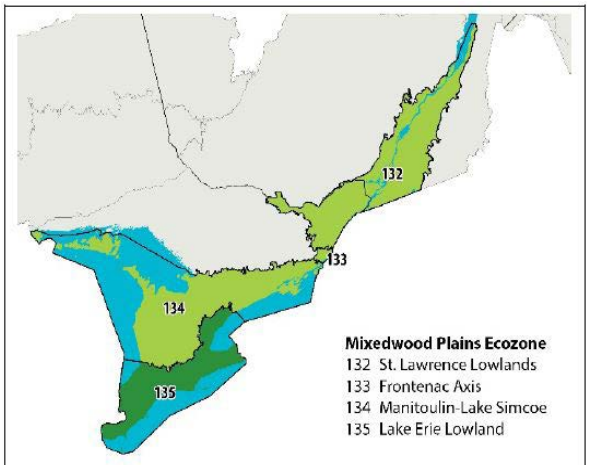
NATURE CONSERVANCY CANADA

LAKE ERIE LOWLAND (#135)

The Lake Erie Lowland ecoregion is the southernmost ecoregion in Canada, with its southern limits at the same latitude as northern California. It is highly influenced by the moderating effect of the lower Great Lakes. The landscape is generally flat, with the exception of the Niagara Escarpment. It includes two major rivers and many smaller rivers and streams. Over 130 species at risk have been documented here, including many that reach their northern range limits in Canada. This ecoregion is within one of Canada's urban and agricultural heartlands. Only 14% of this ecoregion remains in natural cover, and only 1% is within conserved/protected areas.

LOCATION

The Lake Erie Lowland ecoregion extends from east of Toronto on Lake Ontario, west through London to the coast of Lake Huron north of Grand Bend. This ecoregion is part of a larger ecoregion south of Lake Erie. This zone is often called the Great Lakes Forest ecoregion in the U.S. and includes most of Ohio, Indiana, southern Michigan, the northern edge of Pennsylvania and western New York.



Terrestrial & Inland Water Area	41,174 km^2 (0.4% of Canada)*
Provinces	ON
Biodiversity Ranking[1]	HIGHEST (5/5)
Threat Ranking	HIGHEST (5/5)
Conserved/Protected Area Ranking	LOWER (1/5)

CLIMATE/GEOLOGY

The climate of this ecoregion is highly influenced by the Great Lakes. It is marked by humid, hot summers and mild, snowy winters. The mean annual temperature is approximately 8^{0}C. The mean summer temperature is 18^{0}C and the mean winter temperature is -2.5^{0}C. Mean annual precipitation ranges from 750 to 900 millimetres.

The Lake Erie Lowland is generally flat or gently rolling. The most prominent landform features are the Niagara Escarpment, with limestone cliffs rising up to over 100 metres from the surrounding landscape (and viewed most dramatically at Niagara Falls), and three large sand spits along the Lake Erie coast (Long Point, Rondeau and Point Pelee). The ecoregion also has a few areas of sandy soils and exposed limestone bedrock outcrops and includes the archipelago of islands in Lake Erie.


Photo by Simon Wilson

VEGETATION

Forests of the Lake Erie Lowland are generally characterized by sugar maple (Acer saccharum), American beech (*Fagus grandifolia*), white oak (*Quercus alba*), (northern) red oak (*Quercus rubra*), shagbark and bitternut hickory (*Carya ovata* and *C. cordiformis*) and white ash (*Fraxinus americana*). Forested swamps are often dominated by silver maple (*Acer saccharinum*) and red ash (*Fraxinus pennsylvanica*). This ecoregion is sometimes referred to as Carolinian Canada because some of the agricultural crops that can be grown here and the vegetation have some similarities to the Carolinas. "Carolinian" trees that reach their northern range limit here include tuliptree (*Liriodendron tulipifera*), blackgum (*Nyssa sylvatica*), sassafras (*Sassafras albidum*) and sycamore (*Platanus occidentalis*). This ecoregion also includes lakeplain prairies, oak savannahs, sand dunes and large coastal marshes.

Historically, most of the forests were old-growth, and disturbances were limited to gaps from large trees falling, tornados, ice storms and by large flocks of passenger pigeons (*Ectopistes migratorius*; now extinct). Fire and flooding were important ecological processes in many vegetation communities. Indigenous Peoples played a role in maintaining some vegetation types, including creating forest openings for agriculture and maintaining open canopies in oak savannahs through fire.

[1] Ranking categories for biodiversity threat and conserved/protected area are relative to other ecoregions in the southern Canada study area (5=highest, 4=higher, 3=high, 2=low, 1=lower, 0=lowest). The lowest score for conserved/protected area is 1. For biodiversity and threat, the highest category based on measures and criteria approach is used.

* Including the waters of the Great Lakes.

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FRESH WATER AND COASTS

The ecoregion is within the Great Lakes drainage (Atlantic Ocean basin), including the entire Canadian portion of the Lake Erie basin, and sections of the Lake Ontario and Lake Huron drainage. Major rivers include the Grand and Thames, and the three major rivers that connect the southern Great Lakes: St. Clair, Detroit and Niagara (Figure 1).

Other than the Great Lakes, there are few lakes in this ecoregion. Wetlands, primarily treed swamps, occur across the ecoregion. Large coastal wetlands occur at the three Lake Erie sand spits, Cootes Paradise in Hamilton Harbour and at the St. Clair delta. This is the only delta system in the Great Lakes and one of the largest freshwater deltas in the world. Wetlands and water (not including the Great Lakes) cover approximately 2.3% of the ecoregion.

This ecoregion includes approximately 2,900 kilometres of Great Lakes coast. Common coastal habitats in the ecoregion include bluffs, sand beaches and dunes, and cobble beaches.


Photo by John E. Marriott

AT-RISK VEGETATION COMMUNITIES

This ecoregion harbours many vegetation communities that are at risk globally. This includes both communities that naturally had restricted ranges (such as dunes) and communities that were once more widespread but are now limited to a few occurrences as a result of habitat loss (e.g. prairies and savannahs). Examples of globally at-risk vegetation communities that can be found in the ecoregion include:

- pin oak - swamp white oak - blackgum - red maple sand wet flatwoods forest
- little bluestem - poverty oatgrass - Pennsylvania sedge - (bird's-foot violet) sand grassland
- eastern cottonwood - (eastern red cedar) dune woodland
- chinquapin oak/nodding onion - flat-stem spikerush/ribbed bog moss - bryum moss species wooded grassland
- Prairie cordgrass - sedge species - bluejoint lakeplain wet meadow

WILDLIFE

Common species include white-tailed deer (*Odocoileus virginianus*), coyote (*Canis latrans*) and eastern grey squirrel, (*Sciurus carolinensis*). Bird species include northern cardinal (*Cardinalis cardinalis*), wood thrush (*Hylocichla mustelina)*, eastern screech owl (*Megascops asio*), ruby-throated hummingbird (*Archilochus colubris*), mourning dove (*Zenaida macroura*), wild turkey (*Meleagris gallopavo*) and red-bellied woodpecker (*Melanerpes carolinus*). Several species of large mammals are now extirpated from this ecoregion, such as American black bear (*Ursus americanus*) and gray wolf (*Canis lupus*). Other species, such as fisher (*Pekania pennant*), North American river otter (*Lontra canadensis*) and American beaver (*Castor canadensis*) were once extirpated from this ecoregion but have returned to some areas.


Photo by Simon Wilson

NATURE CONSERVANCY CANADA

LAKE ERIE LOWLAND (#135)


Photo by Bill Hubick

AT-RISK PLANTS AND ANIMALS

The Lake Erie Lowland ecoregion has a very high richness of species of conservation concern, including many species that reach their northern range limits here and do not occur in other ecoregions. There are over 130 national species at risk in the ecoregion. Hot spots of national species at risk can be found around all Lake Erie sand spits (e.g. Long Point), the Lake Erie islands, Windsor/Walpole Island, Port Franks-Pinery, Thames/Sydenham Rivers and at the western end of Lake Ontario. In addition, 36 species of global conservation concern have been documented (Figure 2). Areas with the highest concentrations of species of global conservation concern include the lakeplain prairies at Windsor and Walpole Island, dunes and savannahs at Port Franks-Pinery and the Sydenham River.

Species at risk include:

- Jefferson salamander (*Ambystoma jeffersonianum*)
- northern barrens tiger beetle (*Cicindela patruela*)*
- rusty-patched bumble bee (*Bombus affinis*)*
- Henslow's sparrow (*Ammodramus henslowii*)
- prothonotary warbler (*Protonotaria citrea*)
- redside dace *(Clinostomus elongatus*)*
- tricolored bat (*Perimyotis subflavus*)*
- eastern ratsnake - Carolinian population *(Pantherophis spiloides pop. 2*)
- American ginseng (*Panax quinquefolius*)*
- eastern prairie white-fringed orchid *(Platanthera leucophaea*)*
- butternut (*Juglans cinerea*)

*nationally and globally at risk (NatureServe)

LAND USE

Agriculture and urban areas are the predominant land uses, occupying 67% of the ecoregion (not including the waters of the Great Lakes) (Figure 3). Major crops include corn, soybeans and, in a few areas, tender fruit. There has been a trend toward agricultural intensification over the last 30 years, resulting in a loss of pasture and a decline in wildlife habitat capacity in farmlands in this ecoregion. This ecoregion also includes limited oil and gas extraction and some of Canada's largest and busiest roadways.

This ecoregion experienced a moderate rate of land conversion (2000-2010) (Table 1). The largest driver is expanding urban areas, with some losses of forest cover to agriculture.

Major urban centres include Toronto, Hamilton, St. Catharines, Niagara Falls, Windsor, Sarnia, London, Chatham and Brantford. The total population is 8,324,391 (2016), with a growth of just over 29% in the last 20 years. Much of this growth has been concentrated in and around urban centres.

CONSERVATION CONCERNS

The Lake Erie Lowland ecoregion has experienced historic rates of habitat loss to agriculture and urban areas that are among the highest in Canada. Remaining habitat patches are generally small, highly fragmented and degraded.

High-ranking threats identified from the Nature Conservancy of Canada's (NCC's) Natural Area Conservation Plans (NACPs) in this ecoregion include invasive species, incompatible water management and habitat conversion. Prairie and savannah systems are threatened by the encroachment of woody vegetation, and some species (particularly reptiles) are threatened by roads.

Although there has been tremendous progress in restoring the Great Lakes, large-scale algal blooms as a result of non-point source run-off continues to be an issue for Lake Erie.

The forests of the Lake Erie Lowland ecoregion have been significantly impacted by introduced forest pests and pathogens. These started over a century ago with chestnut blight and dutch elm disease, with more recent introductions of emerald ash borer (*Agrilus planipennis*) and hemlock woolly adelgid (*Adelges tsugae*).

Populations of grassland birds and aerial insectivores that breed in this ecoregion have been rapidly declining.

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CURRENT CONSERVATION STATUS

The Lake Erie Lowlands are one of the most altered ecoregions in all of Canada. Only 14% natural cover remains and there are few large intact blocks of natural habitat remaining. Some of the largest and most significant areas of natural cover occur on First Nations lands, such as Walpole Island. There is limited opportunity for large-scale connectivity across the ecoregion. The greatest potential is primarily near the Great Lakes coastlines and along major river valleys (Figure 4).

Only 1% of the ecoregion is in conserved/protected areas (Figure 5). This number would be higher if conservation authority properties and other conservation lands were accounted for in Canada's national database of protected areas. The largest protected areas include provincial and national parks/national wildlife areas. The diversity of landform features in this ecoregion is poorly represented in the current system of protected areas.

Conservation designations in this ecoregion include three Ramsar Wetlands of International Importance (St. Clair National Wildlife Area, Point Pelee National Park, Long Point) and two Biosphere Reserves (Long Point and Niagara Escarpment).
The ecoregion has 27 Key Biodiversity Areas that protect important landbird, shorebird, waterbird and waterfowl habitats. The largest of these include Long Point Peninsula and Marshes, Lower Detroit River, Niagara River Corridor, Pelee Island Natural Areas, Point Pelee, West End of Lake Ontario, Dundas Valley, Eastern Lake St. Clair, Norfolk Forests and Greater Rondeau Area.

NCC has three NACPs[2] that cover 9.3% of the ecoregion: Essex Forests and Wetlands, Western Lake Erie Islands and Southern Norfolk Sand Plain. NCC has completed over 90 land securement projects in the ecoregion, protecting over 3,360 hectares/8,303 acres. Key properties include Backus Woods and properties on Pelee Island. NCC has transferred many important properties, such as Middle Island and Clear Creek Forest, to government partners. Carolinian Canada and partners have completed similar conservation plans for other important areas in this ecoregion.

A number of land trusts, including Thames Talbot Land Trust, Long Point Basin Land Trust and Ontario Nature, working in this region have secured ecological significant properties.

POTENTIAL CONSERVATION STRATEGIES

Of all the ecoregions in Canada, the Lake Erie Lowland ecoregion is the most altered. Outside of protected areas, there are very few opportunities to protect new large areas of intact habitat. Much of the land is privately owned, and rising commodity prices have increased the costs of land securement. Even with the high degree of land conversion, important areas can still be protected to maintain Canada's biodiversity. There are many places of high importance for biodiversity conservation, and several opportunities exist to protect, connect and restore key areas. Protecting these areas will require partnerships with local governments, the agricultural community and cities.protection can be accomplished through a combination of increasing the number of conserved lands and improving partnerships and incentives that support farmers.

LARGEST CONSERVED AREAS

(TOP 10, BY SIZE)

1. Long Point National Wildlife Area - Long Point and Thoroughfare Units (3,284 hectares/8,115 acres)
2. Rondeau Provincial Park (3,254 hectares/8,041 acres)
3. Pinery Provincial Park (2,532 hectares/6,257 acres)
4. Rouge National Urban Park (1,874 hectares/4,631)
5. Point Pelee National Park of Canada (1,520 hectares/3,756 acres)
6. Turkey Point Company (NCC conservation agreement, 1,092 hectares/2,698 acres)
7. St. Williams Conservation Reserve (1,033 hectares/2,553 acres)
8. Bronte Creek Provincial Park (682 hectares/1,685 acres)
9. Short Hills Provincial Park (661 hectares/1,633 acres)
10. Big Creek National Wildlife Area-Big Creek Unit (615 hectares/1,520 acres)

To learn more about this ecoregion and NCC's conservation assessment for southern Canada, visit **natureconservancy.ca/casc.**

[2] NACPs that cover >5% of the ecoregion as of December 31, 2017.

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POTENTIAL CONSERVATION STRATEGIES

Potential conservation strategies for this ecoregion include:

1. Increase natural cover to at least 15% (currently approximately 14%) over the next 10 years, with a focus on buffers and connectivity between protected/conserved areas and riparian habitats.

2. Increase the amount of conserved lands to 5% in the next 10 years, including the accounting of conservation authority lands and other public lands (e.g. Royal Botanical Gardens). There are also several protected areas with key opportunities to conserve adjacent lands to enhance connectivity. These include properties in the Norfolk Sandplain, the Niagara Escarpment and along major rivers. There also may be opportunities to support Indigenous-led conservation efforts.

3. Despite the low amount of natural cover, this region has a very high number of species that are at risk in Canada. This includes species that reach their northern range limits here and are not found in other areas of Canada, and species of global conservation concern. In particular, the lands and waters within the boundaries of NCC's Norfolk Sandplain and Western Lake Erie Islands Natural Areas have a very high richness of species at risk, as do the Thames/Sydenham rivers, Port Franks/Pinery area and the lakeplain prairie of Windsor and Walpole Island. These places should be a priority for species-at-risk recovery actions. Efforts to protect and restore habitat for aquatic species at risk are particularly urgent.

4. Develop long-term partnerships and incentives to manage invasive species and reduce non-point source pollution from agricultural lands. The strategic use of agricultural easements to protect and restore key waterways should be explored. Efforts to reduce phosphorus pollution in Lake Erie could be supported by strategic land protection and restoration of wetlands in key areas of the watershed.

5. Work with municipal and provincial governments to develop land severance policies that facilitate land conservation and to promote retention of remaining natural corridors across the landscape.

6. Develop and implement strategies to link conservation to water security and climate change adaptation.

7. Support Carolinian Canada's efforts to develop strategies and implement coordinated conservation plans for key areas, and integrate these plans into ecosystem-based species-at-risk recovery plans.

KEY REFERENCES

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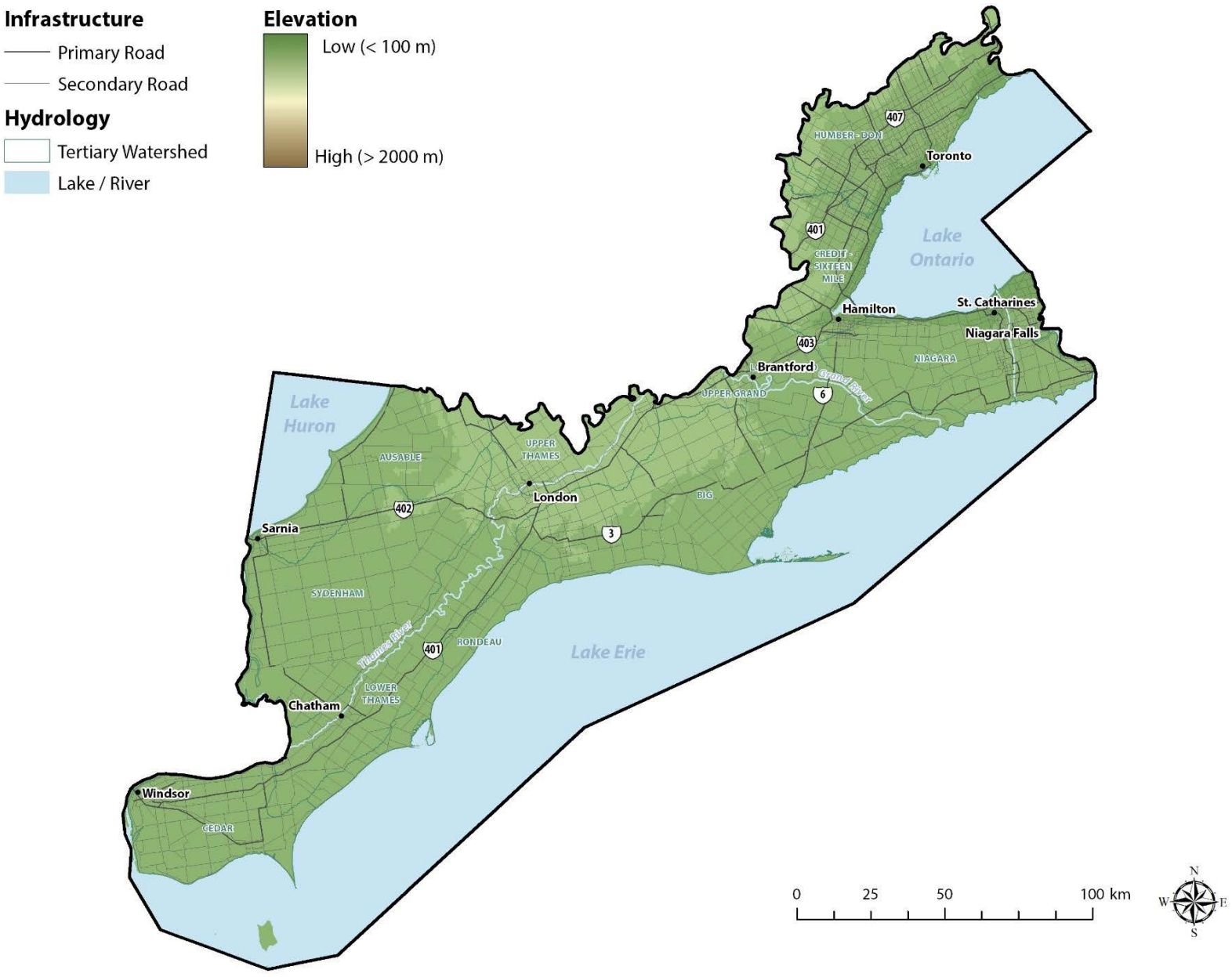

Figure 1: Context of the Ecoregion. This map shows towns, roads, elevation, rivers, lakes and watersheds.

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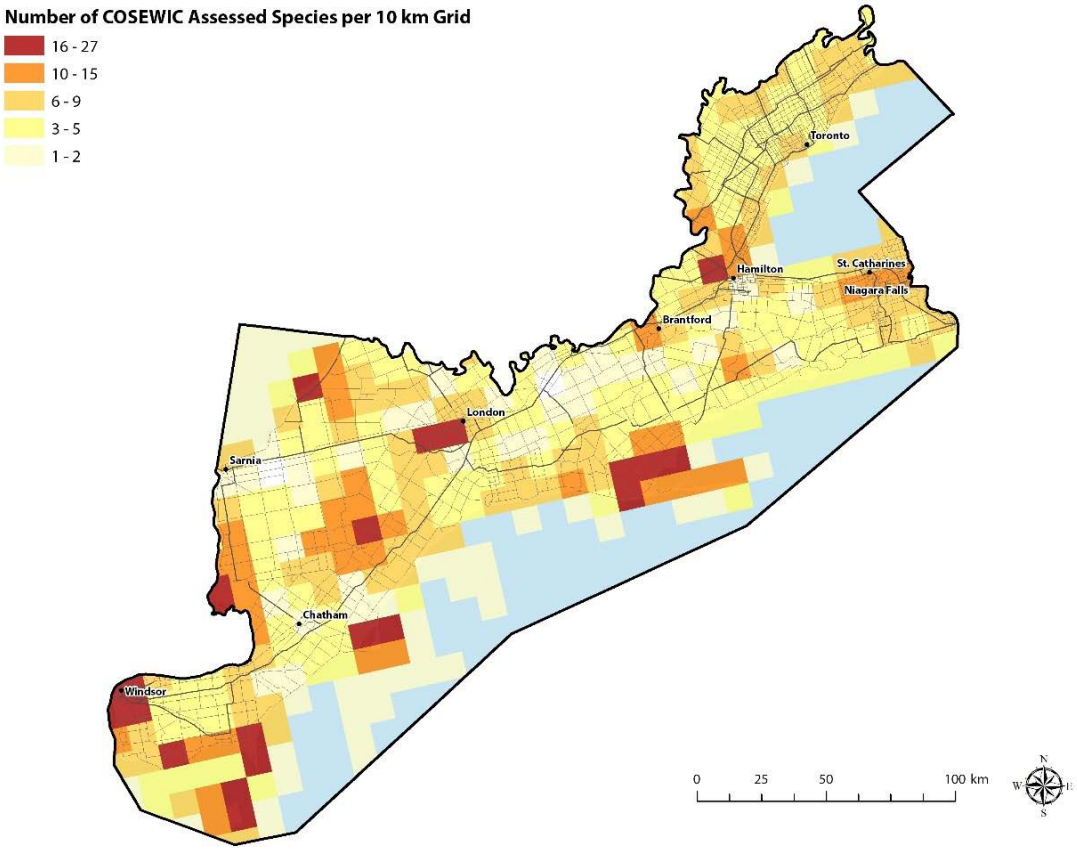

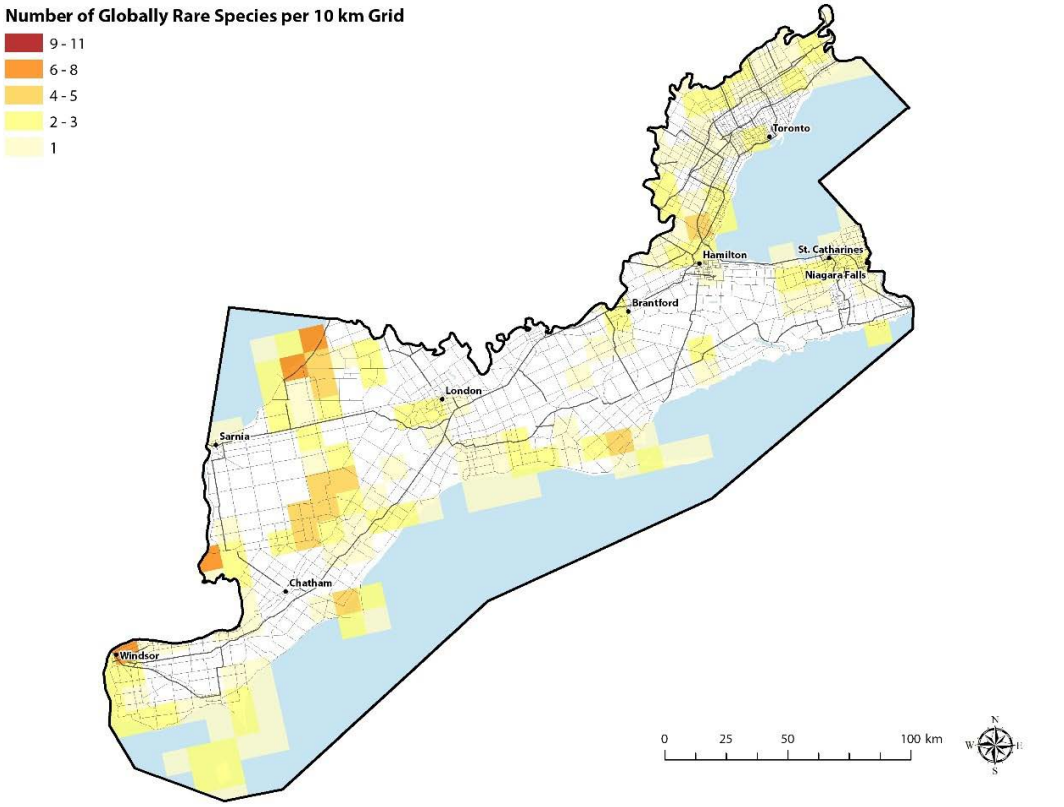

Figure 2: Species of Conservation Concern (COSEWIC and global). These maps show the number of different Committee on the Status of Endangered Wildlife in Canada (COSEWIC)-assessed and globally rare species. The information is current to 2015. Some areas of the ecoregion may be data deficient, and higher numbers of species of conservation concern may occur.

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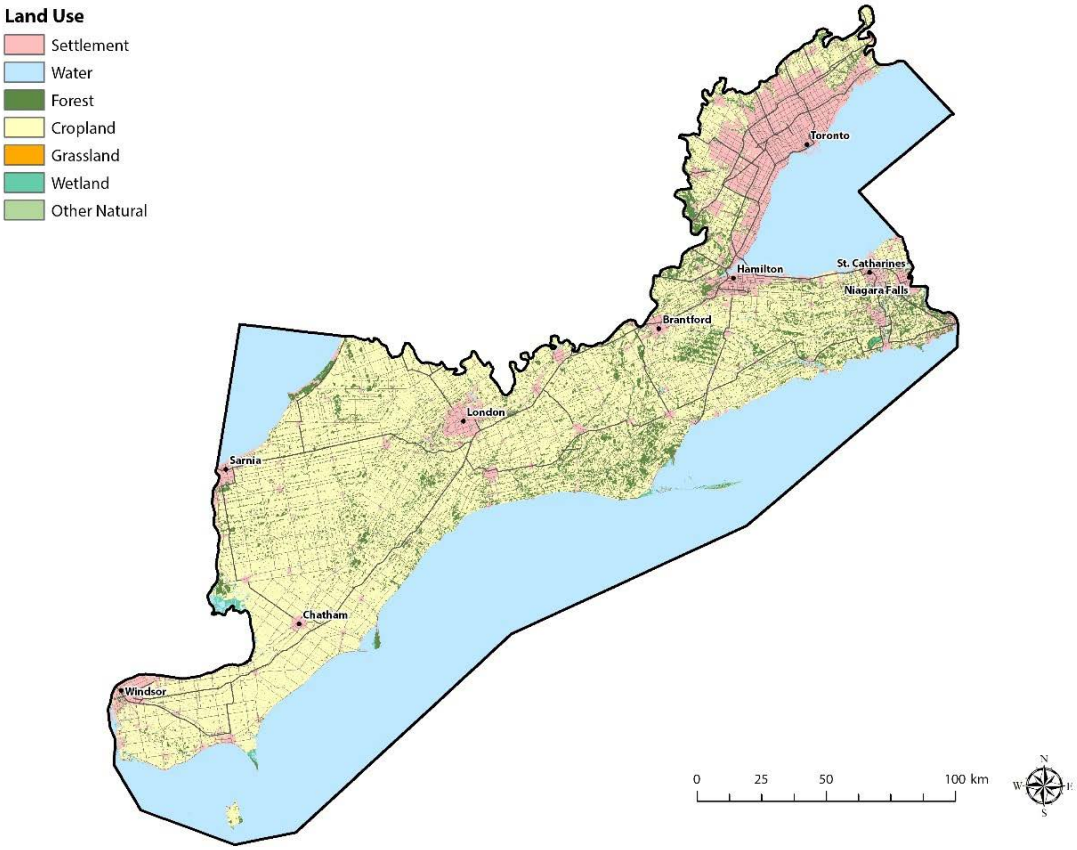

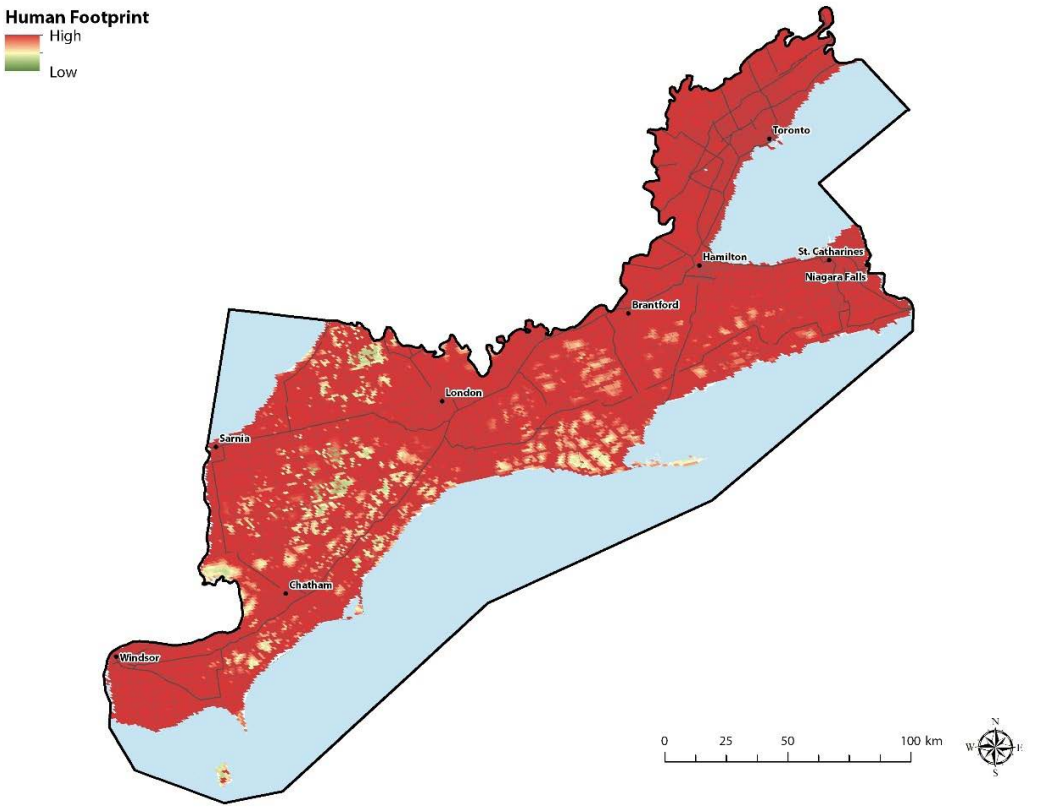

Figure 3: Land Use & Human Footprint. These maps show the dominant land uses and the human influence on the landscape. Human footprint is highest in urban areas, around major roads and on lands that have been converted to croplands. The human footprint map does not show some stresses that may occur, such as invasive species.

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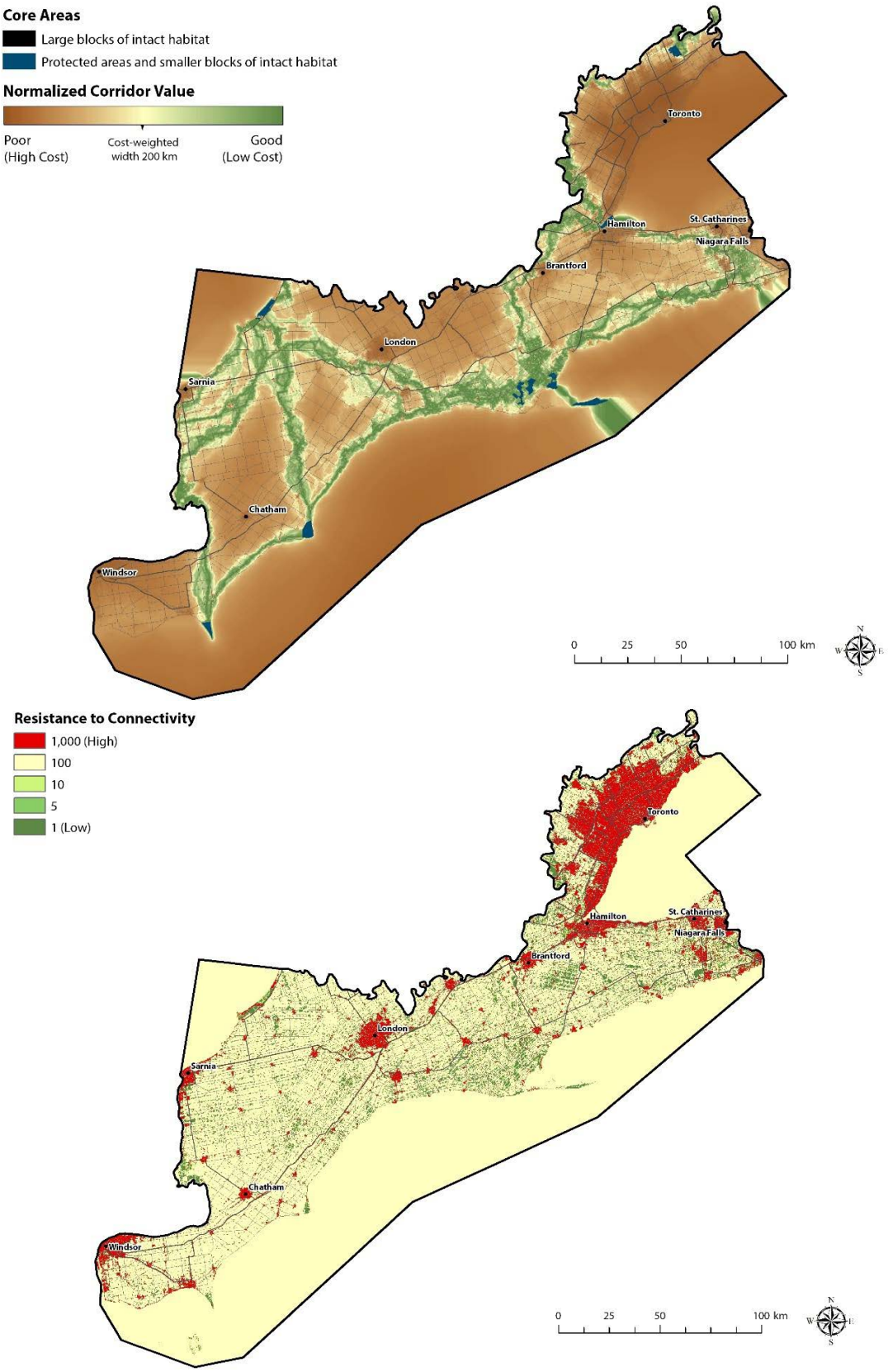

Figure 4: Connectivity. These maps show connectivity between protected/conserved areas and large blocks of intact habitat. The bottom map depicts those regions (green) that have a higher probability of being connected within the ecoregion.

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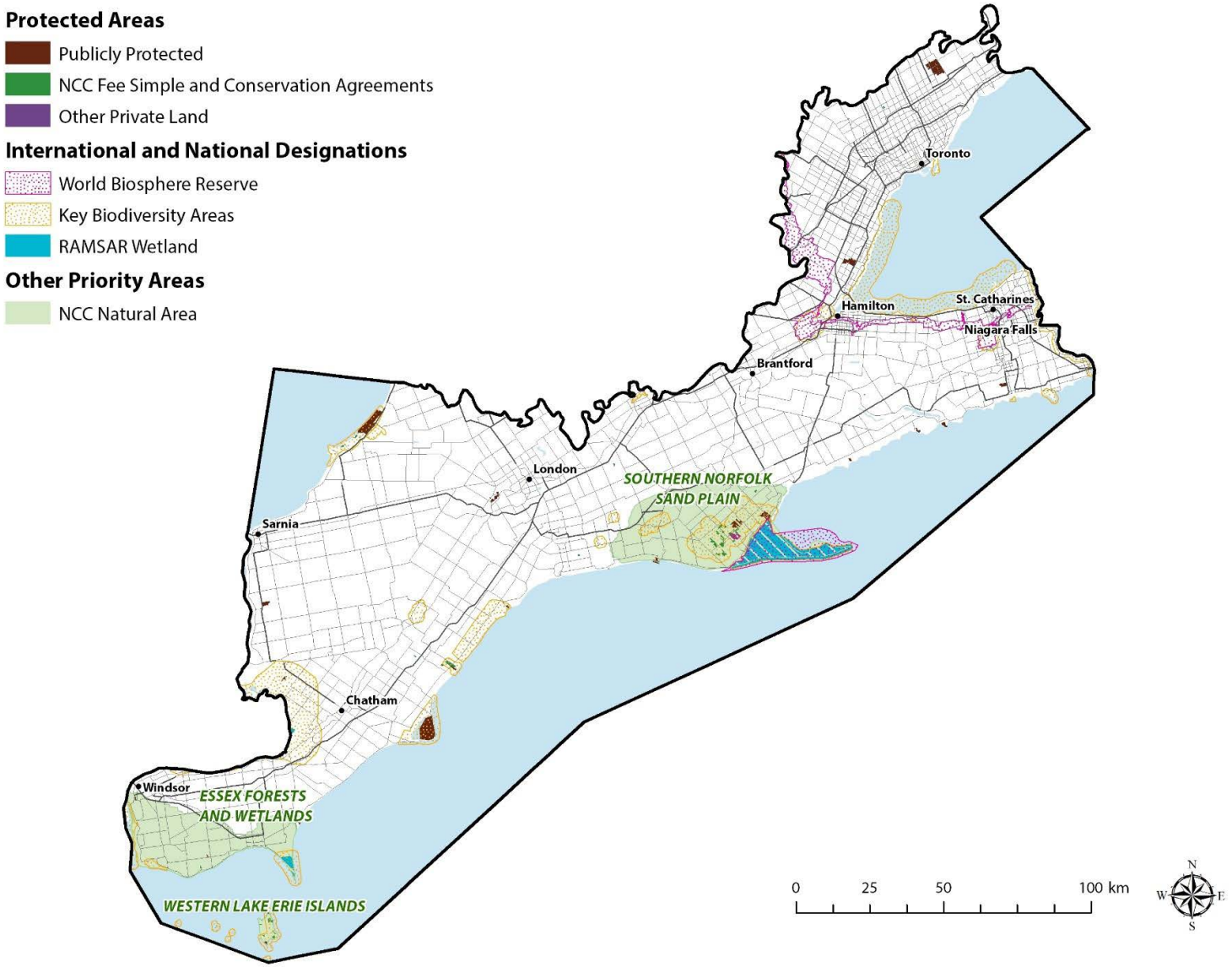

Figure 5: Protected/Conserved Areas. This map shows protected/conserved areas in the ecoregion, including publicly protected areas (such as national and provincial parks), properties conserved by NCC and other non-governmental organizations (private). The map also shows biodiversity designations, such as Key Biodiversity Areas (primarily Important Bird Areas). These designations only highlight important areas and are not protected or do not have legal status, unless they are also within a protected/conserved area. The map also shows the boundaries of NCC Natural Area Conservation Plans.

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Table 1: Change in Land Use, 2000-2010

Change From 2000 (km²)	Land Use Class	Code	Change To 2010 (km²) 11	21	25	31	41	42	45	46	51	61	62	71	73	74	91	Total (From)	Per cent (%) of Total Change
	Unclassified	11		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	*0.0*
	Settlement	21	0.0		354.9	11.9	26.7	0.2	3.9	0.3	150.8	0.0	0.0	1.6	0.1	0.0	0.3	550.9	*22.2*
	Roads	25	0.0	359.2		3.4	22.4	0.5	1.8	0.1	242.5	0.0	0.0	1.2	0.0	0.0	0.2	631.3	*25.5*
	Water	31	0.0	12.1	3.1		11.1	0.5	2.3	0.6	21.2	0.0	0.1	9.5	1.4	0.0	0.7	62.6	*2.5*
	Forest	41	0.0	47.9	25.8	11.2		5.4	0.9	1.4	196.5	0.0	0.1	14.3	0.3	0.0	0.3	304.1	*12.3*
	Forest Wetland	42	0.0	0.4	0.6	0.5	5.2		0.7	0.0	1.9	0.0	0.0	1.8	0.9	0.0	0.0	11.9	*0.5*
	Trees	45	0.0	8.8	2.5	2.3	0.0	0.6		0.3	22.6	0.0	0.0	1.2	0.1	0.0	0.1	38.4	*1.5*
	Treed Wetland	46	0.0	0.4	0.2	0.5	1.5	0.0	0.2		1.3	0.0	0.0	1.2	0.3	0.0	0.0	5.6	*0.2*
	Cropland	51	0.0	278.8	282.3	21.3	197.5	1.5	23.2	1.2		0.0	0.0	10.1	0.4	0.0	0.6	817.0	*33.0*
	Grassland Managed	61	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	*0.0*
	Grassland Unmanaged	62	0.0	0.2	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0		0.1	0.0	0.0	0.1	0.0	*0.0*
	Wetland	71	0.0	3.1	1.6	9.6	13.3	1.9	1.2	1.3	10.6	0.0	0.1		2.7	0.0	0.2	45.7	*1.8*
	Wetland Shrub	73	0.0	0.2	0.1	1.4	0.3	0.8	0.1	0.3	0.4	0.0	0.0	2.7		0.0	0.1	6.4	*0.3*
	Wetland Herb	74	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	*0.0*
	Other	91	0.0	0.6	0.3	0.7	0.3	0.0	0.1	0.0	0.6	0.0	0.1	0.2	0.0	0.0		2.9	*0.1*
Total (To)			0.0	711.6	671.5	63.0	278.3	11.5	34.5	5.5	648.3	0.0	0.5	43.9	6.3	0.0	2.6	2,476.7	
Net Change (To-From)			0.0	160.7	40.2	0.4	-582.4	-0.4	-3.9	-0.1	-168.6	0.0	0.5	-1.8	-0.2	0.0	-0.4		
Per cent (%) of Total Change			*0.0*	*28.7*	*27.1*	*2.5*	*11.2*	*0.5*	*1.4*	*0.2*	*26.2*	*0.0*	*0.0*	*1.8*	*0.3*	*0.0*	*0.1*		
Net Gain/Loss %			0.0	6.5	1.6	0.0	-1.0	-0.0	-0.2	-0.00	-6.8	0.0	0.02	-0.1	-0.0	0.0	-0.01		

** Diagonal represents unchanged land use*