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Data Sources and Methods for the Extent of Canada's Wetlands Indicator

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Environment Canada
Inquiry Centre
10 Wellington Street, 23rd Floor
Gatineau QC K1A 0H3
Telephone: 819-997-2800
Toll Free: 1-800-668-6767 (in Canada only)
Fax: 819-994-1412
TTY: 819-994-0736
Email: enviroinfo@ec.gc.ca

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1. Introduction

The Extent of Canada's Wetlands indicator is part of the Canadian Environmental Sustainability Indicators (CESI) program, which provides data and information to track Canada's performance on key environmental sustainability issues.

2. Description and rationale of the Extent of Canada's Wetlands indicator

2.1 Description

The indicator is a measure of the extent of Canadian wetlands, and provides a baseline from which change can be measured. A wetland is defined as a land that is saturated with water long enough to promote aquatic processes as indicated by poorly drained soils, hydrophytic vegetation and various kinds of biological activity which are adapted to a wet environment.[1]

2.2 Rationale

Wetlands are one of Earth's most productive ecosystems, providing numerous ecosystem services and supporting a disproportionately high number of species, including species at risk and significant numbers of migratory birds, fish, amphibians, a wide diversity of plants, and many other species. Despite this importance, wetlands are being lost and degraded more quickly than any other ecosystem type. This indicator can serve as a baseline to track changes over time and thereby help inform proper management of wetlands in Canada.

3. Data

3.1 Data sources

Because no national wetland monitoring system exists, data from multiple sources were combined. These include:

- CANVEC Saturated Soil Data, 2013.
- Land Cover, circa 2000, Natural Resources Canada, 2009.
- Western Canada wetland inventory, Ducks Unlimited Canada, 2009, unpublished.
- Alberta and Quebec Wetland inventory, Ducks Unlimited Canada, 2014, unpublished.
- BC Sensitive Ecosystem Inventory, British Columbia Ministry of Environment, 2005.
- New Brunswick's Wetlands Mapping System, Government of New Brunswick, 2006.

[1] National Wetlands Working Group (1997) The Canadian Wetland Classification System. 2nd edition. Edited by BG Warner and CDA Rubec. Wetlands Research Centre, University of Waterloo, Waterloo, Ontario.

- Avalon and Minipi Wetlands, Wetland and Coastal Stewardship, Government of Newfoundland and Labrador, 2014.
- Nova Scotia Wetland Inventory, Nova Scotia Department of Natural Resources, 2002.
- Southern Ontario Land Resource Information System (SOLRIS) and Land Information Ontario (LIO), Ontario Ministry of Natural Resources, 2002.
- Wetland Inventory, Government of Prince Edward Island, 2010.
- Conservation Atlas of Wetlands in the St. Lawrence Valley, Environment Canada, 2009.
- Montreal Metropolitan Community Conservation Atlas of Wetlands, Ducks Unlimited, 2010.
- Quebec Metropolitan Community Conservation Atlas of Wetlands, Ducks Unlimited, 2006.
- Canadian Wetland Inventory, Phase 1, Canadian Space Agency, Ducks Unlimited Canada, Environment Canada and North American Wetlands Conservation Council (Canada), 2013.
- La cartographie des milieux humides de la Montérégie, Canards illimitées Canada, 2012.
- Western Boreal Forest Initiative, Ducks Unlimited Canada, 2013.

3.2 Spatial coverage

National.

3.3 Temporal coverage

Circa 2000.

3.4 Data completeness

Completeness of data varies geographically, with the underlying data source (see individual data sources in section 3.1 for details). Data from sources including provincial, territorial and federal governments, as well as non-government organizations, were considered for inclusion. A minimum mapping unit of one hectare or less was required.

4. Methods

The contributing datasets use varying methodology to identify wetlands, although most are based on remotely sensed data. Wetlands are mapped as vector data, which are integrated into a master geodatabase at the national scale.

Information from each contributing dataset was classified based on the Canadian Wetland Classification System,[2] which contains five main wetland classes (bog, fen, marsh, swamp, and shallow water) that represent the types of wetlands encountered in Canada. An additional category, "partially classified," was used to preserve boundary information

[2] National Wetlands Working Group (1997) The Canadian Wetland Classification System. 2nd edition. Edited by BG Warner and CDA Rubec. Wetlands Research Centre, University of Waterloo, Waterloo, Ontario.

for wetlands that could not be classified into the main categories with existing information.

Where two or more datasets overlapped, the best dataset was selected based on the quality of collection methods and the accuracy of the data. Not all datasets had known accuracy; in these cases accuracy was assessed by comparing a sample of wetlands polygons to Landsat imagery.

The national wetland layer contains wetland data compiled from the best available data layer for each region, classified by wetland type.

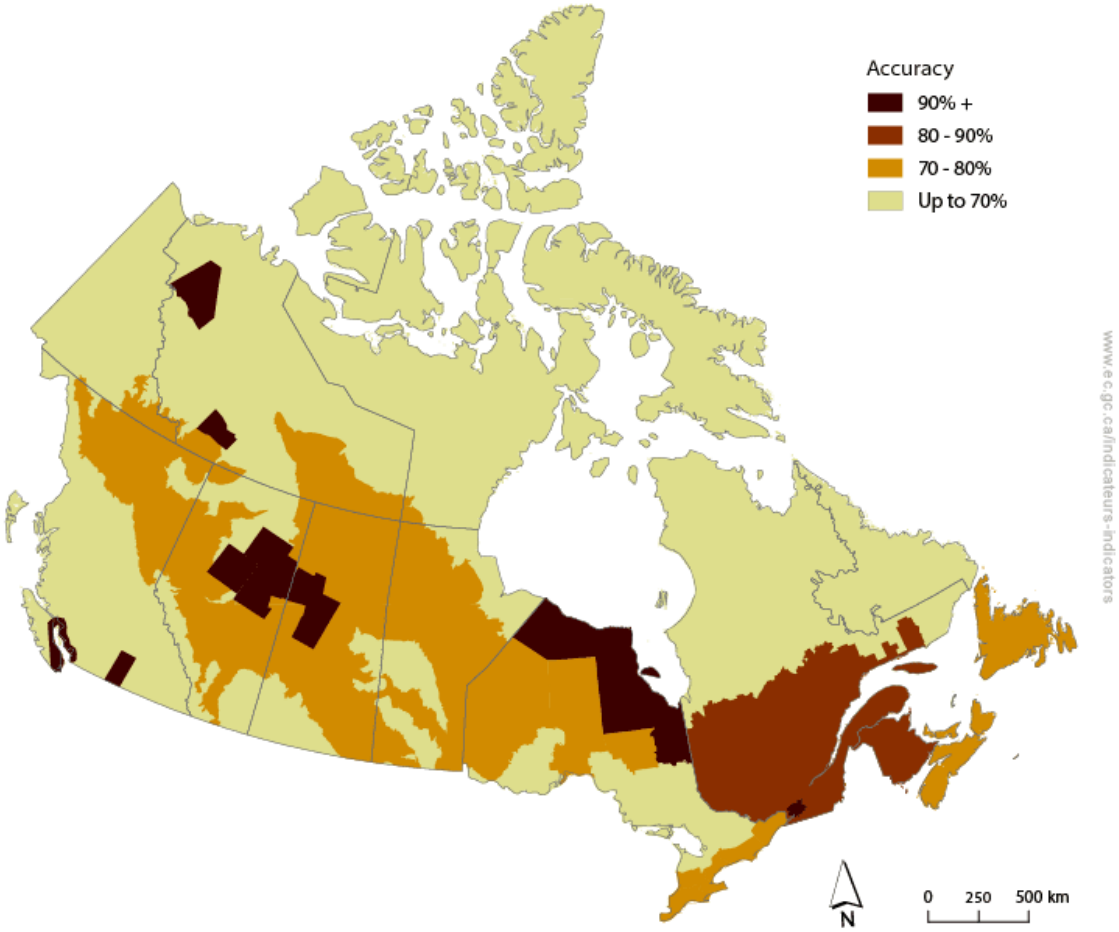
To produce the wetland map, the proportion of wetland in a 25 km by 25 km grid was calculated using ArcGIS software. These proportions were mapped as density classes using previously defined thresholds.[3]

5. Caveats and limitations

Wetlands are difficult to map in part because different types of wetlands contain different vegetation, and because they vary seasonally. The lack of a consistent vegetation pattern can lead to errors when using automated or semi-automated methods designed for remotely sensed data like aerial photographs or satellite imagery, and intensive ground campaigns are required to produce maps with low error rates. The indicator uses the highest quality datasets that are available, but accuracy varies regionally. The greatest uncertainty is in northern areas, particularly Nunavut. Datasets with lower accuracy tend to underestimate wetland extent, so national estimates are likely conservative.

[3] Wells ED and Zoltai SC (1985) The Canadian system of wetland classification and its application to circumboreal wetlands. *Aquilo Ser Botanica* 21: 45-52.

Wetland data accuracy for national wetland layer (*circa* 2000), Canada, 2014



Note: Values are estimated wetland classification accuracy of different contributing datasets. Darker colours are more accurate.

Source: Canadian Wildlife Service, 2014.

The majority of the wetland polygons (68.7%) are partially classified, meaning that they were identified as wetlands, but could not be clearly defined as bog, fen, marsh, swamp, or shallow water.

6. References and further reading

6.1 References

National Wetlands Working Group (1997) The Canadian Wetland Classification System. 2nd edition. Edited by BG Warner and CDA Rubec. Wetlands Research Centre, University of Waterloo, Waterloo, Ontario. 68 pp.

6.2 Further reading

Federal, Provincial and Territorial Governments of Canada (2010) Canadian Biodiversity: Ecosystem Status and Trends 2010, Wetlands, 2011. Retrieved on 6 November, 2014.

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Additional information can be obtained at:
Environment Canada
Inquiry Centre
10 Wellington Street, 23rd Floor
Gatineau, QC K1A 0H3
Telephone: 1-800-668-6767 (in Canada only) or 819-997-2800
Fax: 819-994-1412
TTY: 819-994-0736
Email: enviroinfo@ec.gc.ca