with the river banks

no longer covered with the beautiful timber native to them, to reconstruct the panorama as it slowly spread before the eyes of those Frenchmen more than two centuries and a quarter ago, as they came up the noble St. Clair river.’

By the mid- to late 1800’s, the natural vegetation of much of Southern Ontario had been cleared by European settlers (Langman 1971). Today, over 88% of Ecodistrict 7E-1, in which the Lake St. Clair Coastal CAP is found, has been converted to agriculture (334,345 ha), with an additional 9,725 ha having been altered for residential, industrial and infrastructure uses (Henson and Brodribb 2005). Only about 8% of 7E-1 remains naturally-vegetated. Nearly half of that is marsh, with a mixture of forest systems and some prairie and savannah systems also present. (Henson and Brodribb 2005).

Approximately 89.99% (2,212.07km²) of the Municipality of Chatham-Kent (2,458.09km²) was reported as farmland in 2011 (OMAFRA 2012). The rich soils are ideal for growing a wide variety of crops. These are primarily but not limited to, soybeans, greenhouse vegetables, floriculture nursery & sod, corn, field vegetables, fruit and wheat. The lake-moderated climate provides Canada’s longest growing season, relatively mild winters, and, in most years, adequate rainfall.

The population of the Municipality of Chatham-Kent in 2011 was 103,671, for a density of 42.2 /km². Of this total, 67% lived in urban centres and 33% were in rural households. Communities within the Lake St. Clair Coastal CAP area include the town of Wallaceburg (10,163) and a number of smaller communities with populations of approximately 1,000 or less, including Mitchell’s Bay (Table 1.1). Outside the few main centres the population density is low (<13/km²) reflecting the largely rural nature of the CAP area.

Table 1.1 Summary of Population Information in the Lake St. Clair Coastal CAP area. Only centres within the CAP area are included; all information is from the 2011 census (Statistics Canada 2012).

Name	Population	2006-2011 Population Change (%)	Population Density (persons/km ²)	% of Dwellings as Secondary Homes
Wallaceburg	10,163	-5	1,018.2	5.7

The main industry today in the Municipality of Chatham-Kent is manufacturing and construction (28.7%), concentrated in Chatham. Other major employers include wholesale and retail trade (15.3%), health and education (14.3%), business services (11.4%), agriculture and other resource based industries (10%) and “other services” (16.7%) (Chatham-Kent 2011).

The shores of Lake St. Clair are desirable locations for cottages, water activities, nature appreciation and camping. Mitchell’s Bay and the St. Clair National Wildlife along Lake St. Clair offer recreational activities such as boating, fishing, bird watching, golfing, hunting, camping and beaches. The Municipality of Chatham-Kent also attracts many tourists to visit sites such as Uncle Tom’s cabin, a historic site and museum in Dresden dating to 1841 that commemorates the contributions of Rev. Josiah Henson to the abolition movement. The area was important as a safe destination for free and enslaved African Americans who fled from the US to Ontario during as part of the “underground railroad”.

iii. Ecological Context

Carolinian Canada

The Lake St. Clair Coastal CAP area is located in the southwestern portion of Ecoregion 7E, colloquially known as the Carolinian life zone of Canada, which falls south of a line running between Grand Bend and Toronto. This life zone encompasses the northernmost edge of the deciduous forest region of eastern North America, and though smaller than other Canadian ecological zones (0.25% of Canadian land area), it has greater numbers of species of flora and fauna than any other ecosystem in Canada (Norfolk Environmental Advisory Committee 2006). This zone is characterized by mainly deciduous-dominated forests including some conifer species [e.g., Eastern Red-cedar (*Juniperus virginiana*), White Pine (*Pinus strobus*)], as well as many southern trees at their northern range limits such as Tulip Tree (*Liriodendron tulipifera*), along with shrubs and herbaceous species not found in other parts of Canada (Lindsay 1984). Over 2,200 plant species, 70 native tree species, and more than half of all Canadian bird species can be found in Carolinian Canada (Solymár *et al.* 2008).

Ecodistrict 7E-1

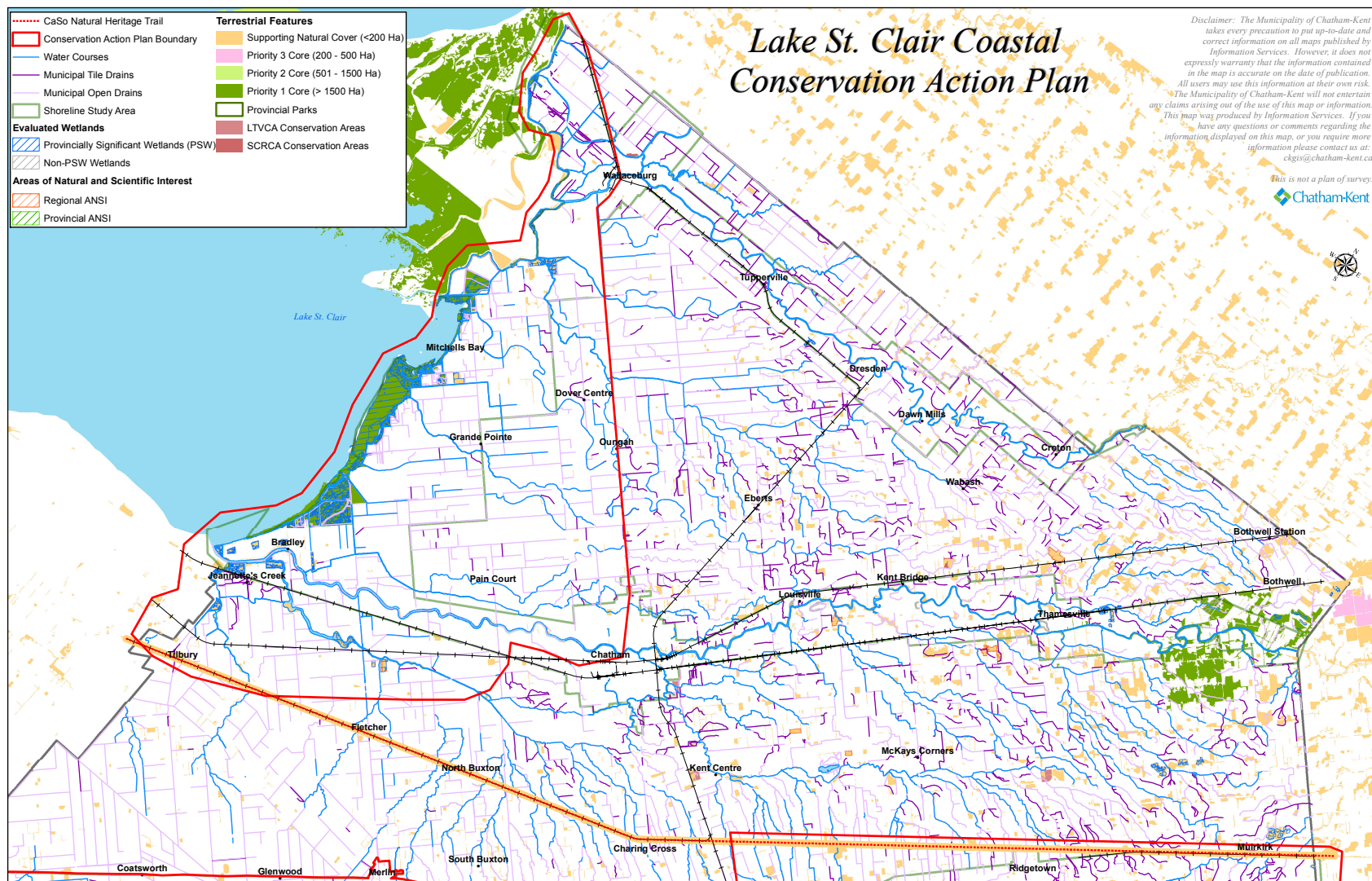
At the southwest end of Ecoregion 7E is Ecodistrict 7E-1 (Chatham), which is the southernmost ecodistrict in Ontario. It is largely composed of the Lake St. Clair clay plains with minor till moraines. The northern boundary borders the Bothwell sand plains and bevelled till plains. Lake Erie sandspits occur at Point Pelee and Rondeau. Ecodistrict 7E-1 is one of the most threatened ecodistricts in Ontario, with < 8% natural cover remaining, nearly half of which is marsh (mainly at Point Pelee and in the St. Clair Delta). The majority of the remaining natural cover is a mixture of forested ecological systems comprised predominantly of small remnant patches of sand plain deciduous forest complexes (4,071 ha/10,059 ac), till plain deciduous forest complexes (3,714 ha/9,177 ac) and clay plain deciduous forest complexes (2,140 ha/5,287 ac) (Henson and Brodribb 2005).

Despite the widespread conversion of natural cover to urban and agricultural land, 7E-1 remains biologically diverse. Within the remaining portions of natural cover, Ecodistrict 7E-1 still supports among the highest concentrations of globally rare species and communities in Ontario, and over 60 species listed as nationally Endangered, Threatened or Special Concern by COSEWIC (Committee on the Status of Endangered Wildlife in Canada). In a recent assessment of global biodiversity values (rare species and communities, endemic and disjunct species), 7E-1 was found to rank fourth in Ontario, behind Manitoulin Island (6E-17) and the Northern and Southern Bruce Peninsula (6E-14 and 6E-4). Despite its high conservation value, Ecodistrict 7E-1 has very few protected areas. Only about 1% of the region is protected in regulated parks, with an additional 2% in conservation lands [e.g. Conservation Authority lands, Areas of Natural and Scientific Interest (ANSI)]. This is the lowest proportion of protected areas and conservation lands of any region in Ontario (Henson and Brodribb 2005).

Lake St. Clair Coastal CAP Area

The Lake St. Clair Coastal CAP area extends as a narrow strip along the eastern shoreline of Lake St. Clair (47790.45 ha, Figure 1.1). The CAP is fully within the Municipality of Chatham-Kent. Mapping includes an additional 10 km buffer into neighbouring Lambton County and Essex County to display landscape connectivity with natural features in adjacent municipalities (e.g. watersheds, natural areas). The northern boundary of the CAP area is the municipal border with Lambton County, while the southern border falls just south of where the Thames River joins Lake St. Clair. Wetlands are the dominant ecosystem in the Lake St. Clair Coastal CAP area, but prairie habitats of high conservation value also occur.

Figure 1.1 The Lake St. Clair Coastal CAP extends as a narrow strip along the eastern shoreline of Lake St. Clair. The CAP also includes riparian zones along watercourses east of the marked CAP boundary (i.e. east of Hwy 40).



Physiography and Glacial History

The Lake St. Clair Coastal CAP is contained within one physiographic region of southern Ontario: the St. Clair Clay Plains (Chapman and Putnam 1984). The bedrock underlying the Lake St. Clair Coastal CAP dates to the middle Devonian consisting of softer sedimentary limestones, shales and sandstone. This softer material was greatly eroded by advance and recession of glaciers through the area in the last major glaciation. During the recession of the Wisconsin glacier, much of the Lake St. Clair Coastal CAP area was under glacial lakes.

St. Clair Clay Plains

The Lake St. Clair Coastal CAP is located within the St. Clair Clay Plains physiographic region (Chapman and Putnam 1984). These extensive clay plains cover 363,200 ha (897,104 ac) in total, at an elevation of approximately 200 m above sea level with very little relief. There is a deep overburden covering the limestone and dolostone bedrock throughout the majority of the region. The region was once extensively covered by the glacial Lakes Whittlesey and Warren, which did not stratify the sediment and left the majority of the land covered in unconsolidated clay till, smoothed by shallow deposits of lacustrine clay. Overall, the area is characterized by poorly drained soils, and in some undrained areas, peat and muck has accumulated. Modern drainage and systematic tiling have made the region exceptionally productive agriculturally with a wide variety of crops grown, including some tender fruits due to the warm climate (Chapman and Putnam 1984). The CAP area has extremely flat topography typical of this region.

Biodiversity

The Lake St. Clair Coastal CAP is situated in one of the southernmost portions of Canada and is home to a remarkable diversity of southern flora and fauna, many of them at the northern limits of their ranges. Despite the fact that much of the area has undergone conversion to agricultural and urban land uses, a total of at least 180 species of breeding birds, 23 reptiles, 14 amphibians, 36 mammals, nearly 90 butterflies and more than 1100 vascular plants have been recorded in the municipality of Chatham-Kent (A. Woodliffe, pers. comm.). The CAP area provides habitat for at least 14 extant terrestrial and aquatic Species at Risk (SAR), with another 15 SAR having occurred historically. Several globally and provincially rare ecological communities also occur (e.g. Moist - Fresh Tallgrass Prairie Type, Dry Tallgrass Prairie Type).

Many southern plant species reach their northern limits in the Carolinian Zone, including trees such as Sassafras (*Sassafras albidum*), Tulip Tree (*Liriodendron tulipifera*) and Kentucky Coffee-tree (*Gymnocladus dioica*). Many southern herbaceous plants, sedges and grasses also reach their northern limits in this area. Prairie ecosystems were common historically in Chatham-Kent but only small remnants exist today. Typical prairie species include Big Bluestem (*Andropogon gerardii*), Little Bluestem (*Schizachyrium scoparium*), Indian Grass (*Sorghastrum nutans*), Dense Blazing-star (*Liatris spicata*) and Butterfly Weed (*Asclepias tuberosa*).

Characteristic southern fauna of the area include marsh birds such as King Rail (*Rallus elegans*), mammals such as Virginia Opossum (*Didelphis virginiana*) and Southern Flying Squirrel (*Glaucomys volans*).

Rivers, Marshes and Wetlands

Wetlands and rivers are major features in the Lake St. Clair Coastal CAP. Portions of the Sydenham River and Thames River contained within the CAP support aquatic SAR such as Pugnose Shiner (*Notropis anogenus*, Endangered) and Spotted Sucker (*Minytrema melanops*, Special Concern). The

municipality of Chatham-Kent has 11,500 hectares of Provincially Significant Wetland (Chatham-Kent Official Plan, 2010). Wetlands form a substantial part of the CAP, with 2018 hectares of the CAP being Provincially Significant Wetland. Most of Southern Ontario wetlands have been drained (Snell 1987), hence the remaining wetlands provide a refuge for many SAR such as King Rail (*Rallus elegans*, Endangered), Silver Chub (*Macrhybopsis storeriana*, Special Concern) and Least Bittern (*Ixobrychus exilis*, Threatened). Snakes and turtles are particularly dependent on wetlands and SAR reptiles such as Blanding's Turtle (*Emydoidea blandingii*, Threatened) and Eastern Foxsnake (*Pantherophis gloydi*, Endangered) are found in the wetlands and municipal drains of the CAP (Figure 1.2).



Figure 1.2 Some of the only remaining ‘natural’ habitat in large parts of the St. Clair Coastal CAP area is found along municipal drains

Prairies and Savannahs

Prairies and savannahs are a rare ecosystem in Southern Ontario and few natural remnants remain (Bakowsky and Riley 1994). The Lake St. Clair Coastal CAP area was historically predominantly tallgrass prairie. Small pockets of prairie and savannah ecosystems still occur, which support SAR such as Riddell's Goldenrod (*Solidago riddellii*, Special Concern) and Eastern Prairie Fringed-orchid (*Platanthera leucophaea*, Endangered).

Lake St. Clair Shoreline

A prominent feature of the Lake St. Clair Coastal CAP is the Lake St. Clair Shoreline running along the western boundary of the CAP area. The associated river, wetland and forest habitats support many migratory birds and insects in addition to resident species.

Forests

Although forests were not the dominant ecosystem in the CAP, swamps were the main type of forest in the Lake St. Clair Coastal CAP area prior to the extensive drainage of land. Only approximately 1% forest cover (upland and moist forests) occurs in the CAP currently. These forests maintain SAR such as Bald Eagle (*Haliaeetus leucocephalus*, Special Concern) and Kentucky Coffee-tree (*Gymnocladus dioicus*, Threatened).

Natural Areas

Protected natural areas are essential for biodiversity conservation as they are often the only safe haven for many organisms that are sensitive to human influence. The Lake St. Clair Coastal CAP area contains many natural areas of various sizes and designations that support the remaining natural cover (Table 1.2, Appendix B). The CAP area, however, does not have any natural areas with strictly regulated protection criteria as set out by the International Union for Conservation of Nature (IUCN), although there are other tracts of land with lower protection levels present. In southwestern Ontario many natural areas are stewarded by conscientious landowners dedicated to biodiversity protection. Natural areas without strict protection, however, can be vulnerable to land use changes and impacts from human uses. For a complete list of the Natural Heritage sites in the Lake St. Clair Coastal CAP area, please see Appendix B.

Table 1.2 Natural Heritage Designations for the CAP area. Some sites can be included in more than one category (e.g. St. Clair Marshes is both an ANSI and a Carolinian Canada Site). Additional natural areas exist which do not have any protection and are not included in this table. See Appendix B for full listing of natural areas.

Designation	IUCN Protected Area Management Category ¹	Area in hectares	Percentage of CAP area	Reference
National Wildlife Area	IV	351.80	0.74	Environment Canada
Conservation Authority Area	V	1.00	<0.01	Conservation Authority
Provincial Life Science Area of Natural and Scientific Interest	VI	568.82	1.19	NHIC 2011
Regional Life Science Area of Natural and Scientific Interest	N/A	19.68	0.04	NHIC 2011
Provincially Significant Wetland	VI	2,059.63	4.31	NHIC 2011
Carolinian Canada Site	N/A	633.53	1.32	CCC
Important Bird Areas (total IBA area is 135,458 ha, approximately 1/4 of IBA is within the CAP)	N/A	33,864.50	70.86	IBA Canada

¹ IUCN Categories (Dudley, 2008): Ia. Strict nature reserve*; Ib. Wilderness area*; II. National/provincial park*; III. Natural monument or feature; IV. Habitat/species management area, V. Protected landscape or seascape, VI. Protected area with sustainable use of natural resources. * Strictly regulated protected areas. Some areas may have more than one IUCN category because of internal zoning.

iv. Natural Cover / Ecosystem Types

Twenty vegetation communities have been identified within ecodistrict 7E-1 (Henson and Brodribb 2005). Of these, 4 are forest types, 3 are wetlands (swamps or marshes), 1 is prairie, 4 are savannahs, 3

are grasslands, 2 are woodlands, 2 are shrublands and 1 is sand beach. Eastern Deciduous Forests are the dominant ecosystem in 7E-1 with pockets of other types of communities dispersed throughout where conditions are appropriate. The dominant vegetation communities in the Lake St. Clair CAP, however, are wetlands and prairies with a smaller proportion of forest cover.

Only small remnant prairie habitats remain in Chatham-Kent representing some of the rarest ecosystems in southern Ontario. Pockets of prairie are scattered throughout the CAP area. Typical species include Big Bluestem, Little Bluestem, Indian Grass, Dense Blazing-star and Butterfly Weed. One globally and provincially rare grassland ecosystem occurs in the CAP area: Moist - Fresh Tallgrass Prairie Type (G2, S1) and one globally and provincially rare savannah ecosystem occurs in the CAP area: Moist - Fresh Pin Oak - Bur Oak Tallgrass Savannah Type (G1, S1) (Table 1.3).

Table 1.3 Globally and Provincially Rare Vegetation Communities in the Lake St. Clair Coastal CAP.

Ontario Name*	Global Common Name*	Global & Provincial Rank*	Comments**
Moist - Fresh Tallgrass Prairie Type	<i>Andropogon gerardii</i> - <i>Sorghastrum nutans</i> - <i>Schizachyrium scoparium</i> - <i>Aletris farinosa</i> herbaceous vegetation	G2; S1	This community occurs in the southern Great Lakes region of the United States and Canada. Stands occur on level sandy glacial outwash, sandy glacial lake plains, valley trains, and in dune areas. Soils are sandy loams, loamy sands, and sands. They are moderately well-drained to imperfectly or somewhat poorly drained. Stands of this community may be dominated by grasses, mixtures of grasses and forbs, forbs, or low shrubs and grasses. Many sites of this type have been eliminated by agricultural development.
Moist - Fresh Pin Oak - Bur Oak Tallgrass Savannah Type	<i>Quercus macrocarpa</i> – <i>Quercus palustris</i> – <i>Quercus bicolor</i> / <i>Calamagrostis canadensis</i> Wooded Herbaceous Vegetation	G1; S1	This bur oak - mixed oak savanna or openings community occurs on lakeplains of the southern Great Lakes in the United States and Canada. Stands occur on sandy or, less commonly, silty/clayey glacial lakeplains with seasonally high water tables. Soils are mildly alkaline very fine sandy loams or loamy very fine sands, sometimes sands. These soils have moderate water-retaining capacity. The wet-mesic type described here is found on flat, poorly drained areas. It is dominated by <i>Quercus macrocarpa</i> , <i>Quercus palustris</i> , and <i>Quercus bicolor</i> with some <i>Acer rubrum</i> and a lakeplain wet prairie ground layer component. The canopy of this community can be very open.

* Information from NHIC (2013)

** Community descriptions from NatureServe (2012)

v. Dominant Environmental Processes

The deciduous forests that historically formed the dominant matrix community throughout southern Ontario, including Chatham-Kent, were relatively stable, and supported wide-ranging species (Davis 1996; Anderson and Bernstein 2003). Nested within these large forests were large and small patch habitat

types (Anderson and Bernstein 2003) that often resulted in response to unique or specific terrain. Within the Carolinian life zone large patch communities include marshes, savannahs and prairies.

Minimum Dynamic Area

Minimum dynamic area (MDA) is often used to determine the minimum area needed to maintain natural ecological processes and to ensure that examples of all successional stages will exist within a given habitat type under all disturbance regimes (e.g. wind, fire, insects) (Pickett and Thompson 1978). Most forests in southern Ontario experienced average disturbances of less than 2 hectares (4 acres), and early successional stages were limited to gaps created in the canopy by windstorms, downbursts and ice-storms (Riley and Mohr 1994; Larson *et al.* 1999). It has been estimated that protected landscapes must be 50 to 100 times larger than average disturbance patches in order to maintain a relative equilibrium of habitats (Shugart and West 1981). In such landscapes, the proportions of different successional stages (e.g. young forest, old growth forest) would be relatively constant over time, even though the sites occupied by different stand types would change. On this basis, minimum recommended area for core forests in southern Ontario would be between 100 and 200 hectares (~250 and 500 acres). Given projections for larger, more frequent storms due to climate change, a conservative strategy would recommend cores of at least 200 hectares (~500 acres) in size.

Fire

Primary disturbance regimes in the prairies and savannahs of southern Ontario were largely driven by drought and fire cycles. Most of these tallgrass systems occurred on sand plains that experienced fires every 5-15 years. Fire is a significant process in the functioning and maintenance of Ontario's remaining prairies (areas which historically supported grasses and herbs with few trees), grasslands (anthropogenic communities of grasses which occur as a result of abandoned cultural use such as farming) and savannahs [grasslands with 25-35% cover of woody species (Lee *et al.* 1998)]. Fire encourages species that respond to newly burned and open conditions and that benefit from the lack of competition from woody species, which cannot populate burned areas as quickly and efficiently. Natural fire regimes in southern Ontario have been suppressed or altered since European settlement, and as a result, many valuable natural areas have been, and continue to be, lost to succession. Succession is defined as the eventual encroachment of woody species, especially trees, into areas which will cause the cover to eventually become a woodland or forest. In this setting, woody species dominate and prairie or grassland species often die out due to shading or competition from these plants.

Savannahs exist as a delicate balance between scattered woody species and grassland species, and grow specifically in areas wet enough to support trees but dry enough to be subject to fire. They rely on frequent fire events to prevent forested oak woodland cover from becoming dominant.

Grasslands and prairies are similar to savannahs but have less cover of fire-tolerant oak species and greater expanses of open land carpeted in herbaceous, fire-tolerant grasses. Fire is usually an essential component in maintaining grasslands, prairies and savannahs. Burning tallgrass prairies has been shown to stimulate growth of prairie plants and the mycorrhizae that aid plants in nutrient acquisition (Bentivenga and Hetrick 1991).

Hydrology

The Lake St. Clair Coastal CAP includes portions of several watersheds whose rivers drain into Lake St. Clair (Figure 1.1). The Sydenham River, the Thames River, and the Chancel Ecarte are partially contained within the Lake St. Clair Coastal CAP.

Changes in land cover, drainage and damming of streams greatly affect the ecological integrity of river ecosystems (Allan 2004). In much of Southern Ontario, including Chatham-Kent, large amounts of forest cover have been removed (Larson *et al.* 1999) and a large proportion of wetlands have been drained (Snell 1987). In addition, streams and rivers in the area are dammed, channelized and dyked to control water flow, modifying the natural flooding cycles and floodplain ecosystems (Figure 1.3).



Figure 1.3 The heavily modified landscape of the St. Clair Coastal CAP area

vi. Significant Species

Despite the fact that much of the area has undergone conversion to agricultural and urban land uses, it provides habitat for at least 14 extant terrestrial and aquatic Species at Risk (SAR), with another 15 SAR having occurred historically.

Unless otherwise indicated, data in Tables 1.4-1.6 are from NHIC (February 2013) but the individual records are generally not current to 2013. Additional records from CAP team members have been included in parentheses. Only designated Species At Risk (SAR) (Endangered, Threatened or Special Concern) are included in tables 1.4 and 1.5. Many additional globally and provincially rare species (Table 1.6) and vegetation communities (Table 1.3) occur in these areas, and some of them may be considered as focal conservation targets during the CAP process. Records have in some cases not been included for locally extirpated species (indicated with X) occurring at sites considered so modified that they are not recoverable, although records of many historic (indicated with H) and extirpated taxa are presented since these could conceivably recolonise (or be reintroduced) as habitats are restored.

Table 1.4 Significant Species found in the Lake St. Clair Coastal CAP Area. Data from NHIC (2013) plus additional observations of species by CAP team members in parentheses. Species-specific threats for all SAR in the CAP are listed in Appendix C.

Element	G-rank ¹	S-rank ¹	COSEWIC ²	OMNR ²	EO Rank ³	Last Observed Date (DD/MM/YYYY)	Associated Conservation Target(s) (see Table 1.7 for key to codes)
American Badger	G5	S2	END	END	H	03/1979 (unconfirmed sightings mid-2000)	3. PS; 4. TF; 5. AG
Bald Eagle	G5	S2N, S4B	NAR	SC	D	2007 (breeding record 2012)	1. UF; 2. MF; 5. RS; 6. IW; 7. CW
Black Tern	G4	S3B	NAR	SC	A	11/07/1991	6. IW; 7. CW
Blanding's Turtle	G4	S3	THR	THR	E	18/04/2002 (2010 & 2012)	5. RS; 6. IW; 7. CW
Climbing Prairie Rose	G5	S3	SC	SC	C	06/07/2002	3. PS; 4. TF
Common Five-lined Skink (Carolinian population)	G5T2	S2	END	END	X	30/03/1986	1. UF; 3. PS
Dense Blazing Star	G5	S2	THR	THR	X	08/2000 (likely still present)	3. PS; 6. IW
Eastern Foxsnake	GNR	S2	END	END	BC	02/09/2008 (2012)	2. MF; 3. PS; 4. TF; 7. CW
Eastern Musk Turtle	G5	S3	THR	THR	H	1881-? (likely still present)	5. RS; 6. IW; 7. CW
Eastern Prairie Fringed-orchid	G2G3	S2	END	END	CD	08/07/2004 (2013)	3. PS
Eastern Prickly Pear Cactus	G5	S1	END	END	X	26/09/1948	*One C-K population extant, not native but planted
Eastern Sand Darter	G3G4	S2	THR	END	H	1985	5. RS; 6. IW; 7. CW
Henslow's Sparrow	G4	SHB	END	END	H	1898	3. PS; 4. TF; 3. RS (low-lying seasonally flooded areas); 4. AG
Kentucky Coffee-tree	G5	S2	THR	THR	C	25/06/2002 (2012)	2. MF; 5. RS; 3. TF

Element	G-rank ¹	S-rank ¹	COSEWIC ²	OMNR ²	EO Rank ³	Last Observed Date (DD/MM/YYYY)	Associated Conservation Target(s) (see Table 1.7 for key to codes)
Kidneyshell	G4G5	S1	END	END	H	25/06/1934	5. RS; 7. CW
King Rail	G4	S2B	END	END	CD	10/05/2005 (2012)	7. CW
Least Bittern	G5	S4B	THR	THR	AB	12/06/2001 (2013)	6. IW; 7. CW
Northern Map Turtle	G5	S3	SC	SC	H*	13/04/1986 (2012)	7. CW
Pugnose Shiner	G3	S2	END	END	C	07/06/1996	5. RS; 6. IW; 7. CW
Queensnake	G5	S2	END	END	H*	15/05/1973 (2012)	5. RS
Riddell's Goldenrod	G5	S3	SC	SC	B	1997 (2012)	1. PS; 2. RS; 3. TF (Wet prairie-like sites and roadside ditches)
Round Hickorynut	G4	S1	END	END	H	1965	5. RS; 7. CW
Round Pigtoe	G4G5	S1	END	END	H	11/10/1965	5. RS
Silver Chub	G5	S2	SC	SC	E	14/06/1990	7. CW
Spiny Softshell	G5	S3	THR	THR	H*	13/07/1984 (2012)	5. RS; 7. CW
Spotted Gar	G5	S1	THR	THR	H	04/07/1975	7. CW
Spotted Sucker	G5	S2	SC	SC	E	07/06/1996	5. RS; 6. IW; 7. CW
Spotted Turtle	G5	S3	END	END	H*	06/1882 (late 2000's, probably extant)	7. CW
Swamp Rose-mallow	G5	S3	SC	SC	A	13/08/2002 (2012)	4. TF; 5. RS; 6. IW; 7. CW

¹ Global and Subnational Ranks: Ranks indicate the conservation status of a species and are designated by a number from 1 (critically imperiled) to 5 (secure), preceded by a letter reflecting the appropriate geographic scale of the assessment (G = Global, and S = Subnational, in this case referring to Ontario).

² National and Provincial Status: Status of species listed nationally (COSEWIC) or provincially (OMNR): END = Endangered, THR = Threatened, SC = Special Concern.

³ EO Rank indicates the viability of the population: A - Excellent predicted viability, B - Good predicted viability, C - Fair predicted viability, D - Probably not viable, E - Verified extant, F - Failed to find, H - Historical, X – Extirpated.

Table 1.5 Additional significant species that occur at Walpole Island, bordering the CAP area. Some species in this table have been recorded in the CAP but do not have an associated NHIC record, others may also occur in the CAP but have not been discovered yet. Data from NHIC (2013) plus additional observations of species by CAP team members in parentheses. Codes as for Table 1.4.

Element	G-rank	S-rank	COSEWIC	OMNR	EO Rank	Last Observed Date (DD/MM/YYYY)	Associated Conservation Target(s) (see Table 1.7 for key to codes)
Colicroot	G5	S2	THR	THR	H*	11/07/1987 (2011, likely extant)	3. PS; 4. TF
Grass Pickerel (recorded in CAP by DFO, but no NHIC record)	G5T5	S3	SC	SC	E	1999	5. RS; 6. IW; 7. CW
Hill's Thistle	G3	S3	THR	THR	X	1914-PRE	3. PS
Lake Chubsucker (occurs in CAP, but no NHIC record)	G5	S2	END	THR	A	10/08/2001	7. CW
Lake Sturgeon (Great Lakes - Upper St. Lawrence River population)	G3G4 TNR	S2	THR	THR	H	01/06/1987	7. CW
Small White Lady's-slipper	G4	S1	END	END	C	1990	2. MF; 3. PS; 4. TF
Willowleaf Aster	G5	S2	THR	THR	X	10/09/1916	3. PS; 4. TF; 5. RS?

Table 1.6 Additional Globally and Provincially Significant Taxa of the Lake St. Clair Coastal CAP. Codes as for Table 1.4.

Element	Scientific Name	Taxonomic Group	G-rank	S-rank	EO Rank
American Gromwell	<i>Lithospermum latifolium</i>	Vascular Plant	G4	S3	H
American Lotus	<i>Nelumbo lutea</i>	Vascular Plant	G4	S2	H
Appendaged Waterleaf	<i>Hydrophyllum appendiculatum</i>	Vascular Plant	G5	S2	H
Black Gum	<i>Nyssa sylvatica</i>	Vascular Plant	G5	S3	H
Black-crowned Night-heron	<i>Nycticorax nycticorax</i>	Bird	G5	S3B,S3N	H
Brindled Madtom	<i>Noturus miurus</i>	Fish	G5	S2	E
Bushy Aster	<i>Symphiotrichum dumosum</i>	Vascular Plant	G5	S2	H
Buttonbush Dodder	<i>Cuscuta cephalanthi</i>	Vascular Plant	G5	S2	H
Canvasback	<i>Aythya valisineria</i>	Bird	G5	S1B,S4N	H
Coast Barnyard Grass	<i>Echinochloa walteri</i>	Vascular Plant	G5	S3	H
Crowned Beggarticks	<i>Bidens trichosperma</i>	Vascular Plant	G5	S2	E
Culver's Root	<i>Veronicastrum virginicum</i>	Vascular Plant	G4	S2	E
Cup Plant	<i>Silphium perfoliatum</i>	Vascular Plant	G5	S2	E
Deer-tongue Panic Grass	<i>Dichanthelium clandestinum</i>	Vascular Plant	G5?	S2	H
Duke's Skipper	<i>Euphyes dukesi</i>	Insect	G3	S2	H
Dusky Dancer	<i>Argia translata</i>	Insect	G5	S2	H
Elusive Clubtail	<i>Stylurus notatus</i>	Insect	G3	S2	H
Forster's Tern	<i>Sterna forsteri</i>	Bird	G5	S2B	D

Element	Scientific Name	Taxonomic Group	G-rank	S-rank	EO Rank
Ghost Shiner	<i>Notropis buchanani</i>	Fish	G5	S2	E
Giant Ironweed	<i>Vernonia gigantea</i>	Vascular Plant	G5	S1?	E
Gray-headed Prairie Coneflower	<i>Ratibida pinnata</i>	Vascular Plant	G5	S3	E
Great Plains Ladies'-tresses	<i>Spiranthes magnicamporum</i>	Vascular Plant	G4	S3?	B
Greater Redhorse	<i>Moxostoma valenciennesi</i>	Fish	G4	S3	F
Hoary Tick-trefoil	<i>Desmodium canescens</i>	Vascular Plant	G5	S2	H
Honey-locust	<i>Gleditsia triacanthos</i>	Vascular Plant	G5	S2	H
Large Yellow Pond-lily	<i>Nuphar advena</i>	Vascular Plant	G5T5	S3	E
Many-fruit Primrose-willow	<i>Ludwigia polycarpa</i>	Vascular Plant	G4	S2S3	E
Mat Panic Grass	<i>Dichanthelium meridionale</i>	Vascular Plant	G5	S1	H
Mead's Sedge	<i>Carex meadii</i>	Vascular Plant	G4G5	S2	H
Muskingum Sedge	<i>Carex muskingumensis</i>	Vascular Plant	G4	S3	E
Northern Fogfruit	<i>Phyla lanceolata</i>	Vascular Plant	G5	S2	H
Painted Skimmer	<i>Libellula semifasciata</i>	Insect	G5	S2	H
Pawpaw	<i>Asimina triloba</i>	Vascular Plant	G5	S3	E
Prairie Milkweed	<i>Asclepias sullivantii</i>	Vascular Plant	G5	S3	E
Prairie Straw Sedge	<i>Carex suberecta</i>	Vascular Plant	G4	S2	H
Pronghorn Clubtail	<i>Gomphus graslinellus</i>	Insect	G5	S3	H
Pumpkin Ash	<i>Fraxinus profunda</i>	Vascular Plant	G4	S2?	E
Red-legged Spittlebug	<i>Prosapia ignipectus</i>	Insect	G4	S1?	H

Element	Scientific Name	Taxonomic Group	G-rank	S-rank	EO Rank
Round-fruited Panic Grass	<i>Dichanthelium sphaerocarpon</i>	Vascular Plant	G5	S3	H
Shellbark Hickory	<i>Carya laciniosa</i>	Vascular Plant	G5	S3	E
Southern Slender Ladies'-tresses	<i>Spiranthes lacera var. gracilis</i>	Vascular Plant	G5T4T 5	S1	H
Spreading Chervil	<i>Chaerophyllum procumbens</i>	Vascular Plant	G5	S2	H
Square-stemmed Spike-rush	<i>Eleocharis quadrangulata</i>	Vascular Plant	G4	S1	H
Stiff Goldenrod	<i>Solidago rigida ssp. rigida</i>	Vascular Plant	G5T5	S3	E
Striped Cream Violet	<i>Viola striata</i>	Vascular Plant	G5	S3	E
Tall Boneset	<i>Eupatorium altissimum</i>	Vascular Plant	G5	S1	E
Tall Nutrush	<i>Scleria triglomerata</i>	Vascular Plant	G5	S1	H
Tall Tickweed	<i>Coreopsis tripteris</i>	Vascular Plant	G5	S2	H
Taper-leaved Bugleweed	<i>Lycopus rubellus</i>	Vascular Plant	G5	S3	H
Variegated Meadowhawk	<i>Sympetrum corruptum</i>	Insect	G5	S3	H
Viscid Bushy Goldenrod	<i>Euthamia caroliniana</i>	Vascular Plant	G5	S1	E
Winged Loosestrife	<i>Lythrum alatum</i>	Vascular Plant	G5	S3	E
Wingstem	<i>Verbesina alternifolia</i>	Vascular Plant	G5	S3	H
Yellow-headed Blackbird	<i>Xanthocephalus xanthocephalus</i>	Bird	G5	S2B	E

2. Biodiversity Targets and Associated Threats

i. Conservation Targets

Table 1.7 Conservation Targets for the Lake St. Clair Coastal CAP.

Conservation Targets	Code	Nested Targets
1. Upland Forests	UF	Bald Eagle, Common Five-lined Skink
2. Moist Forests and Swamps	MF	Bald Eagle, Eastern Foxsnake, Kentucky Coffee-tree
3. Prairies and Savannahs	PS	American Badger, Climbing Prairie Rose, Common Five-lined Skink, Dense Blazing-star, Eastern Foxsnake, Eastern Prairie Fringed-orchid, Henslow's Sparrow, Riddell's Goldenrod
4. Thickets, Hedgerows, Shelterbelts, Fencerows, Abandoned Fields	TF	American Badger, Climbing Prairie Rose, Eastern Foxsnake, Henslow's Sparrow, Kentucky Coffee-tree, Riddell's Goldenrod
5. Rivers, Streams, Drains and associated riparian vegetation	RS	Bald Eagle, Blanding's Turtle, Eastern Musk Turtle, Eastern Sand Darter, Henslow's Sparrow, Kentucky Coffee-tree, Round Kidneyshell, Pugnose Shiner, Queensnake, Riddell's Goldenrod, Round Hickorynut, Round Pigtoe, Silver Chub, Spiny Softshell, Spotted Sucker, Swamp Rose-mallow
6. Inland Marshes, Ponds, Impoundments and Constructed Wetlands ¹	IW	Bald Eagle, Black Tern, Blanding's Turtle, Eastern Sand Darter, Least Bittern, Pugnose Shiner, Spotted Sucker, Spotted Turtle, Swamp Rose-mallow
7. Non-impounded Coastal Wetlands (including Lake St. Clair near-shore aquatic)	CW	Black Tern, Blanding's Turtle, Eastern Foxsnake, Eastern Musk Turtle, Eastern Sand Darter, Kidneyshell, King Rail, Least Bittern, Northern Map Turtle, Pugnose Shiner, Round Hickorynut, Silver Chub, Spiny Softshell, Spotted Gar, Spotted Sucker, Spotted Turtle, Swamp Rose-mallow, Round Pigtoe
8. SAR Reptiles	SR	Blanding's Turtle, Common Five-lined Skink, Eastern Foxsnake, Eastern Musk Turtle, Northern Map Turtle, Queensnake, Spiny Softshell, Spotted Turtle
9. Sustainable Agriculture	AG	Healthy soils, clean water, clean air

¹ Includes St. Clair National Wildlife Area and all impounded wetlands along the coast.

Table 1.8 Conservation Target Viability in the Lake St. Clair Coastal CAP. Assessment ranking and colour codes are described below the table (P = poor, F = fair, G = Good, VG = Very good, NA = not applicable). Shading indicates the level of importance and suggested focus of strategy development assigned to the target by science committee (darker green received most votes, than lighter green, then no shading).

Conservation Target	Key Ecological Attribute(s)	Size	Condition	Landscape Context	Overall
1. Upland Forests	<ul style="list-style-type: none"> • Presence of reproducing populations of characteristic forest interior bird species (specific indicators to be determined) • Extent of forest cover and interior habitat • Quality of forest communities (e.g., FQI; age class; structure) • Measure: no net loss of forest cover from 2012 levels • Measure: x forest interior breeding bird species in x sites 	Fair	Fair	Poor	Fair
2. Moist Forests and Swamps	<ul style="list-style-type: none"> • Groundwater recharge • Presence of: Wood Frog; salamander diversity (egg masses) • Presence of characteristic / indicator species • Measures: overall extent, interior habitat • Extent/presence of tile drains around patches • Presence/persistence of ephemeral pools • Soil types (presence of deeper organic soils) 	Poor	Poor?	Poor	Poor
3. Prairies & Savannahs	<ul style="list-style-type: none"> • Species diversity – presence of key indicator species • Disturbance regime required to maintain the species intact, or managed appropriately • Minimum size 	Poor	Poor	Poor	Poor
4. Thickets, Hedgerows, Shelterbelts, Fencerows, Abandoned Fields	<ul style="list-style-type: none"> • Species diversity - species should be represented in x amounts • Minimum width (e.g., 10 m, or height of trees) • Tree roots not being damaged • Agricultural activities being limited to canopy dripline. Linkages to other hedge rows, thickets. • Presence of indicator species (e.g., pollinators, certain plants, herps) • Benign neglect 	NA	Fair	Good	Fair

Conservation Target	Key Ecological Attribute(s)	Size	Condition	Landscape Context	Overall
5. Rivers, Streams, Drains and associated riparian vegetation	<ul style="list-style-type: none"> Water quality (benthic organism composition, temperature) Extent of naturally-vegetated buffers (measured using GIS over time) (% of watercourse having 30m buffer; measures of surrounding land use measured by %) Extent natural watercourse vs. altered watercourse Structural vegetation composition (diversity / native vs. invasive). Intact hydrology 	Fair	Poor	Poor	Poor
6. Inland Marshes, Ponds, Impoundments and Constructed Wetlands	<ul style="list-style-type: none"> Water quality (benthic organism composition, temperature). Extent of naturally-vegetated buffers (measured using GIS over time) (% of wetland having 30m buffer; measures of surrounding land use measured by %) Connectivity to other wetlands Structural and vegetation composition (diversity / native vs. invasive) Intact hydrology 	Good (less so inland)	Fair	Good	Good
7. Non-impounded Coastal Wetlands (including Lake St. Clair near-shore aquatic)	<ul style="list-style-type: none"> Marsh Monitoring Program (criteria; CWS/BSC) Great Lakes Coastal Wetlands Consortium (health/stressors criteria) Extent of Phragmites and other exotics (e.g., Frog-bit) 	Good (depends on water levels)	Fair (better parts in north; serious Phrag, MUSW & carp impacts)	Fair (but connectivity affected by Phrag; middle portions not so Good)	Fair
8. SAR Reptiles	<ul style="list-style-type: none"> Habitat connectivity Road mortality measures Human persecution (at sites or along roads) Quality of habitat in relation to invasive species (Phragmites, Eurasian milfoil, frogbit) 	Good?	Fair?	Poor (but G? along coast – n.b. Phrag)	Fair
9. Sustainable Agriculture	<ul style="list-style-type: none"> Healthy soils – should have organic matter, bacteria, earthworms, fungus Minimal compaction Agriculture should not depend on synthetic inputs Healthy water - Not nutrient rich, free of toxins, buffered hydrology 				

Conservation Target	Key Ecological Attribute(s)	Size	Condition	Landscape Context	Overall
OVERALL					

Table 1.8 is based on The Nature Conservancy's Conservation Action Planning (CAP) viability summary table. The Nature Conservancy's (CAP) Excel Workbook version 5a can be used to calculate the overall viability ranks. The CAP Workbook is found on NCC's Training and Resources Website under the Reference Materials / Conservation / Campaign / Natural Area Conservation Planning (NACP) / NACP Resource Materials / TNC CAP Process folder. Consider placing nested targets and/or viability rationale in a separate appendix if their content is too overwhelming for the table.

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

ii. Threats

Species-specific threats to Lake St. Clair Coastal CAP SAR are available in Appendix C. Table 1.9 summarizes most relevant threats.

Table 1.9. Summary of Threats in the Lake St. Clair Coastal CAP. Threats are based on the IUCN classification of direct threats (IUCN-CWP 2006a). Detailed codes found below table. VH = Very high, H = High, M = Medium, L = Low.

Threat	Associated Stress(es) Key: VERY HIGH; high; medium; low Stress applies to all conservation targets unless otherwise indicated (with acronym)	1. Upland Forests (UF)	2. Moist Forests & Swamps (MF)	3. Prairie & Savannahs (PS)	4. Thickets, Hedgerows, Shelterbelts, Fencerows & Abandoned Fields (TF)	5. Rivers, Streams, Drains and associated riparian vegetation (RS)	6. Inland Marshes, Ponds, Impoundments and Constructed Wetlands (IW)	7. Non-impounded Coastal Wetlands (CW)	8. SAR Reptiles (SR)	Overall	Notes
Non-Timber Crops (cash crops)	1. Erosion & soil compaction (UF) 2. Reduced extent of habitat & buffering, fragmentation (UF) 3. Loss of wetland size, function and connectivity (MF, CW, IW) 4. Loss of organic matter (AG) 5. Sediment / nutrient loading (MF, CW, IW) 6. Oxygen depletion (MF, CW, IW). 7. Reduced biodiversity. (UF, MF, CW, IW) 8. Water level fluctuations (CW, IW) 9. Herbicide, pesticide run-off. (MF, CW, IW) 10. Increased predator stress (MF, CW, IW) 11. Water level fluctuations (MF, CW, IW) 12. Animal mortality from farm equipment (SR)	H	VH	H	VH	VH	M	H	M?	VH	Highly variable situation; landowners using different practices across the CAP. Some good buffer strip practices (generally non-native grasses), grassed waterways and conservation/no tillage (but has been declining). Encroachment along road allowances. UF, MF - Forests essentially restricted to eastern half of CAP area as historically most of the CAP was tallgrass prairie and marsh. Highly-charged politically (conservation bylaw). High commodity prices affecting situation greatly. Farming to forest edge; squaring forest and loss of edge buffer; incentives are being used to utilize inappropriate equipment to clear forests to reclaim former agricultural lands. Clearing of woodlots, hedgerows, fencerows, etc., to increase farmed area. PS - Existing remnants are being or have been converted to agriculture. Some small remnants remain. Visually can be reversed, but to recover actual functionality requires a very long term commitment (many decades, if not centuries). RS - Drain maintenance is a major impact. IW - Conversion is still occurring, often without regard for legislation.

Threat	Associated Stress(es) Key: VERY HIGH ; high ; medium; low Stress applies to all conservation targets unless otherwise indicated (with acronym)	1. Upland Forests (UF)	2. Moist Forests & Swamps (MF)	3. Prairie & Savannahs (PS)	4. Thickets, Hedgerows, Shelterbelts, Fencerows & Abandoned Fields (TF)	5. Rivers, Streams, Drains and associated riparian vegetation (RS)	6. Inland Marshes, Ponds, Impoundments and Constructed Wetlands (IW)	7. Non-impounded Coastal Wetlands (CW)	8. SAR Reptiles (SR)	Overall	Notes
											CW - Good seed bank often present. Some small recent projects (e.g., Peers, Stewart Farm) having encouraging results. Overall irreversibility is “high”, on a local scale it is “medium”. Economics (crop prices) are a major factor determining scope. Incentives needed, but key programs seem to be being reduced or lost (e.g., EFP, stewardship). Landowners discouraged. Trend toward foreign (i.e., non-local) ownership of agricultural lands (and amalgamation of farms) and operations a high ongoing threat. Some groups of farmers are concerned about land practices and want to do projects at their own cost. But there is a large amount of land conversion due to high crop prices.

Threat	Associated Stress(es) Key: VERY HIGH ; high ; medium; low Stress applies to all conservation targets unless otherwise indicated (with acronym)	1. Upland Forests (UF)	2. Moist Forests & Swamps (MF)	3. Prairie & Savannahs (PS)	4. Thickets, Hedgerows, Shelterbelts, Fencerows & Abandoned Fields (TF)	5. Rivers, Streams, Drains and associated riparian vegetation (RS)	6. Inland Marshes, Ponds, Impoundments and Constructed Wetlands (IW)	7. Non-impounded Coastal Wetlands (CW)	8. SAR Reptiles (SR)	Overall	Notes
Invasive Non-Native / Alien Species (vascular plants)	<p>1. Competition for resources</p> <p>2. Allelopathic spp. have broader ecosystem impacts</p> <p>3. DISPLACE NATIVE PLANTS (PS)</p> <p>4. Reduced food and habitat quality for wildlife (TF)</p> <p>5. Control measures add to impacts</p> <p>6. Filling, succession of wetlands from volume of the biomass</p> <p>MF - Habitat degradation (out competing native species, loss of diversity)</p> <p>Often requires aggressive controls that add to impacts</p> <p>Increases the filling/succession of wetlands from the volume of biomass</p>	VH	H	H	H	VH	VH	VH	M?	VH	<p>Irreversibility value varies depending on species and whether management is local or wide-scale.</p> <p>UF - Impacts appear low at McKerral (i.e., some local exceptions). Common Buckthorn, Multiflora Rose, Garlic Mustard, Common Periwinkle, Phragmites, Dame's Rocket, Dog Strangling Vine, Giant Hogweed...</p> <p>MF - White Mulberry, Garlic Mustard, Phragmites (esp. with opening of canopy due to EAB), Dame's Rocket, exotic earthworms.</p> <p>PS - Black Locust, White Sweet Clover...</p> <p>TF - Haven for invasives & their spread. Crack Willow, Phrag, Common Buckthorn, White Mulberry, Multiflora Rose, Garlic Mustard, etc. *- Some invasive plants provide cover, food and habitat for wildlife, but competition with native species is the major concern.</p> <p>RS - Phragmites, zebra mussels, carp, benthic invasives</p> <p>So little habitat left, that impacts are relatively great.</p> <p>IW - Phragmites, Reed Canary Grass, and species from hedgerows (incl. cold season grasses); better ability to control for Phragmites by raising water levels.</p> <p>CW - Phragmites is a key factor impacting affecting the conservation target. Other species include European Frog-bit, zebra/quagga mussels, Chinese Mystery Snails, Carp, Mute Swan, etc.</p> <p>SR - Red-eared Slider. Round Goby - possible increase in food source.</p>

Threat	Associated Stress(es) Key: VERY HIGH; high; medium; low Stress applies to all conservation targets unless otherwise indicated (with acronym)	1. Upland Forests (UF)	2. Moist Forests & Swamps (MF)	3. Prairie & Savannahs (PS)	4. Thickets, Hedgerows, Shelterbelts, Fencerows & Abandoned Fields (TF)	5. Rivers, Streams, Drains and associated riparian vegetation (RS)	6. Inland Marshes, Ponds, Impoundments and Constructed Wetlands (IW)	7. Non-impounded Coastal Wetlands (CW)	8. SAR Reptiles (SR)	Overall	Notes
Dams & Water Management / Use (includes tile drainage)	1. Hydrological impacts (lower water table) (MF, IW) 2. Loss of headwaters & recharge areas (MF, IW) 3. Increased water temperature (IW) 4. Impeded fish movement (IW) 5. Disrupted sediment transport (IW) 6. Increased problematic native and non-native species (Canada Goose, Common Carp) (IW) 7. Reduced water quality and quantity (IW) 8. Increased energy – flash flooding, erosion (IW) Off-site impacts: erosion, hydrological impacts, eutrophication of wetlands and streams (UF)	L	VH	*	L	VH	L	VH	L	MF - Tile drains included, main factor. Can be closed off fairly easily, but socioeconomic and legal/policy challenges are great. PS - Potential for establishing prairie corridors along municipal drains. TF - If in riparian area, could have significant impact RS - Includes dams, impoundments and pumps. Intensity of impacts and issues/techniques differ between lower and upper reaches of drainage systems. As lake levels decline – access to impounded wetlands may be a positive IW – Ongoing management necessary to maintain habitat quality. Low/declining lake levels potentially impacting accessibility of water source. CW - ARDA dyke development: water control structure that keeps Thames River and Lake St. Clair off the farmland during high water periods. Historically most of Dover Township was either wet prairie or wetland, so extent of coastal wetland has been greatly reduced and natural dynamics/processes severely impacted, and habitat fragmented (connectivity lost). Water currently being pumped straight out to lake. Potential for managing for better water quality by utilizing existing pumping systems to pump into wetlands. Drainage staff keen to work to improve.	

Threat	Associated Stress(es) Key: VERY HIGH; high; medium; low Stress applies to all conservation targets unless otherwise indicated (with acronym)	1. Upland Forests (UF)	2. Moist Forests & Swamps (MF)	3. Prairie & Savannahs (PS)	4. Thickets, Hedgerows, Shelterbelts, Fencerows & Abandoned Fields (TF)	5. Rivers, Streams, Drains and associated riparian vegetation (RS)	6. Inland Marshes, Ponds, Impoundments and Constructed Wetlands (IW)	7. Non-impounded Coastal Wetlands (CW)	8. SAR Reptiles (SR)	Overall	Notes
Renewable Energy (Wind Farms)	<p>Death and damage to flying and migratory species.</p> <p>MF - *Possible impacts of lights, audio, vibration, stray voltage on wildlife; some cutting for access roads.</p> <p>SR – Mortality along access roads.</p>	L	L?	L	H	H	M	H	M	<p>Not certain at this time as to whether all proposed projects will be undertaken</p> <p>UF - Service corridors are the threat to upland forests; some woodlots being cut to allow for development</p> <p>TF - Hedgerows being removed for access roads. Need to refer to specific plans to determine future impacts. Existing legislation for the most part not helpful in protecting habitat. Currently restricted to class 3 & 4 agricultural lands</p> <p>PS - Potential threat; status unknown. Also may be possible to use solar farms to restore/create prairie habitat.</p> <p>IW – Turbines have been built on/at non-PSW or unidentified wetland sites. Depends on what happens with plans for Dover Township wind farms.</p> <p>CW - Land value reduction (conservation-minded landowners driven away) – exacerbates non-local land ownership; some potential for support for conservation projects from industrial farm companies.</p> <p>SR– Increased snake mortality along access roads (especially while basking)</p>	
Excess Energy	<p>1. Erosion, slumping sedimentation</p> <p>2. Damage to vegetation due to flooding & scouring</p> <p>3. Excessive solar radiation, wind along forest edges</p> <p>4. Other edge effects (invasives, disease, predators, nest parasites)</p>	H	H		L	H	L	M	?	<p>The larger the forest/wetland complex the better it can buffer an adverse event.</p> <p>UF, MF - Wind, solar radiation very high in small forest fragments.</p> <p>RS - Flash flooding during extreme storm events. Seasonality is a factor – greater impacts during nesting season. Larger flood pumps, timing of opening of flood gates. Associated with climate change. Swamp forests or other inland wetland features in upper portions of watershed will reduce flooding events.</p> <p>CW - Most excess energy (flooding) occurring due to upstream/upriver impacts.</p>	

Threat	Associated Stress(es) Key: VERY HIGH ; high ; medium; low Stress applies to all conservation targets unless otherwise indicated (with acronym)	1. Upland Forests (UF)	2. Moist Forests & Swamps (MF)	3. Prairie & Savannahs (PS)	4. Thickets, Hedgerows, Shelterbelts, Fencerows & Abandoned Fields (TF)	5. Rivers, Streams, Drains and associated riparian vegetation (RS)	6. Inland Marshes, Ponds, Impoundments and Constructed Wetlands (IW)	7. Non-impounded Coastal Wetlands (CW)	8. SAR Reptiles (SR)	Overall	Notes
Invasive Non-Native/ Alien Species (invertebrate pests)	1. Reduced forest quality, health and diversity MF - Combination and cumulative effects of different stresses exacerbated; increased rate of infestations.	H	VH		L					UF - Not well known (except Emerald Ash Borer). Potential: Asian Long-horned Beetle, etc. Monitoring for ALHB to begin in 2013. Some positive effects for biodiversity (other tree species, fauna, etc.) MF - Emerald Ash Borer, Hickory Bark Beetle; Some beneficial impacts for some species (e.g., Red-headed Woodpecker); VH rank does not preclude efforts at prevention of future infestation. TF - Hedgerows may provide dispersal opportunities for forest insect pests and disease (e.g., Ash, elm)	
Agricultural & Forestry Effluents	1. Herbicides and insecticides (drift) (PS, TF) 2. Nutrient inputs (TF, IW) (contribute to succession if fertilizer gets into groundwater runoff - PS) 3. Reduced resilience of species; more prone to disease. (TF) 4. EXCESS NITROGEN IN SOIL. (AG)	L	L?	L	M	H	L	H	M?	Environmental Farm Plan projects have been helpful. PS – Pesticide drift, fertilizers. TF - Mainly flowing into ditches. Some improvements being made in methods. Irreversibility high because difficult to change industrial agriculture attitudes RS, IW - Non-point source impacts and agriculturally-related processing (e.g., beet, carrot operations, cleaning) are a huge problem and current BMPs may not be adequate or are not being practiced on wide enough scale. Priority project. CW - Some residual effluent from St. Clair River. SR - Chemicals may be accumulating in reptiles.	

Threat	Associated Stress(es) Key: VERY HIGH ; high ; medium; low Stress applies to all conservation targets unless otherwise indicated (with acronym)	1. Upland Forests (UF)	2. Moist Forests & Swamps (MF)	3. Prairie & Savannahs (PS)	4. Thickets, Hedgerows, Shelterbelts, Fencerows & Abandoned Fields (TF)	5. Rivers, Streams, Drains and associated riparian vegetation (RS)	6. Inland Marshes, Ponds, Impoundments and Constructed Wetlands (IW)	7. Non-impounded Coastal Wetlands (CW)	8. SAR Reptiles (SR)	Overall	Notes
Problematic Native Species (e.g., Canada Goose, Wild Turkey, White-tailed Deer, Raccoon, American Crow)	1. Increased nutrients, habitat destruction 2. Decreased biodiversity 3. Impede natural succession / regeneration SR - Predation (eggs, young and to a lesser degree adults)	M	L	H	L	L	M		H	PS – Red Cedar, cool season herbaceous and woody species (due to fire suppression) TF - Staghorn Sumac is not favoured by farmers and ends up being removed, with associated habitat loss. Often provide corridors / habitat for habitat generalists which may be problematic for other conservation targets. Succession issue for thickets. IW – Raccoon (predation – turtles), temperate-breeding Canada Goose (feeding on vegetation, competing for nesting sites) SR - Higher (albeit cyclical) predator populations (raccoon, skunks, Red Fox, opossum)	
Roads	1. Habitat fragmentation and loss 2. Road mortality (TF) 3. Run-off (salt, chemicals) (MF)	L	L	L	L	H	L	L	H	Upgrade of road surface (e.g., to asphalt) increases threat (higher potential for basking + higher speed traffic). UF – Culverts; road widening into forests TF - Road salt damaging vegetation and habitat. Suspended particulate impacts. Dust control (calcium chloride/carbonate, beet juice). Road mortality as species move from patch to patch. Construction of roads is “irreversible”, but except for usual maintenance activities impacts are minor; no major plans to expand road network. RS - CA works with road crews to minimize impacts of maintenance/construction. Depends on whether road is paved or gravel. Road is often a dyke requiring maintenance. CW, IW - Road salt (being used less, brine now), dust control (calcium chloride, nitrogen), culverts. SR - Mainly affecting Eastern Foxsnake, Snapping Turtle and possibly (locally) Blanding’s Turtle. Other SAR herps found mainly away from roads.	

Threat	Associated Stress(es) Key: VERY HIGH ; high ; medium; low Stress applies to all conservation targets unless otherwise indicated (with acronym)	1. Upland Forests (UF)	2. Moist Forests & Swamps (MF)	3. Prairie & Savannahs (PS)	4. Thickets, Hedgerows, Shelterbelts, Fencerows & Abandoned Fields (TF)	5. Rivers, Streams, Drains and associated riparian vegetation (RS)	6. Inland Marshes, Ponds, Impoundments and Constructed Wetlands (IW)	7. Non-impounded Coastal Wetlands (CW)	8. SAR Reptiles (SR)	Overall	Notes
Air-borne Pollutants	<ul style="list-style-type: none"> 1. Forest plant health 2. Climate change 3. Impacts of increased severe weather events 4. Burning of plastic releases carcinogens (dioxins, furans). (AG) 	M?	M?	L?	M?	L?	L	VH?	L?	<p>Climate change affecting ALL conservation targets. UF, MF –Drift from agricultural fields, industrial air pollution. PS - Overspraying may potentially impact. Round-up ready weeds spreading. TF - Vehicle exhaust – impacts of roadsides higher than hedgerows and thickets. CW - Some garbage burning still occurs. High levels of airborne pollutants from non-local industrial areas.</p>	
Problematic Non-native Fauna (cats, dogs)		M	M	M	M	L	L		H	<p>UF – Cats (in particular) predating birds (migratory & breeding), mammals and herpetofauna. Exotic earthworms. IW – Carp, Mute Swan, cats (occasionally); requires ongoing natural controls or human intervention</p>	
Housing & Urban Development	<ul style="list-style-type: none"> 1. Habitat loss & fragmentation 2. Predation by household pets 3. Light pollution 4. Invasive / non-native species. 5. Encroachment (habitat modification) 6. Loss of prime agricultural land (AG) 7. Erosion, increased sand bedload; suspended sediment / turbidity; reduced groundwater recharge & discharge. (AG, RS) 	L	L	L	L	H	L	L	M	<p>PS – Historical impact was very high. TF - Could include hedgerows and fallow fields in subdivision plan RS - Rural area, so impacts are somewhat localized. Greatest impacts in Chenal Ecarte, Snye area. IW, CW - Rank reflects current situation. Good progress with policy to protect to date. Some potential development plans especially around Mitchell’s Bay, but otherwise not a significant factor.</p>	

Threat	Associated Stress(es) Key: VERY HIGH ; high ; medium; low Stress applies to all conservation targets unless otherwise indicated (with acronym)	1. Upland Forests (UF)	2. Moist Forests & Swamps (MF)	3. Prairie & Savannahs (PS)	4. Thickets, Hedgerows, Shelterbelts, Fencerows & Abandoned Fields (TF)	5. Rivers, Streams, Drains and associated riparian vegetation (RS)	6. Inland Marshes, Ponds, Impoundments and Constructed Wetlands (IW)	7. Non-impounded Coastal Wetlands (CW)	8. SAR Reptiles (SR)	Overall	Notes
Work & Other Activities (drain maintenance – terrestrial; dredging – wetland / aquatic)		H	L	L	L		L	L	L?		UF - Vegetation cleared along closed municipal drains, no regeneration (may benefit meadow and prairie spp.); TF - Soil compaction from equipment can be issue CW, IW, SR - Drain maintenance, brushing and re-sloping along edges. CW - Dredging occurs periodically / sporadically.
Unregulated Hunting, Poaching & Collecting Terrestrial Animals	1. Population decline or loss (SAR turtles) (MF, IW)	L	L		L	L	M?	L	H		TF - Coyote and fox hunting widespread. Deliberate killing of snakes. RS - Collecting of reptile SAR likely does occur, but probably not a significant or only localized impact. Probable direct persecution of Eastern Foxsnakes. A lot of sustainable fishing. IW, CW, SR - SAR turtles - a couple of collectors apprehended annually; how many are not being caught?

Threat	Associated Stress(es) Key: VERY HIGH; high; medium; low Stress applies to all conservation targets unless otherwise indicated (with acronym)	1. Upland Forests (UF)	2. Moist Forests & Swamps (MF)	3. Prairie & Savannahs (PS)	4. Thickets, Hedgerows, Shelterbelts, Fencerows & Abandoned Fields (TF)	5. Rivers, Streams, Drains and associated riparian vegetation (RS)	6. Inland Marshes, Ponds, Impoundments and Constructed Wetlands (IW)	7. Non-impounded Coastal Wetlands (CW)	8. SAR Reptiles (SR)	Overall	Notes
Logging & Wood Harvesting	<ul style="list-style-type: none"> 1. Habitat damage (UF, MF) 2. Loss of canopy cover (UF, MF) 3. Soil compaction & erosion (UF, MF) 4. Invasive species (UF, MF) 5. Reduced forest interior, extent (UF, MF) 6. Siltation (MF) 	L	H		L	L			L		<p>Clear-cutting to expand farms included in “non-timber crops” criterion.</p> <p>UF - Ash harvesting occurred, otherwise very little. High-grading, when it occurs, results in degradation of habitat, reduced biodiversity, loss of seed trees, and habitat quality; no old growth (except McKerral Woodlot) and associated species and processes.</p> <p>MF – Impacts vary depending on techniques used. Cutting is widespread but cyclical. Most moist forests are of relatively young and low quality due to logging. Red Ash generally has been logged out. Old growth is gone and unlikely to return under current circumstances.</p> <p>TF - Hedgerow trees generally not suitable for logging; some landowners cut down large trees that are shading field.</p>
Fire Suppression	<ul style="list-style-type: none"> 1. NATURAL SUCCESSION, LOSS OF ECOLOGICAL INTEGRITY 2. INVASIVE SPECIES (COOL-SEASON GRASSES AND OTHER SPP.) 			H	L			L			<p>PS - Fire is part of the natural processes and can be a management tool for many prairies.</p> <p>CW - Fire would historically have occurred in wetlands and maintained more open conditions. Extent of suppression as a factor today is unclear.</p>
Invasive Non-native Species (diseases, pathogens)	<ul style="list-style-type: none"> 1. Reduced forest quality, health and diversity 	H			L				?		<p>UF - Status unknown. Butternut Canker, Beech Bark Disease, Red Oak Wilt, etc.</p> <p>MF - Major threat to elm, Blue-beech, Butternut.</p> <p>TF - Major threat to Black Knot (cherry), Elm, American Chestnut, Beech, Eastern Flowering Dogwood, walnut, butternut</p>

Threat	Associated Stress(es) Key: VERY HIGH; high; medium; low Stress applies to all conservation targets unless otherwise indicated (with acronym)	1. Upland Forests (UF)	2. Moist Forests & Swamps (MF)	3. Prairie & Savannahs (PS)	4. Thickets, Hedgerows, Shelterbelts, Fencerows & Abandoned Fields (TF)	5. Rivers, Streams, Drains and associated riparian vegetation (RS)	6. Inland Marshes, Ponds, Impoundments and Constructed Wetlands (IW)	7. Non-impounded Coastal Wetlands (CW)	8. SAR Reptiles (SR)	Overall	Notes
Recreational Activities (motorized off-road vehicles, motor boats)	1. Disturbance to wildlife 2. Direct damage to habitat and vegetation 3. Soil erosion & compaction 4. Invasive species 5. Propeller damage (aquatic reptiles)	L	M	L	L	L		L	L	Extent of damage/impact within CAP area is not known. UF - Very little ATV use documented. MF – ATV damage generally probably less in woodlots that are not adjacent to gravel roads. RS - Increase in boating speed limits proposed. Some localized heavier boating impacts (Snye) that can be impacting SAR. CW - Mostly privately owned, little access. ATV use is occurring on shoreline. Kite-boarding a growing activity (potential impacts on wetland habitat). Boating is relatively small scale (minor impacts). SR - Boat traffic. Degree of impact uncertain. Constant boat traffic can greatly affect basking behavior.	
Tourism & Recreational Development	1. Direct habitat loss 2. Household pets (predation) 3. Light pollution 4. Invasive species 5. Encroachment (habitat modification) 6. Direct persecution of snakes (SR)	L	L	L	L	L		L	M	UF – Trailer parks, golf courses (pesticides) CW - Hunting, fishing and other recreational activities at their current levels are generally considered to be a benefit to the health of the conservation target. SR - Mitchell’s Bay, etc. Snake persecution.	
Garbage & Solid Waste	1. Bank destabilization (RS) 2. Erosion (RS) 3. Habitat loss (RS) 4. Introduction of non-native species (RS) 5. Leachate (RS)	L	L	L	L	L	L	M	L	Although actual ecological impacts may be fairly low, aesthetic impact contributes poorly to conservation values/ethic. TF, SR - May provide snake habitat. CW - Waste (both inorganic and organic) is often stored near water’s edge (below high water mark) and gets swept away during high water levels.	

Threat	Associated Stress(es) Key: VERY HIGH ; high ; medium; low Stress applies to all conservation targets unless otherwise indicated (with acronym)	1. Upland Forests (UF)	2. Moist Forests & Swamps (MF)	3. Prairie & Savannahs (PS)	4. Thickets, Hedgerows, Shelterbelts, Fencerows & Abandoned Fields (TF)	5. Rivers, Streams, Drains and associated riparian vegetation (RS)	6. Inland Marshes, Ponds, Impoundments and Constructed Wetlands (IW)	7. Non-impounded Coastal Wetlands (CW)	8. SAR Reptiles (SR)	Overall	Notes
Other Ecosystem Modification: (e.g., restoration activities that are not appropriate to site conditions; dredging)	1. Erosion, bank stability 2. Hydrological impacts 3. Direct habitat loss 4. Loss of biodiversity & changes to species composition (MF) 5. Impact of mowing at wrong time or season (PS).	L	L	L	L	L	L	L	L?	UF - Some landowners wanting to alter habitat (e.g., woodlot to wetland where EAB has had significant impact). PS - Inappropriate restoration (woodland where should be prairie). Many programs promote tree planting (e.g., TOF 50M Tree, C-K Greening Strategy). But prairie can be “harvested” – hence tax “incentive”. IW – “Inappropriate management” occurring, but at the same time it is creating/maintaining habitat diversity. CW - Mitchell’s Bay marina channel currently being dredged. Some controls/limits, but it is occurring (with “sidecasting”).	
Household Sewage & Urban Waste Water	1. Reduced resilience of species; more prone to disease. (TF) 2. Chemicals impact soil quality and water quality; smell (AG) 3. Diseases, pathogenic bacteria (e.g., ecoli), prions (AG) 4. Nutrient loading (RS)		L			L?	L	L	L?	CW - Some issues along Thames River. For the most part past problems have been addressed during amalgamation and improved servicing. SR - Pharmaceuticals and other substances in wastewater impacting turtles. “Hot spots” still apparent at some locations along Thames River.	
Commercial & Industrial Development	1. Loss of prime agricultural land (AG) 2. Erosion, increased sand bedload; suspended sediment / turbidity; reduced groundwater recharge & discharge. (AG, RS)	L	L	L	L	L	L	L	L	RS, CW - Contribution rank reflects current situation. Greenhouses and processing plant development occurring and almost certainly to occur at an increased rate. Potential impacts on water quality. Cedar Line greenhouse project example using DU model for operational wastewater and stormwater management (zero emissions, runoff).	

Threat	Associated Stress(es) Key: VERY HIGH; high; medium; low Stress applies to all conservation targets unless otherwise indicated (with acronym)	1. Upland Forests (UF)	2. Moist Forests & Swamps (MF)	3. Prairie & Savannahs (PS)	4. Thickets, Hedgerows, Shelterbelts, Fencerows & Abandoned Fields (TF)	5. Rivers, Streams, Drains and associated riparian vegetation (RS)	6. Inland Marshes, Ponds, Impoundments and Constructed Wetlands (IW)	7. Non-impounded Coastal Wetlands (CW)	8. SAR Reptiles (SR)	Overall	Notes
Utility & Service Lines	1. Habitat fragmentation 2. Hydrological impacts	L	L	*	L	L	L		L	Most is underground along existing road allowances. UF - New utility (wind & solar farm) service lines may result in hydrological changes due to location of underground cables; utility lines and service roads may fragment forests. TF - Existing corridors, mainly just relatively minor maintenance disturbance. New transmission lines are <u>damaging or destroying habitat in some areas.</u>	
Livestock Farming & Ranching	1. Impaired regeneration of vegetation (MF) 2. Soil compaction & erosion (MF) 3. Invasive species (MF) 4. Reduced water quality (nutrient loading, sediment deposition) (MF, IW) 5. Habitat destruction (trampling, over-grazing) (MF, IW)	L	L	L	L	L	L	L		UF - One site (east of Hwy 40) has had recent grazing in woodlot.	
Oil & Gas Drilling		L	L	L	L	L	L	L		Potential for future “fracking”. CW - Seismic testing was done in the 1980s; no recent activity. Unknown potential.	
Gathering Terrestrial Plants	1. Cumulative impact of losing individuals, seed sources, genes, food sources (MF, PS). 2. Damage to vegetation (trampling) (PS). 3. Habitat loss. (MF, IW)	L	L	L	L	L		L		PS - *As prairie sites become known to public, potential for collection (mainly of seed) increases. TF - Some collecting; no serious impacts noted.	
Industrial & Military Effluents	1. Reduced resilience of species; more prone to disease. (TF) 2. Contaminants, toxins from industrial waste water (AG)		L			L	L	L	L?	CW - Some residual effluent from St. Clair River (potential for major spill). SR - Chemicals may be accumulating in reptiles.	

Threat	Associated Stress(es) Key: VERY HIGH ; high ; medium; low Stress applies to all conservation targets unless otherwise indicated (with acronym)	1. Upland Forests (UF)	2. Moist Forests & Swamps (MF)	3. Prairie & Savannahs (PS)	4. Thickets, Hedgerows, Shelterbelts, Fencerows & Abandoned Fields (TF)	5. Rivers, Streams, Drains and associated riparian vegetation (RS)	6. Inland Marshes, Ponds, Impoundments and Constructed Wetlands (IW)	7. Non-impounded Coastal Wetlands (CW)	8. SAR Reptiles (SR)	Overall	Notes
Fishing & Harvesting Aquatic Resources						L	L	L	L		RS - Bait fish (including crayfish) harvesting has occurred; current status unknown. CW - Entirely sport-fishing. Only significant issue is pre-season bass fishing.
Railroads	1. Habitat damage (by off-road vehicles)	L		*	L						TF – Result in more habitat. PS - Restoration options, especially along abandoned and active rail lines (e.g., Prairie Siding east towards Chatham).
Wood & Pulp Plantations		L						L			TF - Could actually create thickets by converting cropped land to growing willow or other shrubs for biofuel. CW - Miscanthus (biofuel) is a potential threat. “Empress Splendour” also.
Mining & Quarrying					*						IW- Potential for wetland rehabilitation projects
Introduced Genetic Material											White/Red Mulberry hybridization. Garden cultivars.

Very High	The threat is likely to <i>destroy or eliminate</i> the biodiversity target.
High	The threat is likely to <i>seriously degrade</i> the biodiversity target.
Medium	The threat is likely to <i>moderately degrade</i> the biodiversity target.
Low	The threat is likely to <i>only slightly impair</i> the biodiversity target.

3. Conservation Objectives and Strategies

i. Conservation Objectives

Table 1.10 Conservation objectives for the Lake St. Clair Coastal CAP.

Objectives	Threats Addressed	Targets Addressed
1. Establish outreach program to communicate the reasons for the Conservation Action Plan, its goals and objectives, and get input from stakeholders and landowners on best approaches.	All	All
2. Support the development of natural heritage systems planning in Chatham-Kent.	All	All
3. 10 ha of connected prairie habitat (>10m wide) restored adjacent to existing wetlands / drains within next 5 years (0.5 ha in first year).	Habitat loss and fragmentation (cash crops, housing development, succession), invasive species, fire suppression	PS, RS, SR
4. One accessible and visible demonstration site of restored prairie habitat (1 ha minimum) initiated around public utility project site by 2015.	Habitat loss and fragmentation (cash crops, housing development, succession), invasive species, fire suppression	PS, SR
5. One demonstration site of prairie habitat (1 ha minimum) created or restored at a pioneer cemetery (e.g., Hansor, Owen, St. Philippe) by 2015.	Habitat loss and fragmentation (cash crops, housing development, succession), invasive species, fire suppression	PS, SR
6. Two 8 ha blocks of prairie restored by 2023.	Habitat loss and fragmentation (cash crops, housing development, succession), invasive species, fire suppression	PS, SR
7. Promote ecologically appropriate integrated vegetation management of drains by 2018.	Habitat loss, fragmentation and degradation (drain maintenance, crops to edge of watercourse), excess flooding	RS, IW, CW, SR, AG

Objectives	Threats Addressed	Targets Addressed
8. Include sediment basins and two-stage ditches in all new engineers' reports and in at least two drain maintenance bottom-clean up projects annually.	Habitat degradation (drain maintenance, erosion from agricultural fields, excess flooding)	RS, CW, SR, AG
9. Reptile-friendly vegetation mats used in all future drain maintenance projects and road/bridge upgrades.	Reptile mortality	RS, SR
10. Turtle-friendlier drain maintenance practices being applied CAP-wide by 2015.	Reptile mortality	RS, SR
11. Buffers of native vegetation of >1 m width on each side established along 50 km of watercourses by 2020, and included in all new engineers reports.	Habitat loss, fragmentation and degradation (crops to edge of watercourse), agricultural effluents, excess flooding	RS, CW, SR, AG
12. Phragmites control projects expanded to additional coastal wetland sites at identified wetlands, natural watercourses and drains (and other wetlands) with significant species along Lake St. Clair covering [appropriate quantitative target t.b.d.] ha by 2020.	Habitat loss and degradation, invasive species	CW, SR
13. Two new, interested landowners per year engaged in (native-, multi-species, shrub dominated) hedgerow establishment projects by 2018.	Habitat loss and fragmentation (cash crops, wind turbine development), soil erosion, invasive species, excess wind burn	TF, SR, AG
14. Five interested landowners engaged in strategic forest buffer enhancement by 2018.	Habitat loss and fragmentation (cash crops, housing development), invasive species, excess sunlight, heating, wind burn, edge effects, etc.	UF, MF, SR
15. Retain existing forest cover.	Habitat loss and fragmentation (cash crops, housing development, logging), excess sunlight, heating, wind burn, edge effects, invasive species, etc.	UF, MF, RA

ii. Strategic Actions and Action Steps

Table 1.11 Strategic actions and action steps for the Lake St. Clair Coastal CAP.

Objective	Strategic Actions	Timeline	Threats Addressed	Targets Addressed / Recovery Strategy links	Potential Leads (Collaborators)	Costs / Funding Sources
1. Establish outreach program to communicate the reasons for the Conservation Action Plan, its goals and objectives, and get input from stakeholders and landowners on best approaches.	<ol style="list-style-type: none"> 1. Annual community workshop and bus tour to learn about natural features, land uses, ecological impacts and habitat stewardship demonstration sites. 2. Annual report/newsletter on CAP projects available to community. 3. Prepare and make best stewardship practices materials available to landowners via web site and publications. 4. Approach steering committee member groups to support project(s) <ol style="list-style-type: none"> a. Review all potential funding sources. b. Develop funding proposals in partnership with steering committee and implementation partners in order to support 1, 2, & 3. 	2013 and beyond	All	All	Chatham-Kent, SCRCA, LTVCA, Farm organisations, CCC, Ontario NativeScape	
2. Support the development of natural heritage systems planning in Chatham-Kent.	<ol style="list-style-type: none"> 1. Update natural heritage inventory / features (Schedule C) of Official Plan by 2014. <ol style="list-style-type: none"> a. explore opportunities to identify priority corridors and linkages by 2015. 	2014-2015	All	All	C-K	
3. 10 ha of contiguous prairie habitat (>10m wide) restored adjacent to existing wetlands / drains within next 5 years (0.5 ha in first year). ²	<ol style="list-style-type: none"> 1. Restore 1 km of prairie along Hwy 40 (2-3 km south of Wallaceburg) for ~1km (east and/or west side). <ol style="list-style-type: none"> a. Approach MTO roads management to discuss collaboration. 2. Restore prairie between Griffore Prairie and Little Bear Creek drain (Arda dyke). <ol style="list-style-type: none"> a. Approach landowners (3 private) to discuss level of interest and feasibility. 	2018	Habitat loss and fragmentation (cash crops, housing development, succession), invasive species, fire suppression	PS, RS, SR	LTVCA, Ontario NativeScape (MTO, OMAF, Stewardship Kent, SFN, DU)	OPG, MNR SARSF, HSP, OMAFRA / COA

² Each site will require a management plan (e.g. invasive species management, burning program, monitoring, etc.). Prairie restoration should occur away from shrub and tree communities to minimize predation on grassland birds.

Objective	Strategic Actions	Timeline	Threats Addressed	Targets Addressed / Recovery Strategy links	Potential Leads (Collaborators)	Costs / Funding Sources
4. One accessible and visible demonstration site of restored prairie habitat (1 ha minimum) initiated around public utility project site by 2015.	<ol style="list-style-type: none"> 1. Recruit Landowner Leaders through CCC's programs to initiate projects on their lands. 2. Use projects as demonstration sites. 	2015	Habitat loss and fragmentation (cash crops, housing development, succession), invasive species, fire suppression	PS, SR	LTVCA (wind turbine companies, Stewardship Kent, SFN, DU) Union Gas?	OPG, MNR SARSF, HSP, Wind turbine companies
5. One demonstration site of prairie habitat (1 ha minimum) created or restored at a pioneer cemetery (e.g., Hansor, Owen, St. Philippe) by 2015.	<ol style="list-style-type: none"> 1. Implement prairie restoration project at a C-K municipal cemetery or Pioneer cemetery within CAP. <ol style="list-style-type: none"> a. Identify suitable sites for prairie creation or restoration. b. Develop restoration plan and secure funding for project. c. Include signage and other communication tools as educational component for the project. 	2015	Habitat loss and fragmentation (cash crops, housing development, succession), invasive species, fire suppression	PS, SR	C-K (United Church of Canada)	
6. Two 8 ha blocks of prairie created or restored by 2023.	<ol style="list-style-type: none"> 1. Identify opportunities for prairie restoration projects on municipal and private lands. <ol style="list-style-type: none"> a. Approach partners such as the Greening Strategy, Ducks Unlimited, and Ontario Power Generation to secure resources for restoration projects. b. Recruit local landowners through CCC's Landowner Leaders program for prairie restoration project. c. Include signage, demonstration sites and other communication tools as educational component for the restoration project. 	2023	Habitat loss and fragmentation (cash crops, housing development, succession), invasive species, fire suppression	PS, SR	C-K, CSLT, SFN, Ontario NativeScape, Stewardship Kent	

Objective	Strategic Actions	Timeline	Threats Addressed	Targets Addressed / Recovery Strategy links	Potential Leads (Collaborators)	Costs / Funding Sources
7. Promote ecologically appropriate integrated vegetation management of drains by 2018.	<ol style="list-style-type: none"> 1. Provide outreach to responsible municipal staff regarding issue by 2015. <ol style="list-style-type: none"> a. Review, re-emphasize and, if necessary, prepare BMPs on riparian vegetation management. b. Hold workshop(s). 2. Establish public/landowner outreach and education campaign by 2015. 3. Clarify responsibilities and communicate with responsible agencies re: monitoring and enforcement of violations (by 2015). 	2018	Habitat loss, fragmentation and degradation (drain maintenance, crops to edge of watercourse), excess flooding	RS, IW, CW, SR, AG	C-K, CCC, Environmental Farm Plan (OMAF, SCRCA, LTVCA)	
8. Include sediment basins and two-stage ditches in all new engineers' reports and in at least two drain maintenance bottom-clean up projects annually.	<ol style="list-style-type: none"> 1. Investigate the impact of municipal drain maintenance on fish and fish habitat in a municipal drain. Use report as guide for BMPs in maintenance of municipal drains. 2. Share information through presentations at annual meetings of drainage superintendents and through a BMP "newsletter" annually to drainage superintendents. 3. Conservation authorities make appropriate recommendations during report review. 4. Work with municipality to include recommendations in final drain reports. 5. Provide educational materials about cost savings and benefits of two-stage ditches to target landowners 6. Secure funding to initiate projects. 	2013 and beyond	Habitat degradation (drain maintenance, erosion from agricultural fields, excess flooding)	RS, SR	C-K, SCRCA, LTVCA, DFO, CCC, Environmental Farm Plan	
9. Reptile-friendly vegetation mats used in all future drain maintenance projects and road/bridge upgrades.	<ol style="list-style-type: none"> 1. Compile best management practices (BMPs) for reptile-friendly drain maintenance and road/bridge projects by 2014. 2. C-K roads department and drainage superintendent approached with information materials by 2014. 	2013 and beyond	Reptile mortality	RS, SR	C-K, SCRCA	OMNR SARFS

Objective	Strategic Actions	Timeline	Threats Addressed	Targets Addressed / Recovery Strategy links	Potential Leads (Collaborators)	Costs / Funding Sources
10. Turtle-friendlier drain maintenance practices being applied CAP-wide by 2015.	<ol style="list-style-type: none"> 1. Compile best management practices (BMPs) for reptile-friendly drain maintenance practices. 2. Provide BMP “newsletter” annually to drainage superintendents. 3. Present at annual meetings of drainage superintendents. 4. Conservation authorities make informal appropriate recommendations during drain maintenance approvals process. 	2015	Reptile mortality	RS, SR	OMNR, SCRCA, CCC	
11. Buffers of native vegetation of >1 m width on each side established along 50 km of watercourses by 2020, and included in all new engineers reports.	<ol style="list-style-type: none"> 1. Profile progressive practices and disseminate to high priority target audiences. 2. Advocate for strengthening of provincial guidelines (BMPs) to facilitate this objective. <ol style="list-style-type: none"> a. Work with OMAF and Chatham-Kent to lead process. b. Hold webinar or series of webinars to inform community on issue. c. New drainage reports include >1m buffer. 3. Advocate for increased support for Environmental Farm Plan program. <ol style="list-style-type: none"> a. Work with OMAF to facilitate process. 4. Hold on-site “best practices” demonstration events hosted by local landowners (one annually, work with local agricultural organizations). <ol style="list-style-type: none"> a. Tie-in to local OSCIA annual meetings. 5. Secure funding with local partners for implementation of plantings. 6. Lobby for implementation of ALUS-type program province-wide. 	2020	Habitat loss, fragmentation and degradation (crops to edge of watercourse), agricultural effluents, excess flooding	RS, CW, SR, AG	OMNR, SCRCA, LTVCA, Ontario NativeScape, Stewardship Kent, CCC	

Objective	Strategic Actions	Timeline	Threats Addressed	Targets Addressed / Recovery Strategy links	Potential Leads (Collaborators)	Costs / Funding Sources
12. Phragmites control projects expanded to additional coastal wetland sites at identified wetlands, natural watercourses and drains (and other wetlands) with significant species along Lake St. Clair covering [appropriate quantitative target t.b.d.] ha by 2020.	<ol style="list-style-type: none"> 1. Lobby federal government to permit use of “safe” herbicides (e.g., Rodeo) to use over water for Phragmites control annually until achieved. 2. Identify highest priority wetland biodiversity hotspots by 2015 and prioritize invasive species control activities to take place at those locations. 3. Implement Phragmites control projects at priority sites starting in 2014 using BMPs and latest techniques. 4. Provide outreach materials re: Phragmites to wetland owners (e.g., whose interests are for waterfowl hunting). 	2015, and ongoing	Habitat loss and degradation, invasive species	CW, SR	OMNR, LTVCA, SCRCA, Ontario NativeScape, CCC (outreach), Ducks Unlimited, private hunting clubs	HSP, OMNR, SANSF, COA,
13. Two new, interested landowners per year engaged in (native-, multi-species, shrub dominated) hedgerow establishment projects by 2018.	<ol style="list-style-type: none"> 1. Identify opportunities for hedgerow planting projects on private lands. <ol style="list-style-type: none"> a. Approach partners such as the Greening Strategy, 50M Trees, St. Clair Conservation Tree Planting Program and Ontario Power Generation to secure resources for planting projects. b. Recruit local landowners for hedgerow planting projects through St. Clair Conservation Tree Planting Program and CCC’s Landowner Leaders program for hedgerow planting projects. c. Include signage, demonstration sites and other communication tools as educational component for the hedgerow planting projects. d. Identify priority sites for projects. 2. Develop programs to educate, bring awareness, and outreach regarding values and advantages of hedgerows. <ol style="list-style-type: none"> a. CCC’s Landowner Leaders program. 3. Investigate possible criteria for zoned buffer along edges of farm properties. <ol style="list-style-type: none"> a. Investigate possible use of geophysical barriers to removal of new buffers. b. Support “ecological goods and services” incentive programs (modeled on ALUS) to engage farmers. 	2018	Habitat loss and fragmentation (cash crops, wind turbine development), soil erosion, invasive species, excess wind burn	TF, SR, AG	SCRCA, LTVCA, C-K Greening Strategy, Ontario NativeScape, Stewardship Kent, CCC,	

Objective	Strategic Actions	Timeline	Threats Addressed	Targets Addressed / Recovery Strategy links	Potential Leads (Collaborators)	Costs / Funding Sources
14. Five interested landowners engaged in strategic forest buffer enhancement by 2018.	<ol style="list-style-type: none"> 1. Identify opportunities for forest buffer planting projects on municipal and private lands. <ol style="list-style-type: none"> a. Approach partners such as the Greening Strategy, 50M Tree Program, Ontario Power Generation to secure resources forest buffer planting projects. b. Recruit local landowners through CCC's Landowner Leaders program for forest buffer planting projects. c. Identify priority sites for forest buffer planting projects based on opportunities based on ecological values. d. Include signage, demonstration sites and other communication tools as educational component for each project. 2. Support "ecological goods and services" incentive programs (modeled on ALUS) 	2018	Habitat loss and fragmentation (cash crops, housing development), invasive species, excess sunlight, heating, wind burn, edge effects, etc.	UF, MF, SR	C-K, Ontario NativeScape, Stewardship Kent, CCC, Trees Ontario	
15. Retain existing forest cover.	<ol style="list-style-type: none"> 1. Support tax relief, carbon credits, municipal policies, legislation, regulations, guidelines and incentives for private landowners that prevent the loss of existing forest cover. <ol style="list-style-type: none"> a. Support conservation by-law that promotes good, sustainable forest management practices. b. Support policy or programs that encourage retention of mature forests and long-term protection of forests (e.g. incentive programs, conservation easements). c. Support effective "ecological goods and services" incentive programs (such as ALUS). d. Support changes in taxation structure (federal and municipal) to reflect ecological services that forest cover provides to society and to reduce economic advantages of clear-cutting woodlots. 2. Promote good forest management practices and the social, economic and ecological values of forests through outreach materials, newsletters, letters to the editor, workshops and events. 	2013 and beyond	Habitat loss and fragmentation (cash crops, housing development, logging), excess sunlight, heating, wind burn, edge effects, invasive species, etc.	UF, MF, RA	C-K, Woodlot Owners Association, CCC, SCRCA, LTVCA, OSCIA?, agricultural organizations	

iii. Evaluation and Monitoring

An important component of the CAP process is monitoring. Are the CAP's strategic actions and action steps being implemented as planned? Are the strategic actions achieving the objectives they were designed to achieve? And are they resulting in the improved viability of the conservation targets and enhanced overall ecosystem health? Are target audiences receiving the appropriate information and educational materials? Is the community actively engaged and supportive of the CAP objectives and strategies? Are public policy changes occurring that support the vision and long term goals of the CAP?

Having answers to questions such as these during the ongoing implementation of the CAP will allow for 'adaptive management' in what is meant to be a flexible, long term program for positive change on the landscape. Objectives, quantitative targets, timelines, strategic actions and other aspects of the CAP may need adjustment based on unforeseen factors that either impede or prevent progress on a specific objective or target, or at least make it unrealistic to achieve that target within a given timeframe. The CAP is therefore a 'living document' that will be reviewed at least annually, and periodically revised as necessary, based on evaluation of monitoring results.

As long as adequate funding is available, Carolinian Canada Coalition (CC) is committed to monitoring the actual implementation of the CAP (i.e., are the strategic actions being undertaken as planned?). The Lake St. Clair Coastal CAP will be included in CC's annual CAP monitoring report, which is normally submitted to the key funders of the CAP program as well as to all local CAP implementation partners. CC is also exploring ways in which landscape-level monitoring can be undertaken on a regular basis in order to document changes and trends in land cover and land use in CAP areas as well as across the entire Carolinian life zone in Canada. Such high-level monitoring using remotely-sensed data will help determine if goals such as extent of forest cover, forest interior, prairie, wetland and natural connectivity are being achieved by the CAP. For finer-scale monitoring, such as would be required at individual sites and to determine how target species populations are faring, the support of CAP partner agencies and groups will be essential.

Table 1.7 includes a column that lists "key ecological attributes" or KEAs for each major conservation target. KEA are critical components of a target's life history, habitat, physical processes, or community interaction that, if degraded or lost would seriously jeopardize the target's integrity. Tracking change in the KEAs will thus be an excellent measure of the success of the CAP's strategic actions. In many cases, relatively straightforward, efficient, low-cost measures were identified by the CAP science team for each conservation target, and are included in the KEA column in Table 1.7. Wherever appropriate and feasible, CAP implementation partners should consider monitoring KEA in their project work plans. CC will strive to assist partners in developing methods to undertake such monitoring.

A comprehensive array of excellent conservation planning resource materials, including guidance on CAP monitoring methods, are also available on-line at The Nature Conservancy (U.S.) web site (www.conserveonline.org).

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Appendix A

Lake St. Clair Coastal CAP Mapping Methodology

Scope

The project area is a portion of the Municipality of Chatham-Kent centered around the eastern shoreline of Lake St. Clair. A 10km buffer was used in order to avoid exclusion of natural features falling just outside of the county, such as. Any individual land use polygon with a centroid falling within the CAP area or its 10km buffer was included in the mapping analysis. Using this approach, entire polygons were either included or excluded; none were divided.

Data Layers

The data layer SOLRIS v1.2 was the primary component used to create the CAP Mapping. The Southern Ontario Land Resource Information System, or SOLRIS, was developed by the Ontario Ministry on Natural Resources (see document entitled Southern Ontario Land Resource Information System (SOLRIS) - Phase 2 - Data Specifications, Version 1.2, April, 2008) for details about this data layer.

Goal of Map

The goal of the Priorities for Conservation and Restoration map is to provide a tool to guide restoration, stewardship and land securement in Chatham-Kent.

Identification of Core Habitats

Areas of natural cover shown on the maps have been placed into one of the following categories: Priority 1 Core, Priority 2 Core, Priority 3 Core, or Supporting Natural Cover. The category indicates that area's ecological importance as part of the Chatham-Kent. Areas categorized as Priority 1 Core are greater than 1500 hectares in size and represent the largest and most intact areas of natural cover in Chatham-Kent. Areas categorized as Priority 2 Core are between 501 and 1500 hectares in size. Areas categorized as Priority 3 Core are between 200 and 500 hectares and, although smaller than Priority 1 and 2 Cores, nonetheless are an important part of the system, especially when they are located in areas without much overall natural cover. Areas categorized as Supporting Natural Cover are important as stepping stones between core areas.

The categorization of areas of natural cover was based on the overall size of each area. The assessment ignored all fragmenting features with a width of 25 metres or less (e.g., minor roads, trails, power lines). In other words, two or more areas of natural cover separated by a road 25 metres or less in width were considered to be one area. Also, adjacent areas of natural cover (e.g., an area of forest adjacent to an area of marsh) were treated as one area. The criteria are shown in Table A1.

Table A1: Criteria for Identification of Core Habitats

Category	Size (ha)	Fragmenting features
Priority 1	Core >1500	<25m

Priority 2	Core 501 - 1500	<25m
Priority 3	Core 200 - 500	<25m
Supporting Nature Cover	< 200	<25m

Identification of Natural Heritage Features

The map indicates the locations of evaluated wetlands (PSW and non-PSW), Areas of Natural and Scientific Interest (Life Science and Earth Science ANSIs) and freshwater streams.

Footnotes and References

1. We used the definition of a wetland complex from the Ontario Wetland Evaluation System Manual (May 1994 revised).
2. Evaluation by The Nature Conservancy of stopover sites for migratory birds in the western Lake Erie basin ranked undeveloped cover within 1.6km of the Lake Erie shoreline as high or very high for landbirds and raptors (Ewert, *et al.* 2006).
3. We used the size and water protection criteria from the Natural Heritage Reference Manual for Natural Heritage Policies of the Provincial Policy Statement, 2005 – second edition (March 2010).

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Appendix B:

Natural Heritage Designations – Lake St. Clair Coastal CAP

Area Name	Area Type
LAKE ST. CLAIR MARSHES	Carolinian Canada Site
LIGHTHOUSE CONSERVATION AREA	Conservation Authority Area
LAKE ST. CLAIR MARSHES	Life Science ANSI
CHENAL ECARTE PRAIRIE	Life Science ANSI
LAKE ST. CLAIR MARSHES	Life Science Site
ST. CLAIR MARSHES	Life Science Site
CHENAL - ECARTE PRAIRIE AND WOODS	Life Science Site
DEYO'S WOODS	Life Science Site
WALLACEBURG WOODS	Life Science Site
ST. CLAIR RIVER DELTA	Macrosite
ST. CLAIR NATIONAL WILDLIFE AREA	National Wildlife Area
ST. CLAIR	Ramsar Site
BRADLEY FARMS MARSHES	Unofficial Wetland
REAUME'S MARSH	Unofficial Wetland
RECESS CLUB MARSH	Unofficial Wetland
BALMORAL CLUB MARSH	Unofficial Wetland
BIG POINT CLUB MARSH	Unofficial Wetland
ST. CLAIR NATIONAL WILDLIFE AREA- WETLAND	Unofficial Wetland
ST. LUKE'S CLUB MARSH I	Unofficial Wetland
ST. LUKE'S CLUB MARSH II	Unofficial Wetland
BAY LODGE CLUB MARSH	Unofficial Wetland
BEAR CREEK CLUB MARSH	Unofficial Wetland
GRIFFORE'S MARSH	Unofficial Wetland
MALLARD POND MARSH	Unofficial Wetland
MOON ISLAND MARSH	Unofficial Wetland
MUD CREEK CLUB MARSH	Unofficial Wetland
PIGEON MARSH	Unofficial Wetland
PINTAIL MARSH	Unofficial Wetland
RANKIN/ SLOAN MARSH	Unofficial Wetland
REX CLUB MARSH	Unofficial Wetland
REX-CADOTTE MARSH	Unofficial Wetland
JEANETTES CREEK MARSH	Wetland

Area Name	Area Type
MARTINDALE MARSH	Wetland
THAMES RIVER MOUTH - WETLAND	Wetland
ST. CLAIR MARSHES- WETLAND	Wetland
SNYE RIVER MARSHES	Wetland
CHENAL ECARTE MARSHES	Wetland
CHICKEN ISLAND- WETLAND	Wetland
BRAY'S SWAMP	Wetland

*ANSI = Area of Natural and Scientific Interest, PS = Provincially Significant

Appendix C

Species-specific Threats to Lake St. Clair Coastal CAP species at risk

O=Ontario-wide threats, OC=Ontario-wide threats also documented in Chatham-Kent.

ELEMENT	Associated Conservation Target(s) (see Table 1.7 for key to codes)	Habitat Fragmentation	Habitat Loss	Degradation of Habitat	Incompatible Forest Management	Changes to natural succession	Disease	Changes to Hydrology	Disturbance (Recreation, Construction or Maintenance)	Accidental Mortality	Discriminate Killing, Collection, Harvesting	Pollution	Road Mortality	Excessive Predation, Parasitism or Herbivory	Competition with Introduced Species	Hybridization with Introduced Species	Comments
American Badger	3. PS; 4. TF; 5. AG	O C	O C				O			O C?	O C?		O C	O C?			Limited by low population density and large home ranges, low reproductive capacity, presence of deep sandy soils suitable for dens; reduced prey availability; predation by coyotes and domestic dogs; incidental trapping; canine distemper and tularemia
Bald Eagle (STATUS REPORT NOT AVAILABLE)	1. UF; 2. MF; 5. RS; 6. IW; 7. CW		O C				O? C?		O C		O C	O C					Limited by availability of nest sites (large tall trees) and naturally low reproductive output; Pollution (mercury, lead, pesticides); disturbance during nesting; disease (botulism?)
Black Tern (No reports available)	6. IW; 7. CW		O	O				O		O	O						Main threats include wetland drainage and alteration, water pollution, human disturbance at nesting colonies (particularly boat traffic which can swamp floating nests)* from ROM SAR website
Blanding's Turtle	5. RS; 6. IW; 7. CW;	O C	O C	O C			O? C?				O C	O C	O C	O C			Limited by naturally low recruitment, low dispersal, long generation time; road mortality (female-biased); availability of nesting habitat; unusually high levels of predation (esp. nests); fragmentation and isolation of populations (roads/urbanization)?; sarcophagid fly infestation of nests?

ELEMENT	Associated Conservation Target(s) (see Table 1.7 for key to codes)	Habitat Fragmentation	Habitat Loss	Degradation of Habitat	Incompatible Forest Management	Changes to natural succession	Disease	Changes to Hydrology	Disturbance (Recreation, Construction or Maintenance)	Accidental Mortality	Pollution	Road Mortality	Excessive Predation, Parasitism or Herbivory	Competition with Introduced Species	Hybridization with Introduced Species	Comments
Climbing Prairie Rose	3. PS; 4. TF		O	O		O			O					O		Main threats include urban development, incompatible site management, succession, competition with non-native shrubs.
Common Five-Lined Skink	1. UF; 3. PS	O C	O C	O C		O C?			O C			O C	O C?			Limited by availability of sandy substrates used for overwintering; vegetation succession (suppression of fire/other disturbances?); subsidized predators
Dense Blazing-star	3. PS; 6. IW		O C			O C		O C	O		O C		O C?	O C	O C?	Limited by climate and lack of disturbance (e.g. fire); over-grazing; hybridization and genetic erosion (cultivated varieties available at garden centres); herbicide application; mowing
Eastern Foxsnake	2. MF; 3. PS; 4. TF; 7. CW	O C	O C	O C					O C	O	O C	O C	O C			Limited by fidelity to hibernacula, communal use of hibernacula, number of suitable hibernacula available; alteration of distribution of wetland/forest/field mosaics; roads and other barriers; disturbance of hibernacula or nests; accidental mortality from human activities; loss of suitable microhabitats (shedding sites) and replacement with less suitable anthropogenic features; limited availability of natural oviposition sites (reliance on compost piles leads to mortality)
Eastern Musk Turtle (Stinkpot)	5. RS; 6. IW; 7. CW		O C					O		O C	O C					Egg and hatchling survival vulnerable to weather extremes and flooding; shoreline development and wetland drainage; accidental mortality (angling activities, boats); killing by anglers when caught

ELEMENT	Associated Conservation Target(s) (see Table 1.7 for key to codes)	Habitat Fragmentation	Habitat Loss	Degradation of Habitat	Incompatible Forest Management	Changes to natural succession	Disease	Changes to Hydrology	Disturbance (Recreation, Construction or Maintenance)	Accidental Mortality	Pollution	Road Mortality	Excessive Predation, Parasitism or Herbivory	Competition with Introduced Species	Hybridization with Introduced Species	Comments
Eastern Prairie Fringed-orchid	3. PS	O	O	O C		O		O	O	O	O		O	O C	O*	Main threats include habitat loss, fragmentation and degradation due to agricultural intensification, housing development, road development, changes in drainage patterns and invasive species; disturbance from recreational activities (ATV, trampling); natural succession, excessive herbivory; pollution from agricultural runoff; *hybridization with native orchids (low). Limited by narrow habitat preferences, availability of pollinators (hawkmoths), long age to reproduction (3-7 years) and periods of dormancy with no reproduction, sensitivity to droughts.
Eastern Prickly Pear Cactus	Shoreline dunes and sand barrens, prairies and savannahs		O			O							O			<i>The only known native occurrences in Ontario are in Essex County (Point Pelee National Park and Pelee Island). One planted population in Chatham-Kent, not native. Main threats to native populations include vegetation succession, alteration of natural disturbance regimes, collection.</i>
Eastern Sand Darter	5. RS; 6. IW; 7. CW			O				O		O	O			O		Limited by strong preference for sandy substrates (not silt or cobble); increased siltation; impoundments; stream channel and flow modifications; excessive nutrient enrichment and turbidity; round goby; incidental harvest in commercial bait fisheries; aquatic insecticides (reduce prey abundance)

ELEMENT	Associated Conservation Target(s) (see Table 1.7 for key to codes)	Habitat Fragmentation	Habitat Loss	Degradation of Habitat	Incompatible Forest Management	Changes to natural succession	Disease	Changes to Hydrology	Disturbance (Recreation, Construction or Maintenance)	Accidental Mortality	Discriminate Killing, Collection, Harvesting	Pollution	Road Mortality	Excessive Predation, Parasitism or Herbivory	Competition with Introduced Species	Hybridization with Introduced Species	Comments
Henslow's Sparrow	3. PS; 4. TF; 3. RS (low-lying seasonally flooded areas); 4. AG	O C	O C	O C		O			O C	O				O C			Area-sensitive species (min 50ha; prefer >100ha); changes in agricultural practices (continuous use of fields without fallow years; earlier and more frequent hay cutting); over grazing or mowing; fire suppression and vegetation succession; habitat disturbance early in breeding season; nest and fledgling mortality from mowing during breeding season (late in summer may be acceptable); susceptible to catastrophic disturbance due to small population size, clumped distribution, and semi-colonial breeding behaviour; subsidized predator populations; Brown-headed Cowbird nest parasitism (low threat); competition for breeding habitat (other sparrows, Bobolink, Red-winged Blackbird)
Kentucky Coffee-tree	2. MF; 5. RS; 3. TF	O	O	O	O			O		O				O		O	Limited by climate, lack of suitable habitat, low genetic diversity (only 2 sites in Canada produce seed, most sites are single-sex clones); livestock grazing; Double Crested Cormorant colonies; introgression of non-native cultivars; dams and water flow regulation (may affect seed dispersal); roadside maintenance activities
Kidneyshell	5. RS; 7. CW		O C	O C				O C				O C			O C		Main threats include non-native dreissenid mussels, siltation, water quality (nutrients and contaminants), water quantity, decline of host fish?, urbanization?, impoundments?, predation?. Limited by complex reproductive cycle and limited dispersal.
King Rail	7. CW		O	O				O		O	O?	O?	O				Main threats include wetland loss and degradation, changes in water levels, invasive species degrading habitat, collisions with artificial structures, toxic pollutants?, decreasing crayfish populations?, West Nile virus?, incidental trapping? and targeted hunting?

ELEMENT	Associated Conservation Target(s) (see Table 1.7 for key to codes)	Habitat Fragmentation	Habitat Loss	Degradation of Habitat	Incompatible Forest Management	Changes to natural succession	Disease	Changes to Hydrology	Disturbance (Recreation, Construction or Maintenance)	Accidental Mortality	Discriminate Killing, Collection, Harvesting	Pollution	Road Mortality	Excessive Predation, Parasitism or Herbivory	Competition with Introduced Species	Hybridization with Introduced Species	Comments
Least Bittern	6. IW; 7. CW	O	O	O		O	O	O	O	O		O	O	O			Draining/filling of wetlands; Biomagnifications of agricultural and industrial chemicals (eggshell thinning); invasive species replace cattails (used as nesting material); succession to drier habitat; natural succession from wetland to upland; disease, parasites (semi-colonial); vehicular collisions; wake from boats floods nests, degrades foraging habitat
Northern Map Turtle	7. CW		O C					O C	O C	O C	O C	O C					Development, shoreline hardening; dams, control of water levels (submerge nest sites, alter habitat); Heavy metals and other toxins
Pugnose Shiner	5. RS; 6. IW; 7. CW	O C	O C	O C						O C		O C					Main threats include habitat modification, aquatic vegetation removal, sediment loading/turbidity, nutrient loading, exotic species degrading habitat, baitfish industry, changes in trophic dynamics, climate change. Limited by habitat specificity to quiet wetlands with clear water and dense vegetation.
Queensnake	5. RS		O	O					O	O	O	O?			O		Main threats include habitat loss, fragmentation and degradation (including invasive species), persecution, disturbance by humans (recreational activities), water pollution? (may also affect prey), invasive species. Limited by prey specialization (crayfish), narrow habitat preference (shorelines), viviparity, limited dispersal, isolation between populations, availability of overwintering features.

ELEMENT	Associated Conservation Target(s) (see Table 1.7 for key to codes)	Habitat Fragmentation	Habitat Loss	Degradation of Habitat	Incompatible Forest Management	Changes to natural succession	Disease	Changes to Hydrology	Disturbance (Recreation, Construction or Maintenance)	Accidental Mortality	Discriminate Killing, Collection, Harvesting	Pollution	Road Mortality	Excessive Predation, Parasitism or Herbivory	Competition with Introduced Species	Hybridization with Introduced Species	Comments
Riddell's Goldenrod	1. PS; 2. RS; 3. TF (Wet prairie-like sites and roadside ditches)		O						O	O							Roadside and ditch maintenance; small, isolated populations (susceptible to habitat disturbance)
Round Hickorynut	5. RS; 7. CW		O C	O C				O C				O C			O C		Main threats include non-native dreissenid mussels, siltation, water quality (nutrients and contaminants), water quantity, decline of host fish?, urbanization?, impoundments?, predation?. Limited by complex reproductive cycle and limited dispersal.
Round Pigtoe	5. RS		O	O C								O			O C		Main threats include siltation, nutrient loads, contaminants, increased water temperatures, exotic species especially dreissenid mussels. Limited by low dispersal ability.
Silver Chub	5. RS; 7. CW			O C													Low dissolved oxygen levels; water temperature fluctuations; Eutrophication?
Spiny Softshell	5. RS; 7. CW	O C	O C	O C			O C	O C?	O C	O C	O C	O C		O C			Limited by prey specialization (crayfish and molluscs); main threat is habitat degradation (alteration of nest sites by/for human recreation, shoreline hardening, disturbance from construction projects; disturbance during nesting; fragmentation by dams; decline in crayfish and mollusc (mussel?) populations; subsidized predators; sarcophagid fly infestation of nests; environment contamination; high numbers of infertile eggs at some Ontario sites; accidental mortality (angling and hunting activities, collisions with watercraft); egg poaching

ELEMENT	Associated Conservation Target(s) (see Table 1.7 for key to codes)	Habitat Fragmentation	Habitat Loss	Degradation of Habitat	Incompatible Forest Management	Changes to natural succession	Disease	Changes to Hydrology	Disturbance (Recreation, Construction or Maintenance)	Accidental Mortality	Pollution	Road Mortality	Excessive Predation, Parasitism or Herbivory	Competition with Introduced Species	Hybridization with Introduced Species	Comments
Spotted Gar	7. CW	O		O C						O	O C			O?	O?	Main threats include habitat modification, aquatic vegetation removal, sediment loadings, nutrient loadings, exotic species degrading habitat, climate change, barriers to movement, incidental harvest, competition and hybridization with exotic species?. Limited by cool water temperatures, availability of habitat, habitat fragmentation.
Spotted Sucker	5. RS; 6. IW; 7. CW	O	O	O						O	O			O		Main threats include habitat loss and degradation (turbidity, siltation), nutrient loading, exotic species, altered coastal processes, barriers to movement, toxic compounds, climate change, incidental harvest. Limited by cool temperatures?
Spotted Turtle	7. CW		O C	O C		O C						O C	O C			Limited by slow growth rates, delayed maturity, naturally low nest and juvenile survivorship, relatively small clutch sizes; Hibernate communally (susceptible to collection and mortality of large # of individuals); natural succession; Phragmites; overgrazing by livestock
Swamp Rose Mallow	4. TF; 5. RS; 6. IW; 7. CW		O C					O C	O C					O C		Drainage and development of wetlands; roadside and utility corridor maintenance; invasive species (<i>Phragmites</i> , Black Alder), strangling by grapevines