

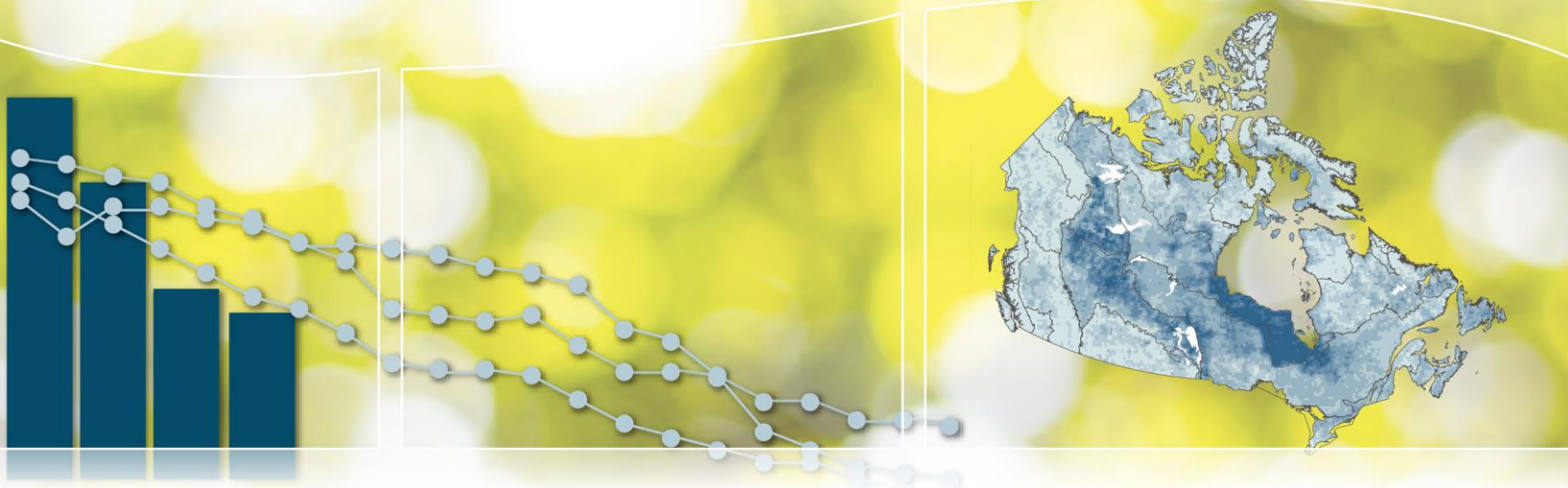


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Canadian Environmental Sustainability Indicators

Wildlife Habitat Capacity on Agricultural Land



Canada

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Canadian Environmental Sustainability Indicators

Wildlife Habitat Capacity on Agricultural Land

August 2016

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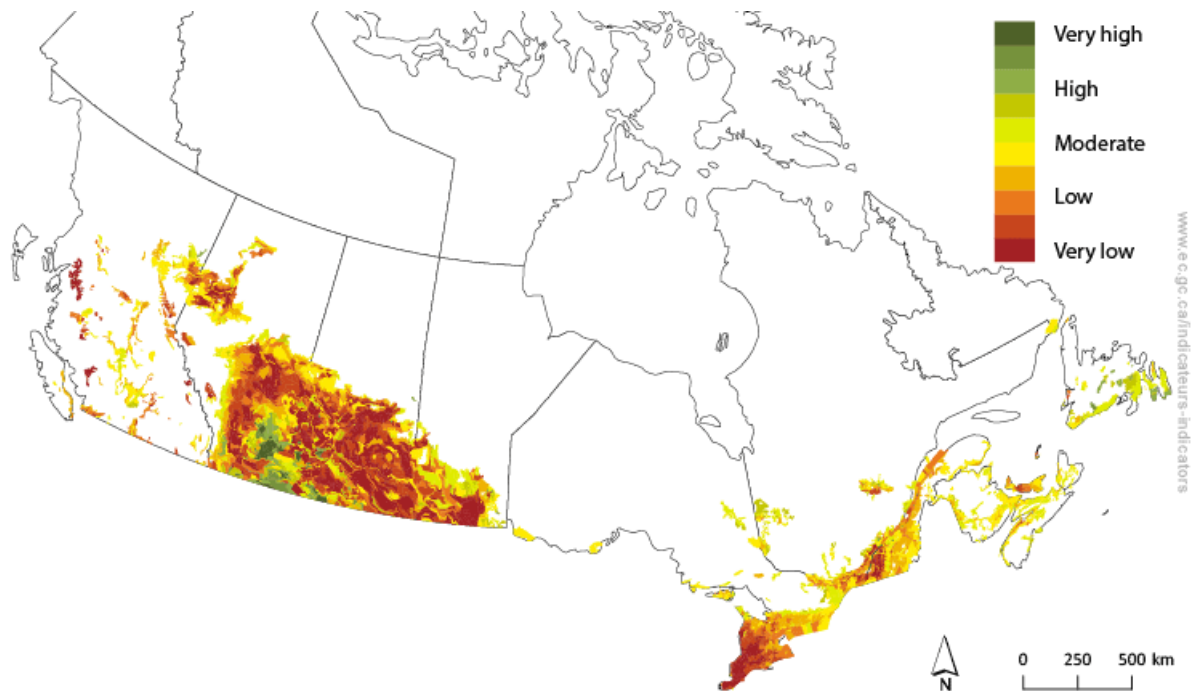
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Part 1. Wildlife Habitat Capacity on Agricultural Land Indicator

About 7% of Canada's terrestrial area is used for agriculture. Farming is concentrated in the regions of the country with suitable climate and soils. Agriculture necessarily involves significant manipulation of the vegetation of production areas, so it can have a marked impact on wildlife habitat capacity. The conservation of biodiversity in agricultural regions depends on careful management and protection of species' habitats while maintaining the food production we need.

The habitat capacity of agricultural land is higher in less intensively farmed areas. Habitat capacity is measured as the ability of the landscape to support wildlife breeding and feeding, based on the kind of vegetation present.

Figure 1. Index of wildlife habitat capacity on agricultural land, Canada, 2013



[View western Canada](#)

[View eastern Canada](#)

Note: Habitat capacity refers to the ability of the landscape to support breeding and feeding by terrestrial wild vertebrate species. Relative habitat capacity is shown as a gradient from very high (green), for areas of high habitat capacity, to very low (red), for areas of lower habitat capacity.

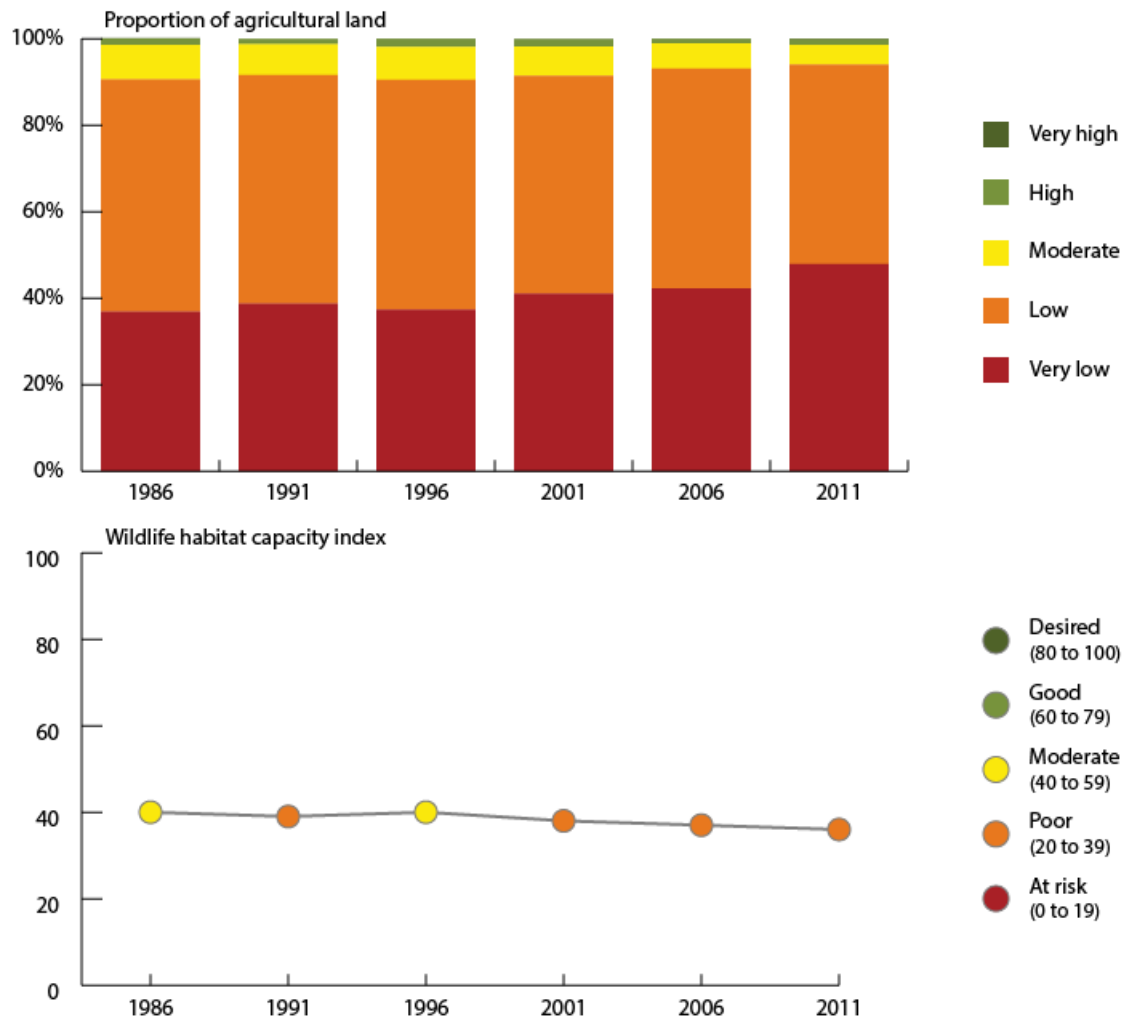
Source: Agriculture and Agri-Food Canada (2014).

Trends

While agricultural production has been increasing in recent decades, wildlife habitat in most agricultural areas is stable, with some areas decreasing and a few increasing. Results for previous years use a less precise data source and cannot be directly compared to 2013 results. However, the loss of natural and semi-natural land cover and the intensification of agricultural operations resulted in a small but measurable decline in average national habitat capacity on farmland from 1986 to 2011. Most of these declines occurred in southern

Ontario and Quebec following a reduction in pasture and hay land, and dramatic increases in soybean production. The Prairies, which account for the majority of Canada's agricultural lands, have had pockets of decline, but have remained stable in terms of their ability to provide wildlife habitat.

Figure 2. Trends in wildlife habitat on agricultural land, Canada, 1986 to 2011



[Data for Figure 2](#)

Note: The stacked columns show the proportion of agricultural land in each of five habitat capacity categories ranging from very low to very high. The line chart shows the Wildlife habitat capacity index across all agricultural land in Canada. For more information, refer to Agriculture and Agri-Food Canada's [Wildlife Habitat Capacity on Farmland Indicator](#).

Source: Agriculture and Agri-Food Canada (2014).



This indicator is used to measure progress towards [Target 5.4: Sustainable Agriculture – By 2020, agricultural working landscapes provide a stable or improved level of biodiversity and habitat capacity](#) of the [Federal Sustainable Development Strategy 2013–2016](#).

Part 2. Data Sources and Methods for the Wildlife Habitat Capacity on Agricultural Land Indicator

Introduction

The [Wildlife Habitat Capacity on Agricultural Land](#) 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. This indicator is also used to measure progress towards the goals and targets of the [Federal Sustainable Development Strategy 2013–2016](#).

Description and rationale of the Wildlife Habitat Capacity on Agricultural Land indicator

Description

The Wildlife Habitat Capacity on Agricultural Land indicator maps the relative value of farmland for wildlife. In particular, different types of vegetation and land cover are assessed based on two factors:

- 1) the number of species that can use that habitat type for breeding or feeding weighted by
- 2) a score related to the importance of the habitat type for each species.

Rationale

The Wildlife Habitat Capacity on Agricultural Land indicator provides a multi-species assessment of broad-scale trends in the potential ability of the Canadian agricultural landscape to provide suitable habitat for populations of terrestrial vertebrates.

Canada's agricultural landscape is comprised of cultivated and grazing land with associated riparian zones, wetlands, woodlands, and natural grasslands. These habitats support many species of birds, mammals, reptiles, and amphibians. As land managers, agricultural producers play a significant role in sustaining biodiversity. Conversion of natural landscapes and changes in land use (such as wetland drainage, cultivation of natural lands, overgrazing, and the loss and fragmentation of forest cover) affect wildlife habitat negatively. Conversely, conservation tillage, planting shelterbelts, responsible grazing on natural and tame grasslands, and buffering riparian areas help sustain biodiversity.

Data

Data source

Land cover data

For 2013, [Agriculture and Agri-Food Canada Annual Crop Inventory](#).

For earlier years, Canadian [Census of Agriculture](#), total area of farms and use of farm land, [CANSIM Table 004-0002](#).

Species ranges

For birds, [Digital Distribution Maps of the Birds of the Western Hemisphere](#).

For mammals, [Digital Distribution Maps of the Mammals of the Western Hemisphere](#), version 3.0.

For amphibians, [Digital Distribution Maps of the World's Amphibians](#).

For reptiles, [Digital Distribution Maps of the Reptiles of the Western Hemisphere](#).

Habitat use data

Information was gathered from a review of scientific literature and expert opinion. Habitat suitability matrices were then developed for wildlife species associated with farmland habitat (adapted from Neave and Neave, 1998).

Analysis framework

[Soil Landscapes of Canada](#) polygons.

Spatial coverage

Canada's agricultural ecumene.¹ The national agricultural ecumene includes all census blocks with 'significant' agricultural activity.

Temporal coverage

For the 2013 indicator, summer 2013. For the trends indicator, 1986–2011.

Data completeness

The geographic coverage is limited to Soil Landscapes of Canada polygons where agriculture occurs on at least 5% of the area.

Data timeliness

The wildlife habitat capacity index is based on 2013 crop data. Trends require a longer time-series, and for this reason are based on the Census of Agriculture, which is conducted every five years. The most current census data available at the time of production was for 2011.

Methods

2013 analysis:

The estimated habitat capacity of a particular land cover type was based on the number of species it supported and the value of the habitat to each species.

Each of the 63 cover types (habitats) within the Canadian agricultural landscape was assigned a value for each co-occurring species. This created a habitat association matrix for each of the 587 species of birds, mammals, reptiles, and amphibians associated with agricultural land in Canada. For species occurring in more than one ecozone, a habitat association matrix was created for each ecozone, accommodating geographic variability in habitat use.

¹ [Ecumene](#) is a term used by geographers to mean inhabited land. It generally refers to land where people have made their permanent home and to all work areas that are considered occupied and used for agricultural or any other economic purpose. Thus, there can be various types of ecumenes, each having its own unique characteristics (population ecumene, agricultural ecumene, industrial ecumene, etc.).

Each matrix contained information on habitat use and value (primary, secondary, or tertiary) for a particular species. Primary habitat refers to land cover on which a species is dependent or for which it has a strong preference. Habitat was considered secondary if a species used it but was not dependent on it. Tertiary refers to habitat not needed, but where a species is occasionally found. Values were assigned such that primary = 1, secondary = 0.75, and tertiary = 0.25. Only species requirements for breeding and feeding were considered.

A habitat capacity estimate was made for each Soil Landscapes of Canada polygon in the agricultural ecumene:

- 1) The proportion of land cover types within the polygon was estimated.
- 2) Species-specific habitat availability was calculated for each species with a range of occurrence that overlapped the Soil Landscapes of Canada polygon. Species-specific habitat availability was calculated as a weighted average of habitat use based on the relative proportion of land cover types used and the value of that habitat to the species as follows:

$$SSHA = \sum (\%LC_b \times HUV_b) + \sum (\%LC_f \times HUV_f)$$

Where: SSHA = Species-specific habitat availability, %LC = the percentage of the polygon occupied by a particular land cover type and HUV = Habitat Use Value for breeding (b) and feeding (f).

- 3) The overall Wildlife Habitat Capacity was the average (across species) of Species-specific habitat availabilities per Soil Landscapes of Canada polygon divided by two.

Trend analysis:

For the 2013 analysis, fine-grained (30 metre) data from the Annual Crop Inventory was used to estimate the land cover type proportions. However, the Annual Crop Inventory has not existed for long enough to allow the estimation of trends. The analysis for earlier years used land cover data derived from the Canadian Census of Agriculture, conducted every five years. The census was designed to gather economic information and uses much broader land use categories. Many important habitat types were included in the category "All Other Land," including wetland, riparian zones, shelterbelts, woodland, and idle land/old fields. Farm buildings, greenhouses, and lanes are also included in "All Other Land." While broad trends can be detected, important details cannot be captured.

Applying habitat values to a broad category like "All Other Land" is difficult. For this reason, the trend analysis considers only whether habitats are used or not and does not assign primary, secondary and tertiary values. The balance of the analysis is the same as for the 2013 analysis.

For graphing purposes, wildlife habitat capacity values were divided into five categories, based on the national distribution of habitat capacity scores from all reporting Soil Landscapes of Canada polygons: Very low (< 26.0), Low (26.0 to 42.5), Moderate (42.6 to 59.5), High (59.6 to 76.0), and Very high (> 76.0).

Caveats and limitations

The indicator only addresses habitat capacity for terrestrial vertebrate species. For these species, only two categories of habitat use are considered: breeding (nesting, reproduction) and feeding (foraging). Other needs, such as water, hiding from predators, resting, roosting, and basking are not included. Use is only considered for the summer season, excluding wintering habitat and use during migration.

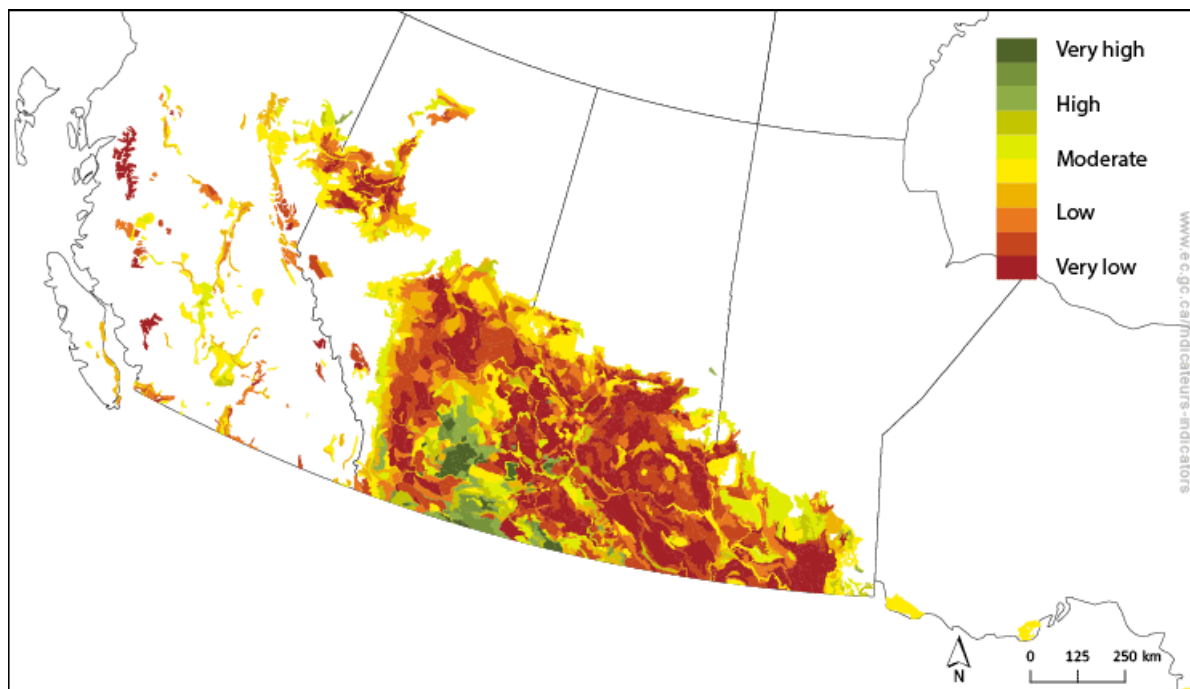
The indicator deals only with the quantity of habitat and does not address quality, habitat fragmentation or the influence of landscape pattern (composition and configuration) on wildlife.

Before 2013, calculation of the indicator was limited by the lack of detailed national land cover data required to provide spatial and temporal estimates of the diverse habitats contained in the "All Other Land" category.

Part 3. Annexes

Annex A. Regional figures

Figure A.1. Index of wildlife habitat capacity on agricultural land, western Canada, 2013

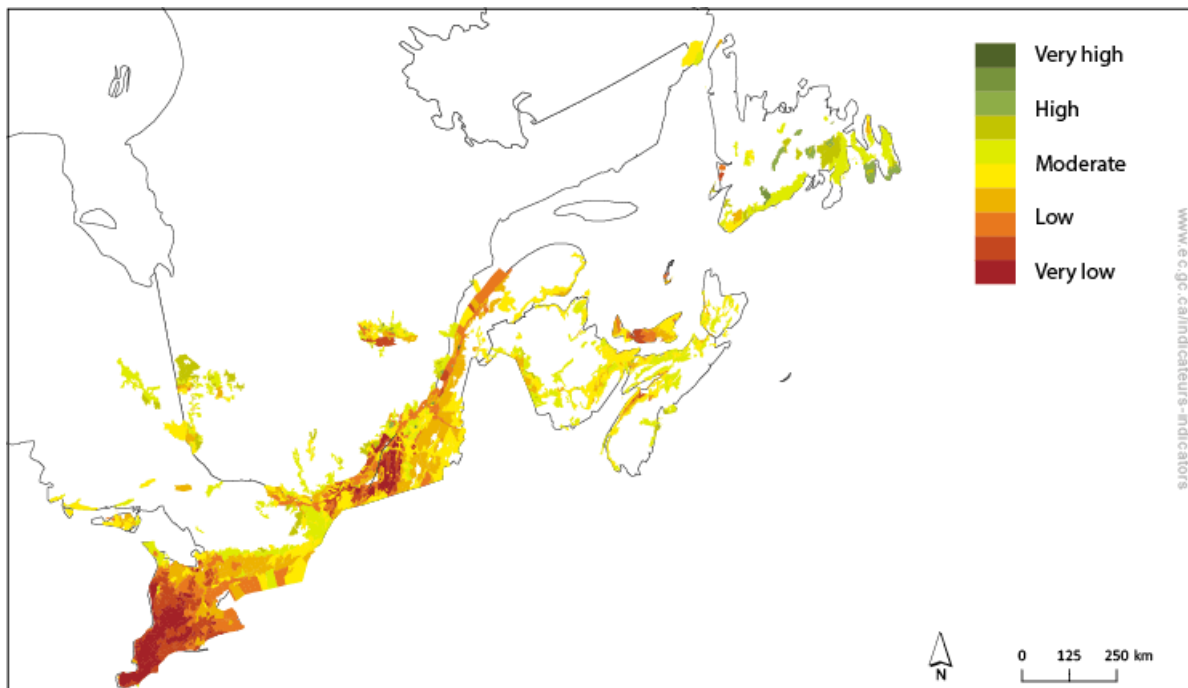


[Return to Figure 1](#)

Note: Habitat capacity refers to the ability of the landscape to support breeding and feeding by terrestrial wild vertebrate species. Relative habitat capacity is shown as a gradient from very high (green), for areas of high habitat capacity, to very low (red), for areas of lower habitat capacity.

Source: Agriculture and Agri-Food Canada (2014).

Figure A.2. Index of wildlife habitat capacity on agricultural land, eastern Canada, 2013



[Return to Figure 1](#)

Note: Habitat capacity refers to the ability of the landscape to support breeding and feeding by terrestrial wild vertebrate species. Relative habitat capacity is shown as a gradient from very high (green), for areas of high habitat capacity, to very low (red), for areas of lower habitat capacity.

Source: Agriculture and Agri-Food Canada (2014).

Annex B. Data tables for the figures presented in this document

Table B.1. Data for Figure 2. Trends in wildlife habitat on agricultural land, Canada, 1986 to 2011

Year	Land with very high habitat capacity (percentage)	Land with high habitat capacity (percentage)	Land with moderate habitat capacity (percentage)	Land with low habitat capacity (percentage)	Land with very low habitat capacity (percentage)	Wildlife habitat capacity index
1986	0.1	1.5	7.9	53.7	36.9	40
1991	0.0	1.2	7.1	52.9	38.7	39
1996	0.1	1.8	7.6	53.2	37.3	40
2001	0.1	1.6	6.8	50.4	41.0	38
2006	0.1	1.0	5.8	50.9	42.2	37
2011	0.2	1.3	4.5	46.1	47.9	36

Note: For more information, refer to Agriculture and Agri-Food Canada's [Wildlife Habitat Capacity on Farmland Indicator](#).

Source: Agriculture and Agri-Food Canada (2014) [Wildlife Habitat Capacity on Farmland Indicator](#).

Annex C. References and additional information

References and further reading

Javorek SK, Antonowitsch R, Callaghan C, Grant M and Weins T (no year) AEI Technical Supplement, [Wildlife Habitat on Farmland: Methodology](#). (PDF; 44.7 KB) Retrieved on April 9, 2015.

Javorek SK and Grant MC (2011) [Technical Thematic Report No. 14. – Trends in wildlife habitat capacity on agricultural land in Canada, 1986–2006](#). Retrieved on April 22, 2015.

Neave P and Neave E (1998) Habitat and Habitat Availability Indicator. Report produced for Agri-Environmental Indicator Project. Agriculture and Agri-Food Canada.

Related information

[Discover Agriculture](#)

[Environmental Sustainability of Canadian Agriculture: Agri-Environmental Indicator Report Series – Report #4](#)

[Extent of Canada's Wetlands](#)

[An Overview of the Canadian Agriculture and Agri-Food System 2016](#)

[Risk to Soil and Water Quality from Agriculture](#)

[Trends in Canada's Migratory Bird Populations](#)

[We Grow a Lot More Than You May Think](#)

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