



STATE OF ONTARIO'S PROTECTED AREAS

Change in Land Cover

2021

State of Ontario's Protected Areas Indicator Report

Change in Land Cover

This indicator summarises the amount and composition of land cover across Ontario, including within and near protected areas.

Status



Status: Mixed



Trend: Baseline

Why it's important

Protected areas are not physically isolated from the surrounding landscape. However, they can become isolated ecologically if the broader surrounding landscape is modified from a natural state to a non-natural state. This change can impact biodiversity such as by leading to declines of native species that depend on forests, wetlands, and other natural habitats. Activities such as forest management tend to alter these lands temporarily, while other activities such as agriculture, mining, industrial development and urbanization are more permanent and can isolate protected areas within the larger landscape. These activities have greater impacts on biodiversity when the total amount of natural cover drops to low levels.

Protected areas help to alleviate these impacts by maintaining natural cover (composition), which is necessary for maintenance of ecological functions associated with aquatic, wetland and terrestrial environments. When natural cover is lost within protected areas, the ecological function within these environments is negatively impacted.

Considering natural cover composition across the landscape and in proximity to protected areas also helps to identify whether the ecological integrity of protected areas is being affected by land uses outside their boundaries.

How we monitor

The amount and composition of natural cover across the landscape provides insights on the ability of species, individuals, and genetic materials to flow freely into, out of, and between protected areas.

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Composition was considered from three perspectives, across three ecozones – Hudson Bay Lowlands, Ontario Shield, and Mixedwood Plains – as follows:

- Landscape matrix: the entire landscape outside of protected areas
- Perimeter area: a portion of the landscape outside of the protected area within two kilometres of the protected area boundary
- Protected area: composition inside the protected area

Provincial land cover information for this indicator was derived from Ontario Land Cover Compilation (OLCC) Version 2. OLCC is a consistent land cover raster dataset for the entire province, suitable for regional and landscape-level analyses. Published in 2014, OLCC represents the provincial landscape between 1999-2011. It consists of 29 land cover classes derived by combining three different land cover products: Land Cover Far North (version 1.4), Provincial Land Cover (2000 Edition) (PLC 2000), and Southern Ontario Land Resource Information System (SOLRIS) (version 1.2) (**Figure 1**). Each of these separate land cover databases was resampled to a common pixel space (15 metres), re-projected to a common projection (NAD83 Lambert Conformal Conic) and reclassified into a common class structure.

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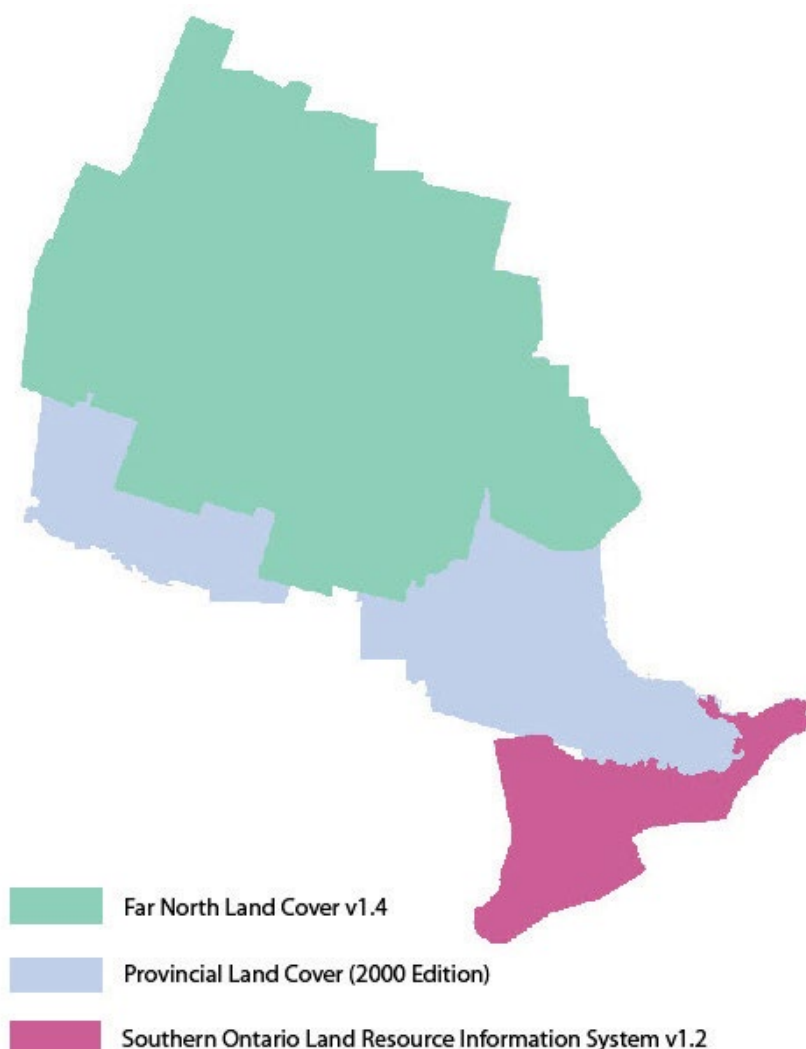


Figure 1. Source land cover databases for Ontario Land Cover Compilation (OLCC) Version 2 (from Ontario Land Cover Compilation Version 2, 2014).

For the purpose of this indicator report, the 29 land cover classes were reclassified into four broad land cover categories: Aquatic, Natural Terrestrial, Anthropogenic, and Disturbance. The disturbance classification from OLCC includes natural and/or anthropogenic disturbance to “non and sparse woody” and “treed and/or shrub” land cover types within the Far North Land Cover, and “forest depletions (cuts and burns)” within the PLC 2000. No disturbance classification is found within SOLRIS (Mixedwood Plains ecozone) (**Table 1**). The reclassified OLLC raster database was then clipped to the ecozone boundaries (**Figure 2**).

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Table 1: Classification of land types in Ontario Land Cover Compilation, Version 2 and the broad reclassified categories

Ontario Land Cover Compilation Classification	SOPAR Reclassification
Clear Open Water	Aquatic
Turbid Water	Aquatic
Shoreline	Natural Terrestrial
Mudflats	Natural Terrestrial
Marsh	Natural Terrestrial
Swamp	Natural Terrestrial
Fen	Natural Terrestrial
Bog	Natural Terrestrial
Heath	Natural Terrestrial
Sparse Treed	Natural Terrestrial
Treed Upland	Natural Terrestrial
Deciduous Treed	Natural Terrestrial
Mixed Forest	Natural Terrestrial
Coniferous Treed	Natural Terrestrial
Plantations - Treed Cultivated	Anthropogenic
Hedge Rows	Anthropogenic
Disturbance ¹	Disturbance
Cliff and Talus	Natural Terrestrial
Alvar	Natural Terrestrial
Sand Barren and Dune	Natural Terrestrial
Open Tallgrass Prairie	Natural Terrestrial
Tallgrass Savannah	Natural Terrestrial
Tallgrass Woodland	Natural Terrestrial
Sand/Gravel/Mine Tailings/Extraction	Anthropogenic
Bedrock	Natural Terrestrial
Community/Infrastructure	Anthropogenic
Agriculture and Undifferentiated Rural Land Use	Anthropogenic
Cloud/Shadow	Cloud/Shadow
Other	Other

¹ Disturbance = Forest depletions (cuts and burns) and disturbance to non and sparse woody and treed and/or shrub land cover types

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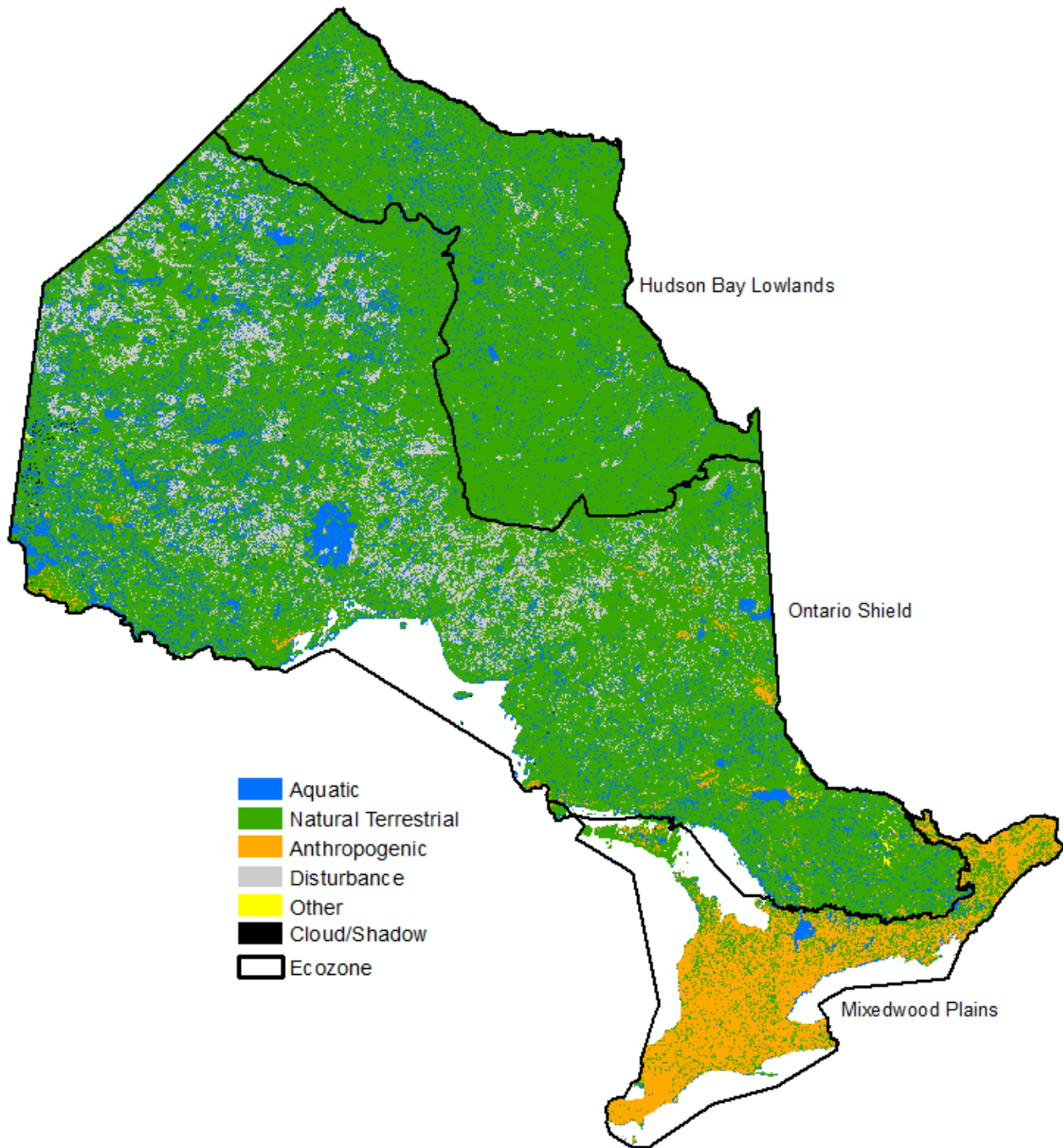


Figure 2: OLCC clipped to Ecozone and reclassified to four broad categories. The categories “Other” and “Cloud/Shadow” were excluded from the analysis.

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The newly clipped OLCC raster was then assessed at the three perspectives (landscape, perimeter, and protected areas) for each ecozone. The composition and proportion of each of the classes was tallied and summarized (**Table 2**) and represented graphically (**Figures 3 to 5**).

Table 2: Percent land cover composition inside and outside of protected areas in the three ecozones across Ontario.

Description ²	Ecozone: Hudson Bay Lowlands	Ecozone: Ontario Shield	Ecozone: Mixedwood Plains
Landscape Composition (%)^{3,4}			
natural terrestrial cover	88.6	73.1	27.8
aquatic cover	8.3	13.0	2.9
disturbance cover	3.0	12.4	0.0
anthropogenic cover	0.1	1.3	69.3
Perimeter Area Composition (%)^{3,5}			
natural terrestrial cover	87.7	71.4	39.0
aquatic cover	7.8	17.8	5.4
disturbance cover	4.0	9.5	0.0
anthropogenic cover	0.4	1.0	55.6
Protected Areas Composition (%)^{3,6}			
natural terrestrial cover	87.7	69.7	79.0
aquatic cover	9.5	20.5	3.3
disturbance cover	2.6	9.1	0.0
anthropogenic cover	0.3	0.1	17.7

² Refer to Table 1 for details of land use categories

³ Totals may not sum to 100% because of areas not classified due to Cloud Cover or classified as "Other"

⁴ Landscape composition = area outside of protected areas, including perimeter area

⁵ Perimeter area composition = area outside protected areas and within 2km of protected area boundaries

⁶ Protected Areas = provincial parks, conservation reserves, wilderness areas, national protected areas, privately protected areas

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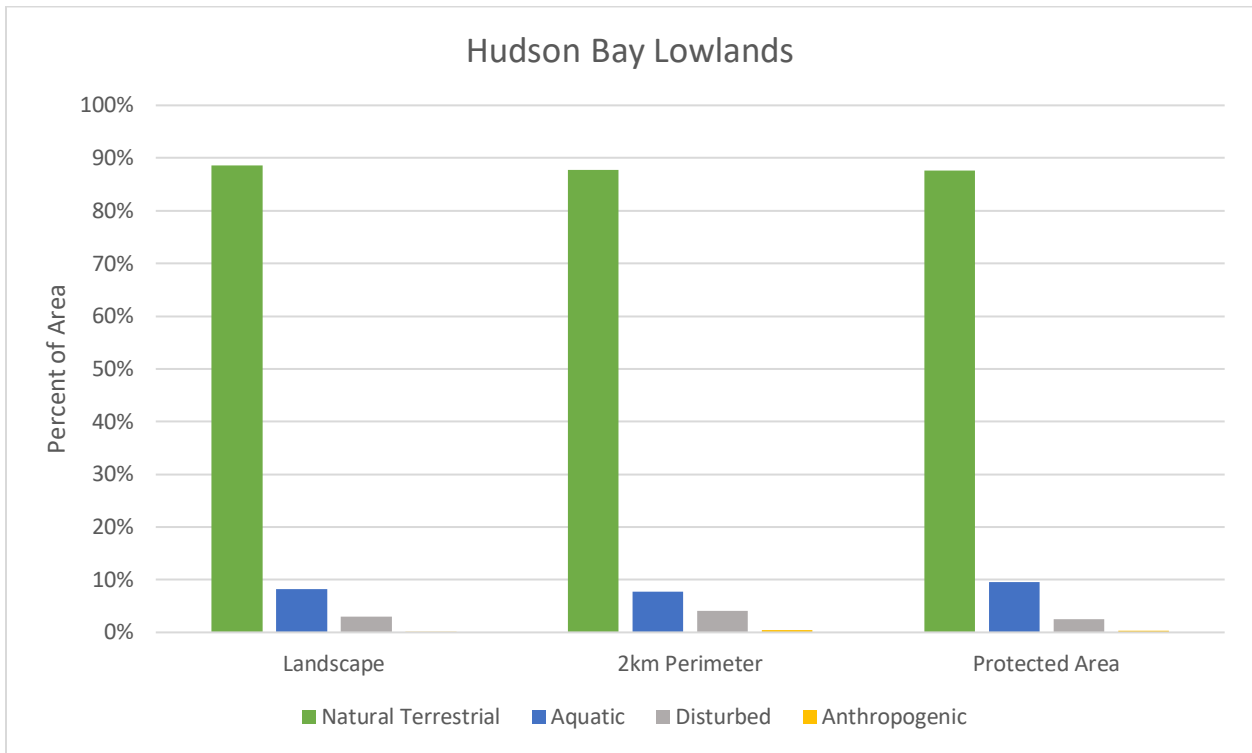


Figure 3: Percent of land cover types across the Hudson Bay Lowlands Ecozone

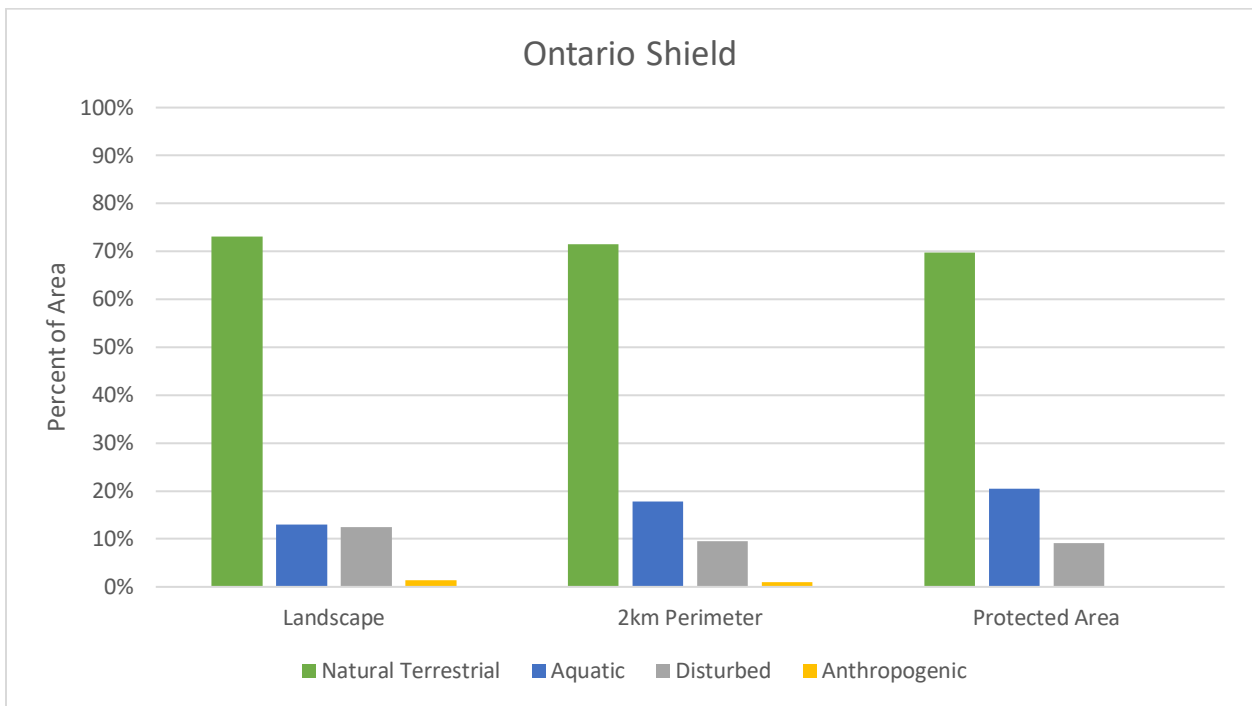


Figure 4: Percent of land cover types across the Ontario Shield Ecozone

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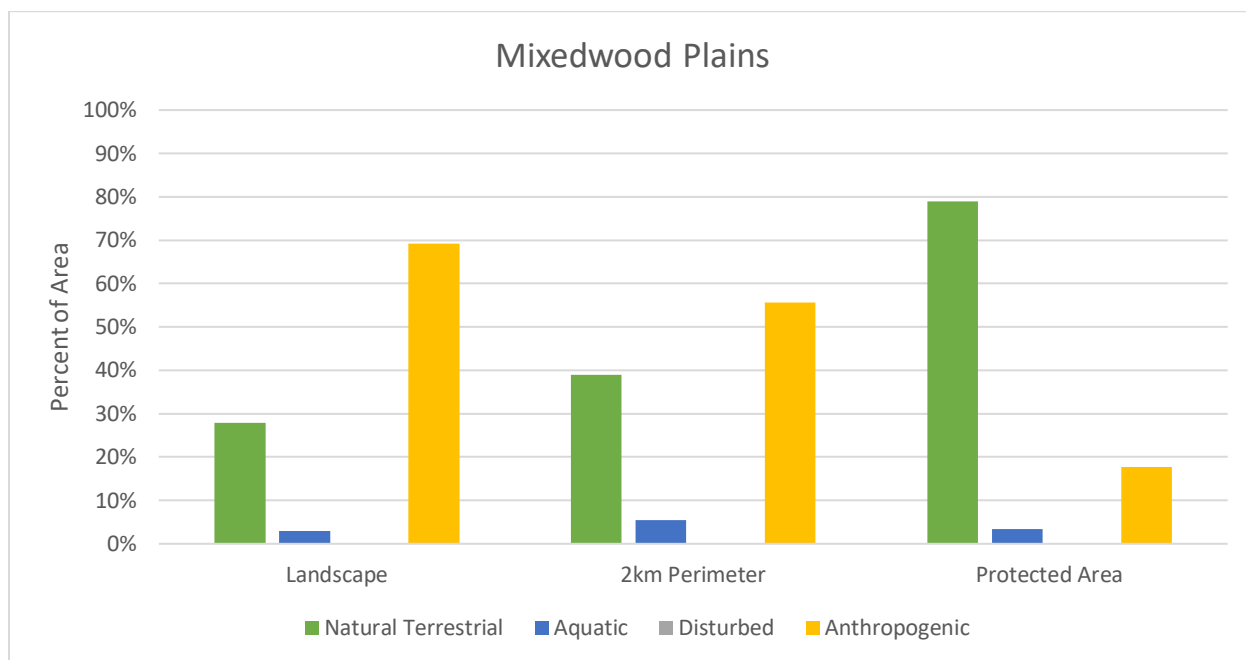


Figure 4: Percent of land cover types across the Mixedwood Plains Ecozone

What's happening

Landscape

Generally, natural cover declines and anthropogenic cover increases from north to south whether inside protected areas, within the perimeter area, or outside protected areas (**Table 2**). The Hudson Bay Lowlands ecozone is dominated by natural terrestrial cover (89%) with only small amounts of disturbance and anthropogenic cover. The Ontario Shield ecozone follows a similar trend (73 percent natural terrestrial cover) with a smaller amount of disturbance and anthropogenic cover (14%). However, the trend is reversed in the Mixedwood Plains ecozone with 69 percent anthropogenic cover while retaining only 28 percent of its natural terrestrial cover. This small proportion of natural cover threatens biodiversity and increases the value of protected areas where natural cover is much higher than in the surrounding landscape.

Perimeter Area

The composition of the perimeter area of protected areas is similar to the landscape as a whole in both the Hudson Bay Lowlands and Ontario Shield ecozones (88 percent and 71 percent natural coverage, respectively). The trend is similarly reversed in the Mixedwood Plains, containing only 39 percent natural terrestrial cover while over half (56%) of the remaining area is anthropogenic cover. Land cover composition in the protected area perimeter is similar to that within protected areas in both the Hudson Bay

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Lowlands and Ontario Shield ecozones, where the majority is comprised of natural terrestrial cover. However, in the Mixedwood Plains ecozone, there is much more anthropogenic cover and less natural terrestrial cover in the protected areas perimeter compared to within protected areas.

Protected Area

In the Hudson Bay Lowlands and Ontario Shield ecozones, natural terrestrial cover in protected areas is similar to that found in the surrounding areas and in the landscape as a whole. In the Mixedwood Plains ecozone, the composition of protected areas is 79 percent natural terrestrial cover. This is approximately twice the value of the immediate areas and almost three times the value of the landscape as a whole.

These results suggest the importance of protected areas in the Mixedwood Plains ecozone, where they represent critical areas of high natural cover in regions with a high degree of development and agriculture, and little remaining natural cover. The higher proportion of anthropogenic cover within protected areas of the Mixedwood Plains ecozone compared to the other ecozones reflects the greater proportion of infrastructure and facilities to support higher park visitation, at the expense of natural terrestrial cover.

General Patterns

The general trend of natural terrestrial increasing, and anthropogenically modified land cover decreasing, as you travel north from the Mixedwood Plains to the Hudson Bay Lowlands is generally consistent throughout the landscape. Disturbed land cover also exhibits a pattern of increased proportion in a north to south direction. The absence of disturbance land cover data for the Mixedwood Plains in the OLCC dataset prevents comment on further trends.

Previous Analysis

Land cover composition in protected areas was last analyzed in the State of Ontario's Protected Areas Report published in 2011. The data used to analyze land cover in that report was PLC 2000 and was produced in 2004. The Ontario Land Cover Compilation (version 2) used in the current report incorporates more recent land cover data for northern Ontario (Land Cover Far North version 1.4) and southern Ontario (SOLRIS version 1.2).

While general land cover patterns are similar between the two time periods, a direct comparison of the change in land cover is not possible because of dramatically different mapping methods used and low accuracies reported for the PLC 2000, as well as the subjectivity associated with the land cover mapping process.

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However, a more direct analysis of changes in land cover composition will be possible when new vintages of land cover products making up the OLCC become available in the near future.

Indicator last updated

December 2021

Data source(s)

Canadian Protected and Conserved Areas Database (CPCAD), (Ontario and national protected areas; November 2020 edition)

Land Information Ontario ([LIO](#))

Ontario Land Cover Compilation (version 2) (2014). [Ontario GeoHub](#)

Related links

State of Ontario's Protected Areas Report (2011)

Ontario Land Cover Compilation Data Specifications Version 2.0 (2014). [Ontario GeoHub](#)

Percentage of Land Cover Types Indicator Report. Ontario Biodiversity Council. 2015. [State of Ontario's Biodiversity](#)