



## INDICATOR: Extent of wetland cover and wetland loss

**Strategic Direction:** Enhance Resilience

**Target:** N/A

**Theme:** State of Ecosystems and Species — Wetlands

**Previous version:** [http://sobr.ca/\\_biosite/wp-content/uploads/Indicator-Extent-of-Wetland-Cover-and-Wetland-Loss-May-19-2015.pdf](http://sobr.ca/_biosite/wp-content/uploads/Indicator-Extent-of-Wetland-Cover-and-Wetland-Loss-May-19-2015.pdf)

### Background Information

Wetlands are lands that are seasonally or permanently covered by shallow water, as well as lands where the water table is close to or at the surface. Wetlands lie at the interface of terrestrial and aquatic habitats and as a result possess a unique mixture of species, conditions and interactions. This makes wetlands among the most dynamic, biologically diverse and productive ecosystems on the planet. Wetlands provide habitat for a diverse array of species and provide a wide variety of ecosystem services that benefit people and the environment. These include shoreline stabilization, water purification, groundwater recharge and discharge, and flood control/attenuation. Wetlands help limit greenhouse gases in the atmosphere by acting as carbon sinks and they provide many recreational opportunities. When wetlands are lost or destroyed the important ecosystem services they provide are also lost.

Canada has approximately 1.29 million km<sup>2</sup> of wetlands covering 13% of Canada's terrestrial area; representing close to one quarter of world's remaining wetlands (ECCC 2016). Twenty-five percent of Canada's remaining wetlands (6% of wetlands world-wide) are found in Ontario. In Ontario, four major types of wetlands are recognized: marshes, swamps, fens and bogs (OMNRF 2020). The majority of the province's wetlands are found in northern Ontario (Figure 1). The Hudson Bay Lowlands Ecozone has more than 20,000,000 ha of wetlands that account for 82% of the ecozone and is one of the largest wetlands in the world. In southern Ontario Great Lakes coastal wetlands provide continentally significant migratory bird habitat and support many globally rare species and vegetation communities.

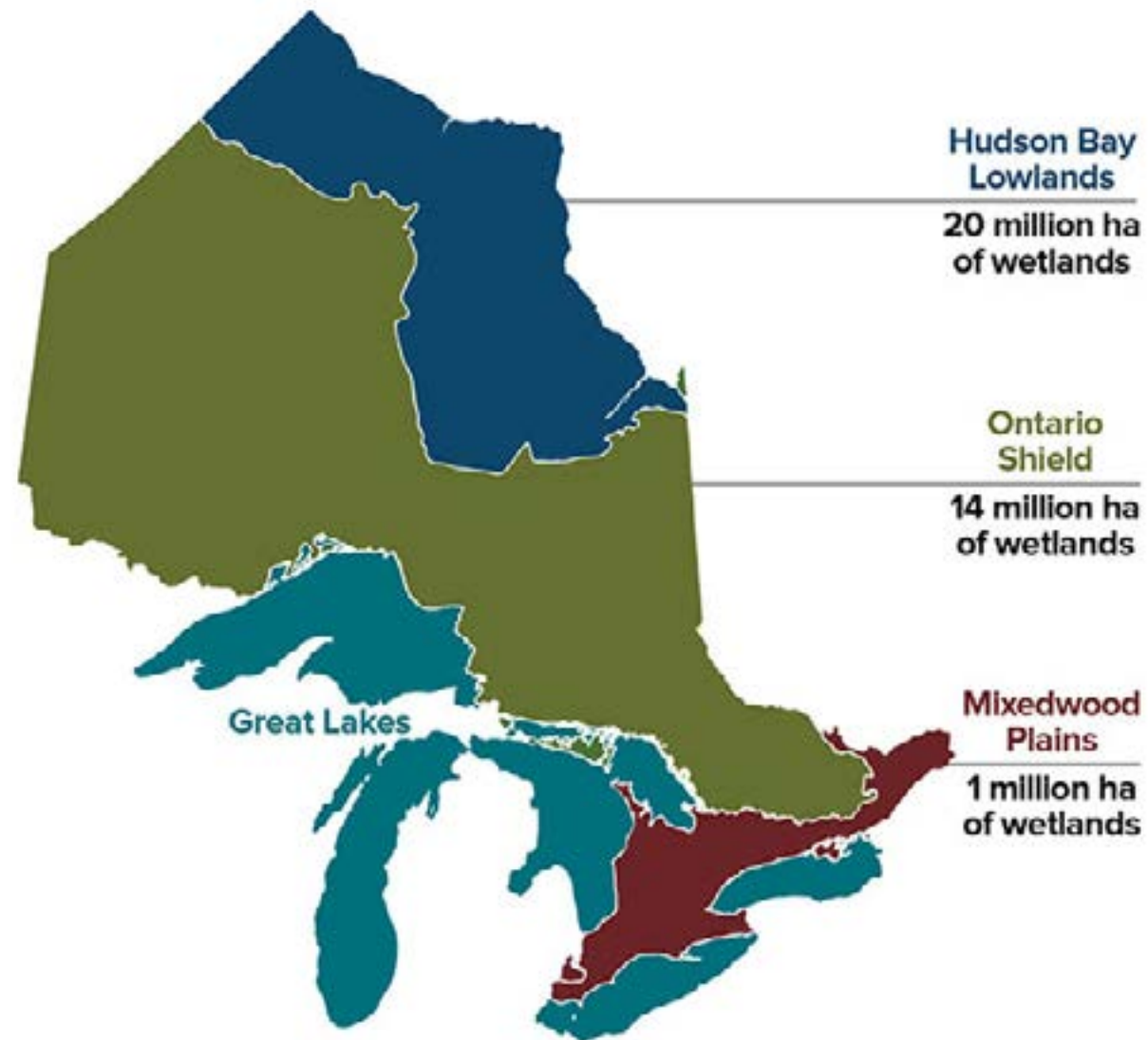


Table 1. Ontario's ecozones and wetland coverage (MNRF 2017).

Despite their important values, wetlands continue to be lost. It is estimated that up to 70% of wetlands have been destroyed or degraded in settled areas of Canada (DUC 2021). Wetlands in southern parts of Ontario have been drained for agriculture, filled for development, polluted by toxic runoff and damaged by artificial changes in water levels (Environment Canada 2010). In Southern Ontario (Mixedwood Plains area), 68% of the wetlands originally present were lost by the early 1980s (OBC 2010) and an additional 4% has been lost since this time (OBC 2015). Wetland loss has been greatest in southwestern Ontario, parts of eastern Ontario, Niagara and the Toronto area, where over 85% of the original pre-settlement wetlands have been converted to other uses. While land conversion is the primary cause of wetland loss in southern Ontario, pollution, invasive species, alteration to natural water levels and climate change also pose serious threats.

Notwithstanding some localized losses or alteration, the wetlands in the Hudson Bay Lowlands and central and northern regions of the Ontario Shield ecozones are largely intact.

This indicator assesses changes in wetland extent in southern Ontario from 2000 to 2011 and changes between 2011–2015 based on updated land cover information.

### Data Analysis

Land cover information from the Southern Ontario Land Resource Information System (SOLRIS 3.0; OMNRF 2020) was used to assess changes in the extent of southern Ontario wetlands between 2011–2015. SOLRIS coverage includes all of the ecodistricts in the Mixedwood Plains Ecozone with the exception of Manitoulin Island and includes wetlands as small as 0.5 ha in area. SOLRIS version 1.2 (2000) was originally developed by integrating orthophoto based interpreted mapping and elevation model/satellite image based geospatial modelling. Each new version of SOLRIS is updated using automated landsat satellite image change over time analysis of a previous version. In this way, SOLRIS version 3 (2015) is an update of SOLRIS 2.1 (2010). The change analysis process provides both an updated spatial inventory and summaries of mapping class change (e.g. area of change from forest to urban impervious).

In this application, change detection analyzes the decreases in vegetation greenness, focusing on loss, using full-leaf summer Landsat-5 TM imagery for three time periods — 2000–2005, 2005–2010, and 2010–2015. Changes identified during change detection were verified using orthophotography available between 2000 and 2015. The modelling mapped large and dramatic loss events with high certainty but in some cases, subtle and smaller change events could not be modelled with certainty. These events, when occurring in close proximity to high certainty events, were flagged for manual interpretive review. Additional high certainty events were then identified through detailed examination of multi-date digital orthophotos. Although attempts were made to capture all major events, some remain undetected.

The total wetland area was calculated for each time period (2000–2011 and 2011–2015) using a Geographic Information System (GIS) and the area of wetlands lost was mapped for each ecodistrict (Figure 2). Wetland loss was also mapped as the percentage of wetland area from 2000 that had been lost by 2011, as well as the loss between 2011 and 2015 (Figure 3).

It is important to note that previous assessments (1982–2002) of changes in wetland cover excluded wetlands smaller than 10 ha and many Great Lakes coastal wetlands (DUC 2010). The current analysis addresses smaller wetlands but could miss the incremental loss of small areas along the edge of larger wetlands (i.e., areas less than 0.5 ha over a 5-year period). For these reasons, the results of the 2 most recent assessments of wetland loss since 2000 cannot be directly compared to previous assessments of loss for earlier time periods.

While this indicator assesses changes in the extent of wetland coverage, there is no comprehensive, landscape-scale data available for assessment of trends in the quality and function of remaining wetlands. The State of the Great Lakes Report 2019 indicates that coastal wetland habitats in Lake Superior and the northern shorelines of Lake Huron are generally in better condition and show fewer signs of impairment than wetlands in Lakes Erie and Ontario. (ECCC and USEPA 2021)).

[Download wetland loss summary data](#)

## Results

Trend: Deteriorating    Data Confidence: Medium    Geographic Extent: Mixedwood Plains Ecozone

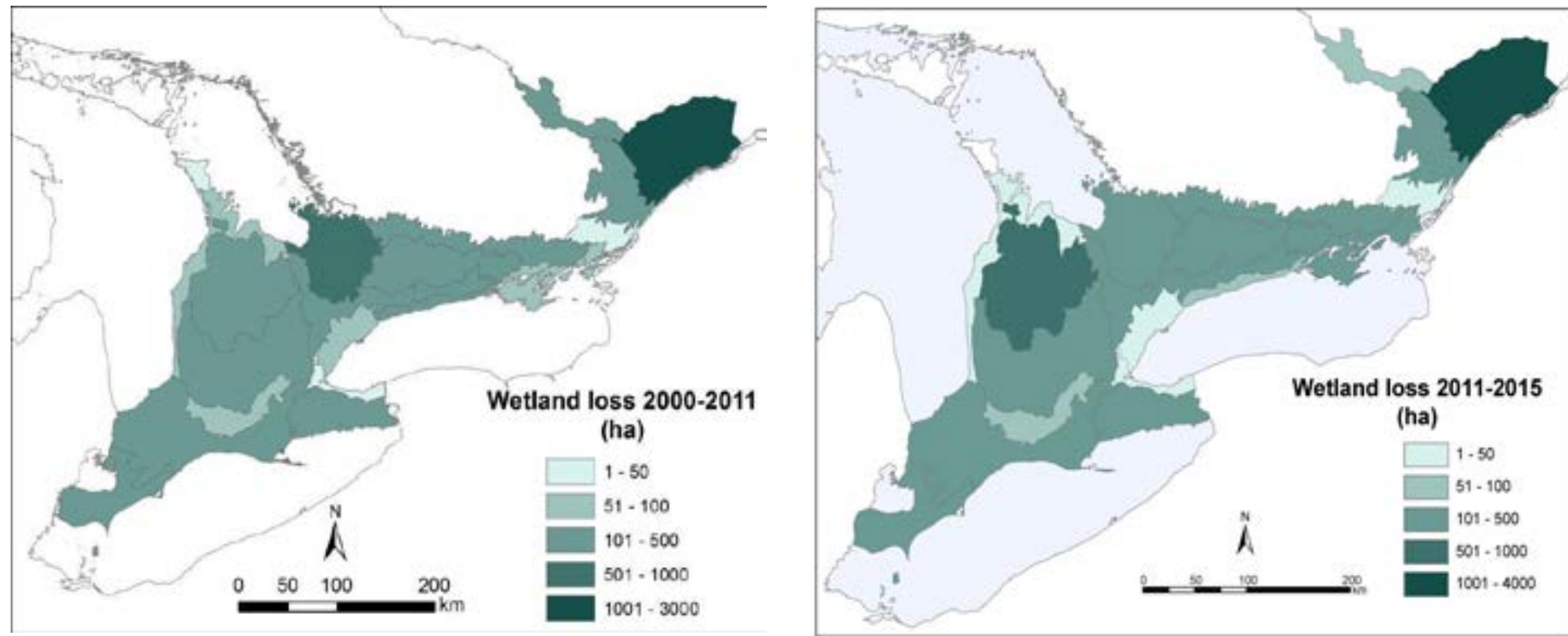


Figure 2. Area of wetlands lost in southern Ontario ecodistricts over the period 2000–2011 as well as loss between 2011–2015.

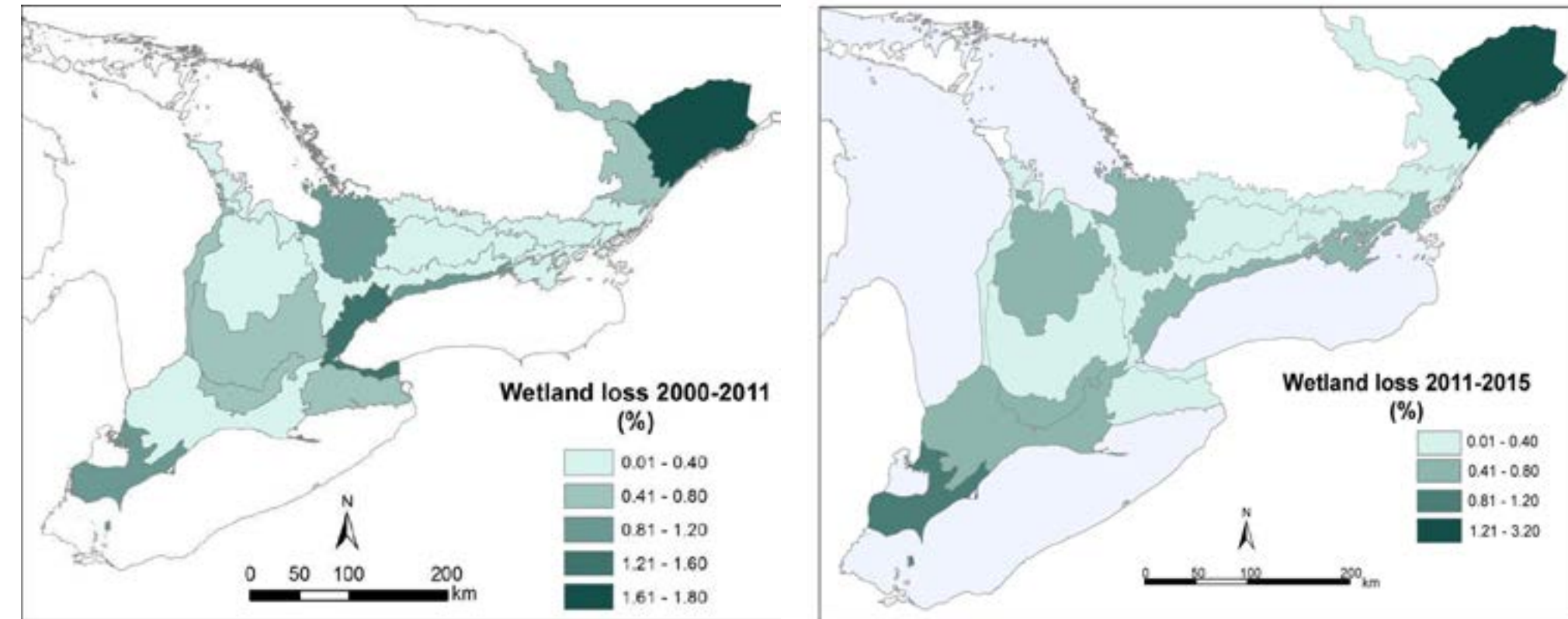


Figure 3. Percentage of wetland area lost in southern Ontario ecodistricts over the period 2000–2011 as well as between 2011–2015.

\*Ecodistrict 6E-14 (Tobermory) was assessed at a 0% loss.





## Status

- Between 2011–2015, a total of 7,303 ha of wetlands were lost. This total is higher than the previous 6,152 ha lost between 2000 and 2011. This loss represents 0.7% of remaining wetland area in southern Ontario, a value slightly greater than the 2000–2011 assessment which represented a loss of 0.6% of remaining wetlands.
- The rate of wetland loss between 2011–2015 (1,825 ha per year) is considerably higher than the rate of wetland loss previously assessed for the decade between 2000–2011 (615 ha per year).
- Similar to the previous assessment wetland losses in the Kemptville Ecodistrict (6E-12) of eastern Ontario were the highest, accounting for 53% of the total area of wetland losses between 2011–2015 (3,913 ha). This ecodistrict also had the highest percentage of wetland loss (3%).
- The Mount Forest Ecodistrict (6E-5) had the second largest area of wetland loss, 609 ha (0.41%) of wetlands were lost between 2011–2015. This number is up from the last assessment that saw a total of 492 ha of wetlands loss between 2000–2011.
- The rate of loss in Essex and Toronto appear to be decreasing however the number of wetlands left on the landscape is small and many are protected.

## Links

**Related Targets:** Invasive Species

**Related Themes:** Pressures on Biodiversity – Habitat Loss

### Web Links

Ducks Unlimited Canada – Ontario wetlands <https://www.ducks.ca/our-work/wetlands/>

Ontario Ministry of Natural Resources and Forestry – wetland conservation <https://www.ontario.ca/environment-and-energy/wetland-conservation>

Ontario Ministry of Natural Resources – wetland conservation strategy <https://www.ontario.ca/page/wetland-conservation-strategy>

Ontario Ministry of Municipal Affairs and Housing – Provincial Policy Statement <https://www.ontario.ca/page/provincial-policy-statement-2020>

Environment Canada – wetlands of Ontario <http://www.ec.gc.ca/tho-wlo/default.asp?lang=En&n=06269065-1>

Ontario GeoHub - Southern Ontario Land Resource Information System (SOLRIS) 3.0 – <https://geohub.lio.gov.on.ca/documents/lio::southern-ontario-land-resource-information-system-solris-3-0/about>

The State of the Great Lakes Report 2019 (ECCC and USEPA 2021) <https://binational.net/2020/06/03/sogl-edgl-2019-2/>

## References

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Environment and Climate Change Canada (2016) Canadian Environmental Sustainability Indicators: Extent of Canada's Wetlands. [Available at: [www.ec.gc.ca/indicateurs-indicators/default.asp?lang=en&n=69E2D25B-1](http://www.ec.gc.ca/indicateurs-indicators/default.asp?lang=en&n=69E2D25B-1)]

[https://www.canada.ca/content/dam/eccc/migration/main/indicateurs-indicators/69e2d25b-52a2-451e-ad87-257fb13711b9/4.0.b-20wetlands\\_en.pdf](https://www.canada.ca/content/dam/eccc/migration/main/indicateurs-indicators/69e2d25b-52a2-451e-ad87-257fb13711b9/4.0.b-20wetlands_en.pdf)

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Natural Resources Canada. 2011. Polarimetric RADARSAT-2 for monitoring Canadian wetlands. Natural Resources Canada, Ottawa, ON. [Available at: [http://www.nrcan.gc.ca/sites/www.nrcan.gc.ca/files/earthsciences/pdf/sarrso/pdf/polarimet\\_e.pdf](http://www.nrcan.gc.ca/sites/www.nrcan.gc.ca/files/earthsciences/pdf/sarrso/pdf/polarimet_e.pdf)]

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Ontario Ministry of Natural Resources and Forestry (OMNR). 2019. Southern Ontario Land Resource Information System Version 3.0 – Ontario Ministry of Natural Resources and Forestry, Peterborough, ON.

Ontario Ministry of Natural Resources (OMNR). 2014. Wetland conservation. [Available at: <https://www.ontario.ca/environment-and-energy/wetland-conservation>]

### Citation

Ontario Biodiversity Council. 2021. State of Ontario's Biodiversity [web application]. Ontario Biodiversity Council, Peterborough, Ontario. [Available at: <http://ontariobiodiversitycouncil.ca/sobr> (Updated: July 5, 2021)].