15 Availability of Wildlife Habitat on Farmland

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Geographic scope: National, ecozones
Time series: 1981, 1991, 1996

HIGHLIGHTS

- Loss and alteration of habitat is the leading cause of depletion of the earth's wildlife species, and thus of biodiversity. Conversion of natural land to agriculture has contributed to declining wildlife habitat, but agriculture also offers better habitat than some other land uses by humans, such as urban development. Wildlife on farmland offer both advantages (e.g., aesthetic appeal, hunting, fishing) and disadvantages (e.g., reduced crop yields).

- An indicator of Availability of Wildlife Habitat on Farmland was developed for the seven main ecozones in which agriculture is practised in Canada. The indicator identifies the share (%) of habitat use units associated with agricultural habitat types that have increased, decreased, or remained constant in area between 1981 and 1996. The assessment is based on habitat use by mammals, birds, reptiles, and amphibians known to occur in the agricultural areas of each ecozone. The indicator also notes changes in the distribution of agricultural habitat types during this period. A national performance objective has not yet been set, though objectives exist in specific habitat conservation programs throughout the country.

- To construct the indicator, habitat availability matrices were developed for each of the seven ecozones. These matrices specify how various wildlife species use agricultural land to meet their habitat needs (e.g., breeding, feeding, cover, staging, winter use). Each use of a habitat type by a species was recorded as one habitat use unit. Habitat use units were then summed by habitat type for each ecozone. The five habitat types assessed correspond to the five main land use categories defined in the 1996 *Census of Agriculture* (Cropland, Summerfallow, Tame or Seeded Pasture, Natural Land for Pasture, and All Other Land).

- All agricultural land has some value as wildlife habitat, but the All Other Land and Natural Land for Pasture census categories support the most habitat use units, followed by Cropland and Tame or Seeded Pasture. Summerfallow is used little as habitat by wildlife.

- The indicator shows positive trends in the availability of habitat on farmland in three ecozones. Habitat area increased for 86% of habitat use units in the Boreal Plains, 80% in the Prairies, and 73% in the Atlantic Maritime ecozones. In contrast, habitat area decreased for 74% of the habitat use units in the Mixedwood Plains and 75% in the Pacific Maritime ecozones. Habitat area remained relatively constant for 75% of habitat use units in the Boreal Shield and 79% of habitat use units in the Montane Cordillera.

- Reduced area in Summerfallow and expanded area in All Other Land and Tame or Seeded Pasture account for most increases in habitat availability between 1981 and 1996. Decreases in habitat availability are mainly the result of the expansion of Cropland through the conversion of farmland more suited as wildlife habitat, such as Natural Land for Pasture and All Other Land.

- Once additional information is gathered on how much more optimal farmland habitat is needed, if any, regional planners can set habitat goals and objectives to meet the needs of specific species groups and ecosystems.

The Issue

Each year, many of the earth's wild animal and plant species are depleted or lost to extinction, some because of natural causes and many others because of human activity. By far the main cause of wildlife loss is degradation or loss of habitat because of human encroachment through urbanization, logging, mining, agriculture, fishing, and other activities (including those that result in pollution or the introduction of exotic species).

Wildlife habitat includes all the things that a species needs to survive — food, water, cover, and home range (space). Habitat must also provide for special needs such as reproduction and dispersal. Species may use different portions of the landscape to meet their resource needs.

Habitat availability

Wildlife species may use different parts of the landscape to meet their need for resources. Habitat availability — how well a species can meet its needs in a certain landscape — is determined by

- the abundance of the habitat type within the potential range for a species
- the current occupancy rate of the habitat type
- the patchiness of the landscape (size of, and distance between, habitat patches)
- access to, and connectance of, the habitat patches
- how the species' needs change through the seasons
- the occurrence of competitors, predators, and disease.

Natural landscapes are variable by nature, and most species use different landscape components to meet different resource needs over time. Differences in the quality of habitat patches and their position in the landscape determine the survival and distribution of a species. How these patches are connected, and how accessible they are to wildlife are also important aspects. For example, certain landscape features may act as a physical barrier or make a species vulnerable to predation.

Agroecosystems can be a mosaic of cropland, pasture, woodland, and wetland. This patchiness greatly benefits some species, such as the white-tailed deer. Other species, such as the Red-shouldered Hawk, are not as successful in patchy environments. They require large blocks of mature forest to reproduce successfully. Fragmentation of habitat blocks and the creation of additional edge can lead to greater competition, nest parasitism, and nest predation for such species.

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Their ability to meet all their needs is related to both *habitat quality* and *habitat availability* (*see* Box). If the actual area of habitat is limited, or if the habitat is of poor quality (offering limited food resources or little protection against predators), certain species will not be able to use the area to meet their needs.

Agroecosystems differ from natural ecosystems because they are managed to be more productive for human purposes. Agriculture has reduced the quantity of natural habitat, mainly through conversion of the natural landscape and changes in land use, such as drainage of wetlands and removal and fragmentation of forest cover. It can also affect the quality of wildlife habitat through various land management practices, such as tillage, fertilization, pesticide use, and intensive grazing.

Some wildlife species are able to thrive where native habitat has been replaced by agricultural habitat. Other species become restricted to the remnants of natural or semi-natural habitats remaining in the agricultural landscape. Despite the continual change of habitat in agroecosystems, agricultural lands offer more benefits to wildlife than more-developed areas, such as urban areas. These benefits include

- shelter, in the form of trees and shrubs (e.g., shelterbelts, woodlots), grass, and water
- a ready supply of food
- close proximity of natural landscapes
- less human pressure than in urban areas.

Wildlife on farmland offers many benefits to farmers and to all Canadians, including aesthetic aspects, recreational opportunities (hunting, fishing), and, in some cases, economic opportunity (e.g., ecotourism). In many cases farmers are actively managing their land to benefit wildlife. At the same time, wildlife have the potential to reduce a farm's productivity (e.g., by trampling or eating crops) and may pose a cost to the farmer.

One element of understanding how agriculture affects the environment is by assessing the availability of wildlife habitat on Canada's farmland.

The Indicator

Description

To assess how agriculture generally affects habitat availability, we developed an indicator that can be assessed for each of the seven main terrestrial ecozones in which agriculture is practised. This Availability of Wildlife Habitat on Farmland indicator identifies the ways in which various wildlife species use agricultural habitat types, and then relates this use to changes in the area of these habitats. The indicator is then used to identify which habitat types in the agricultural landscape support the most wildlife use and whether these types increased, decreased, or remained constant in area between 1981 and 1996. A trend of increasing area for superior agricultural habitats is positive for this indicator. Although national objectives for this indicator have not yet been established (*see* Response Options), some objectives exist in specific habitat conservation programs throughout the country.

Method of calculation

To construct the indicator, *habitat availability matrices* were developed by ecozone for individual wildlife species associated with farmland habitat. A habitat availability matrix is a chart that relates habitat type found on agricultural land to habitat use by a wildlife species. A matrix was constructed for each bird, mammal, amphibian, and reptile known to use agricultural land and adjacent habitats in Canada to meet one or more specific habitat requirements. Species lists were developed from accepted wildlife guidebooks and expert opinion.

The vertical axis of the matrix lists agricultural habitat types. At the most general level, these correspond to the land use categories covered by the *Census of Agriculture:*

- *Cropland*
- *Summerfallow*
- *Tame or Seeded Pasture*
- *Natural Land for Pasture*
- *All Other Land*.

These broad categories were then subdivided to more precisely reflect different habitats found on agricultural land. Cropland was sub-divided into crop type (e.g., wheat, canola, corn). Natural Land for Pasture was divided into natural grassland, sagebrush/shrubs, and shrubs/woodland. All Other Land, rated the most valuable habitat type, was subdivided into buildings, shelterbelts, woodland types (e.g., plantations, woodlands with or without interior), and *wetland* types (e.g., *riparian* areas, shallow wetlands with or without extensive margins, and deep permanent ponds with or without extensive margins).

The horizontal axis of each matrix lists five main categories of habitat use:

- breeding, nesting, reproduction
- feeding, foraging
- cover, resting, roosting, basking, and loafing
- wintering
- *staging* (for birds only).

Each separate use of a habitat type by a species was recorded as one *habitat use unit* (i.e., the habitat use unit is not the number of species using a habitat, but the number of individual ways in which the habitat is used. For example Mallard feeding, Mallard nesting, and Mallard loafing in one habitat type would equal three habitat use units).

When completing the matrices, each habitat use was ranked according to how dependent a species is on a certain habitat for this use. Primary use means that a species is dependent on, or strongly prefers, a certain type of habitat (equivalent to the concept of *critical habitat*). Secondary use means that a species uses a certain habitat (e.g., to obtain food) but is not totally dependent on it. Tertiary use means that a habitat type is not needed by a species, but it might occasionally be observed there. A matrix cell was left blank if the species was not typically found in that habitat, or marked with an X if the species is known to avoid that habitat.

To summarize the data, primary and secondary habitat use entries were separately summed for the five main use categories, and then habitat use units were summed by habitat type for each ecozone. Changes in habitat area supporting these habitat use units were then analyzed to calculate the indicator. The data on habitat area were obtained from the *Census of Agriculture*.

Limitations

Because the indicator records only information about the absence or presence of certain habitat uses, it does not tell us much about habitat quality. An effort was made to factor in habitat

quality by dividing three census land use types (Cropland, Natural Land for Pasture, and All Other Land) into finer categories that have different value for different species. However, the great variation in quality across the five main habitat types shows the difficulty in using census data for habitat studies. For example, All Other Land includes land unsuitable for most wildlife, such as land occupied by lanes, greenhouses, and farm buildings. Also, some farm operators may not report wetlands and woodlot area in the All Other Land category. Separating wetlands and woodlands out from the All Other Land category would prove useful in further development of this indicator.

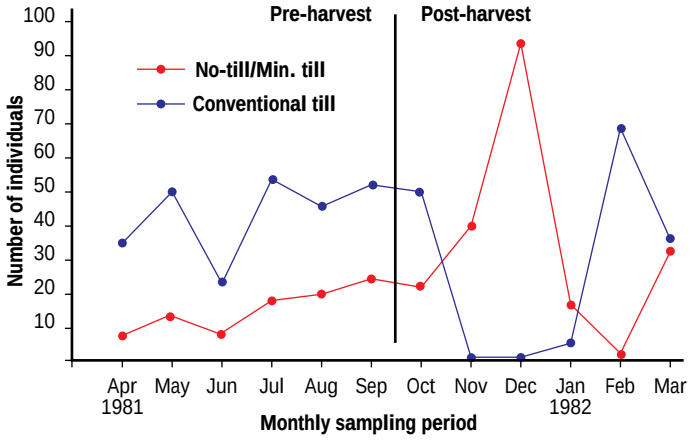
Effects of tillage on wildlife

In the past 15 years, many farmers have begun to replace conventional tillage practices with conservation tillage, including no-till. Conservation tillage makes fewer or no passes of equipment on the field and leaves more crop residue on the soil surface. Among other effects on the soil, this type of tillage

- reduces disturbance of the soil
- changes the soil's moisture regime and bulk density
- increases levels of soil organic matter.
- decreases the risk of soil erosion from wind and water.

Several studies have shown that wildlife benefits from conservation tillage. For example, invertebrate numbers have been shown to rise as a result of the protection afforded by the crop residue cover and the reduction in the mortality caused by plowing. Many species of birds become more common as their prey invertebrates grow in numbers.

Frequency of birds recorded in no-till and conventionally tilled corn



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Related to this, the indicator does not consider how successful a habitat use is. Success of use is sometimes reflected in the ranking system (e.g., for Mallard nesting, a primary ranking was used for habitats where nesting success is high and a secondary ranking for habitats with lower nesting success). This information was often available for waterfowl, but rarely for other species. Thus, even if a type of wildlife habitat increases in area, that habitat may not be of sufficient quality to support successful reproduction and maintain a population.

Using the broad land use categories does not account for biological factors that may limit a species' use of a particular habitat type. For example, a species may not use a habitat because

- one requirement is met (e.g., food), while other requirements are not (e.g., water, nest site)
- the habitat is too fragmented
- there may be behavioural barriers to use
- the preferred habitat is occupied.

Another limitation is that the indicator does not examine the effects of various land management practices. The effects on habitat use of practices such as tillage (*see* Box) and weed control practices have, however, been reported elsewhere.

Results

Table 15-1 shows the share or proportion of farmland in five different agricultural habitat types and the share of habitat use units supported by each of the five habitat types in the seven ecozones studied. Although all five habitat types are used by wildlife in all seven ecozones, Natural Land for Pasture and All Other Land support the most habitat use units across all ecozones.

After dividing Natural Land for Pasture and All Other Land into more specific habitat types, it was evident that those most important for wildlife are woodlots with and without interior, riparian areas, and shallow and deep wetlands with margins. In ecozones where these habitats are present, sagebrush/other shrub, and natural grasslands are also favoured by wildlife. Cropland and Tame or Seeded Pasture support less use by wildlife, and Summerfallow supports less than 1% of habitat use units for the wildlife species analyzed.

Table 15–1

Agricultural habitat types and associated habitat use units in 1996

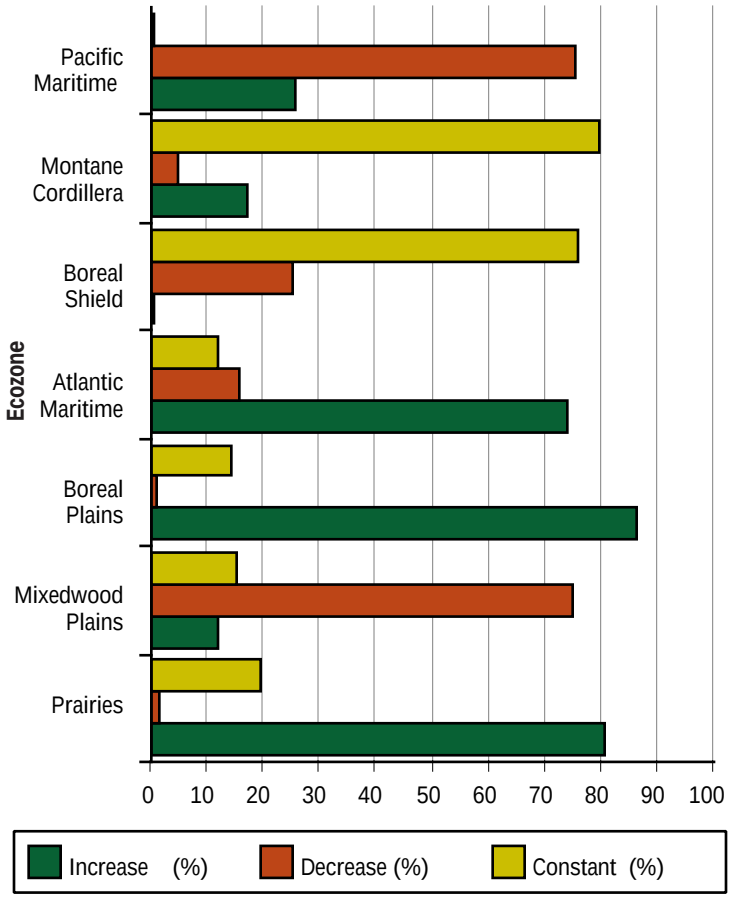
Ecozone	Total farmland area evaluated (1000 ha)	Share (%) of farmland (1) and share of total habitat use units (2) associated with various agricultural land uses										Total primary plus secondary habitat use units
		Cropland		Summerfallow		Tame or Seeded Pasture		Natural Land for Pasture		All Other Land		
		1	2	1	2	1	2	1	2	1	2	
Pacific Maritime	139	49	7	<1	<1	11	3	26	17	14	73	3048
Montane Cordillera	1532	16	9	<1	<1	9	3	62	17	13	70	4011
Boreal Plains	13 445	49	13	5	<1	10	3	24	14	12	69	3098
Prairies	41 853	53	17	13	<1	5	4	24	19	5	59	3865
Boreal Shield	1245	37	8	1	<1	9	3	24	14	29	75	3262
Mixedwood Plains	6294	75	11	<1	<1	6	3	10	14	9	71	3784
Atlantic Maritime	1546	40	12	<1	<1	8	3	13	12	39	73	2792

Figure 15-1 shows the share of habitat use units supported by habitat area that increased, decreased, or remained constant between 1981 and 1996. Three ecozones — the Boreal Plains, Prairies, and Atlantic Maritime — show positive trends. In the Boreal Shield and Montane Cordillera, 75 and 79% of habitat use units are associated with habitat area that remained constant. In two ecozones, the Mixedwood Plains and the Pacific Maritime, 74 and 75% of habitat use units were associated with habitat area that decreased.

Changes in the area of the five agricultural habitat types between 1981 and 1996 are given in Table 15-2. The distribution of All Other Land is shown for western (Fig. 15-2) and eastern Canada (Fig. 15-3).

Figure 15–1

Share of habitat use units for which habitat area increased, decreased, or remained constant between 1981 and 1996



Interpretation

The availability of wildlife habitat on Canadian farmland is a function of many factors, including land use. Agricultural land use has changed over the past 15 years because of changing demands in world markets and domestic policy (Table 15-2). Other factors that contribute to change in the agricultural landscape include

- crop prices
- availability of new crop varieties
- growing use of conservation farming techniques
- new technology.

Figure 15–2

Western Canadian distribution of the census land use category All Other Land in 1996

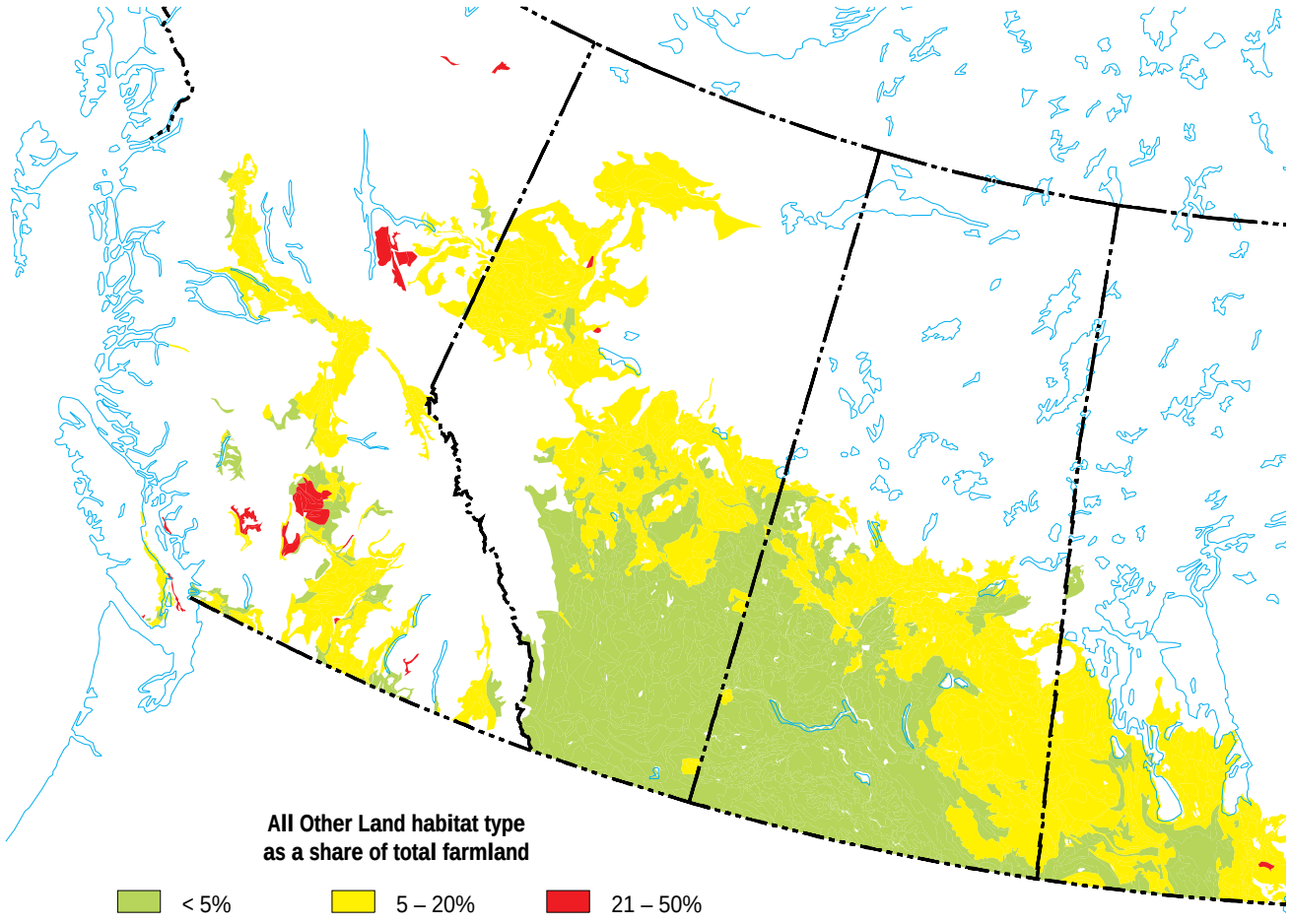


Table 15–2

Change in the areas of agricultural habitat types between 1981 and 1996

	Per cent change in area					
Ecozone	Cropland	Summerfallow	Tame or Seeded Pasture	Natural Land for Pasture*	All Other Land*	Total Farmland
Pacific Maritime	28	–	–46	6	–21	2
Montane Cordillera	constant	–	–33	7	constant	11
Boreal Plains	15	–47	41	constant	8	13
Prairies	17	–33	13	constant	16	3
Boreal Shield	–21	–	–55	–7	constant	–24
Mixedwood Plains	35	–	–50	constant	–19	10
Atlantic Maritime	constant	–	–52	–9	13	–20

* the change in the area of Natural Land for Pasture and All Other Land is calculated between 1991 and 1996 because of the change in the census definition for these land uses between 1981 and 1991.

Note: A positive number denotes a proportionate increase in area, a negative number denotes a proportionate decrease.
— signifies that this habitat type is insignificant in this ecozone.

On the whole, the availability of wildlife habitat on farmland grew between 1981 and 1996 mainly because of the expansion of Cropland as a result of reducing Summerfallow, and the expansion of All Other Land. Tame or Seeded Pasture and Natural Land for Pasture remained relatively constant, which also helped maintain habitat availability. Summerfallow is most commonly utilized in the Boreal Plains and Prairies, where the area under this practice declined by 47% and 33%, respectively, between 1981 and 1996. Land taken out of Summerfallow is usually converted to Cropland or Tame or Seeded Pasture, both of which are more suitable wildlife habitat.

In both the Pacific Maritime and Mixedwood Plains ecozones, agriculture has become more intensive in recent years. Farmland previously used for other purposes, such as woodlots or native pasture, has been brought into crop production, reducing its value as wildlife habitat. A discussion of changes in habitat by ecozone follows.

Pacific Maritime

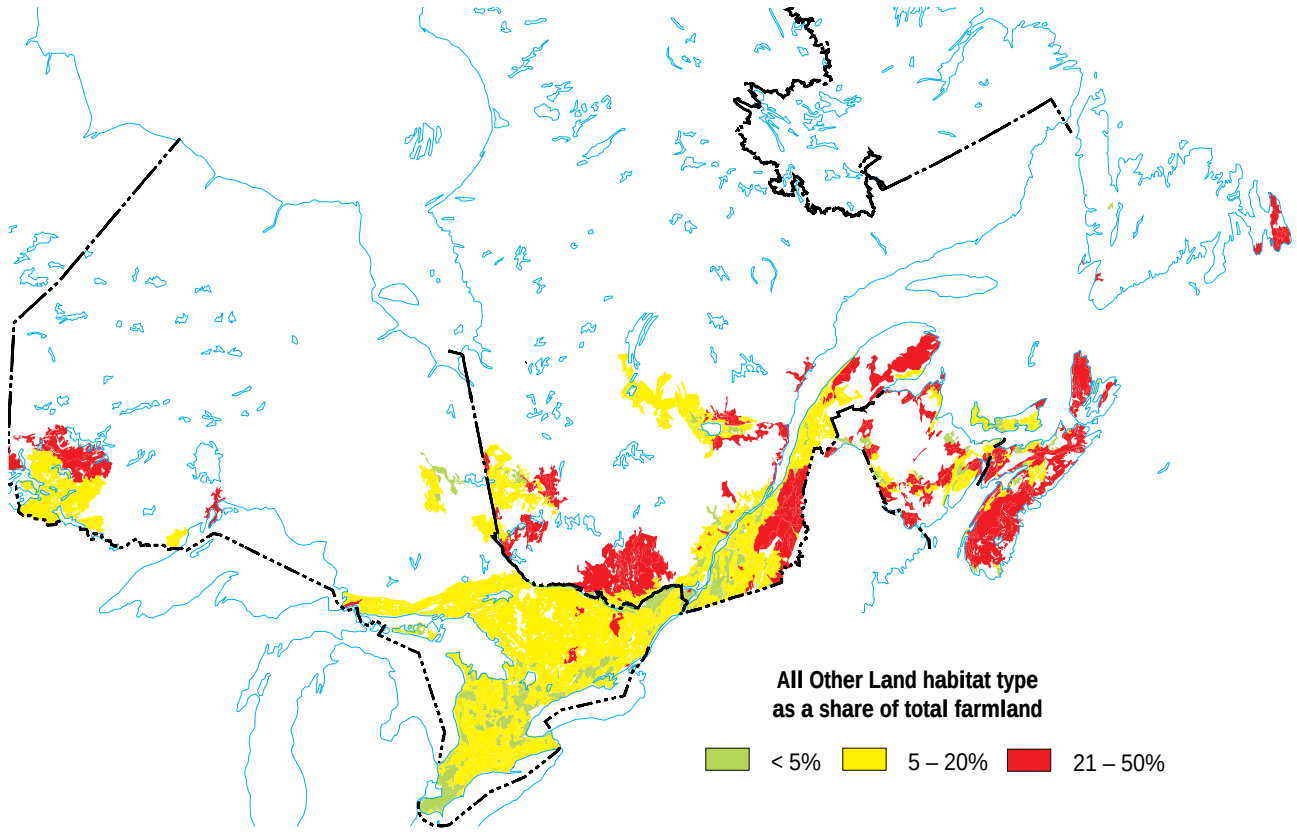
Urbanization, agriculture, and wildlife habitat are often conflicting land uses in the Georgia Basin, particularly the Lower Mainland of British Columbia. Between 1981 and 1996, the area of farmland (the sum of the area of the five census land uses, or habitat types, analyzed for this indicator) grew by 2% in this ecozone. However, Cropland grew by 28%, a negative trend for wildlife because much of this expansion came from conversion of Tame or Seeded Pasture and All Other Land, two habitat types more favourable for wildlife.

Montane Cordillera

Habitat has changed in this ecozone as a result of the reduced quality of native grassland because of fire suppression, the introduction of cattle and non-native wildlife, and drainage of wetlands. Forestry, the main industry, also strongly affects wildlife habitat in the Montane Cordillera, where the most diverse mix of ecosystems in Canada occurs.

Figure 15–3

Eastern Canadian distribution of the census land use category All Other Land in 1996



However most agricultural areas in this ecozone have a balanced distribution of the five main agricultural habitat types. Even where the most valuable agricultural habitats are limited in area, there are usually areas of forest adjacent to farmland, providing ample cover. The area of farmland grew by 11% between 1981 and 1996, while that of Cropland remained steady. The area of Natural Land for Pasture grew between 1991 and 1996, and that of All Other Land remained relatively constant (an increase of 5%).

Boreal Plains

Total farmland in this ecozone expanded by 13% between 1981 and 1996 and is having a greater effect on wildlife habitat. Logging is also a major influence on wildlife habitat.

Wildlife on intensively managed farmland in British Columbia

The Delta Farmland and Wildlife Trust was established by farmers and conservationists in 1993 to support and promote the sustainability of farmland and wildlife habitat in the lower Fraser River delta. The delta is a major stopover for birds migrating on the Pacific Flyway. It also has the highest density and diversity of waterfowl, shorebirds, and birds of prey in Canada during the winter season. The Canadian Wildlife Service and other wildlife agencies recognize that delta farmland is absolutely critical (e.g., for food, nesting, roosting) for the continued survival of the 1.5 million birds that annually use this area.

During the winter months, Wigeon, Snow Geese, and Trumpeter Swans make extensive use of planted winter cover crops (e.g., barley, winter wheat, fall rye), as well as crop residues from corn and potato fields. In 1998, the Delta Farmland and Wildlife Trust sponsored the planting of more than 1539 hectares of cover crops at a cost of $171 000. The other major field program they support is grassland set-asides. Cooperating farmers take intensively farmed fields out of production for 3 to 5 years and plant them to grass, providing habitat for small mammals, which are the main source of food for raptors (e.g., owls, hawks, and eagles). In 1998, about 243 hectares were enrolled in this program at a cost of $180 000.

The Trust has also been encouraging farmers to plant hedgerows, which provide habitat for a wide variety of songbirds, such as American Robin, Black-capped Chickadee, Savannah Sparrow, and many more. Several kilometres of hedgerows have been planted in the last couple of years. All of the programs promoted by the Delta Farmland and Wildlife Trust provide benefits to both the exceptional wildlife resource in the Fraser Valley and the agricultural community.

R.A. Bertrand, British Columbia Ministry of Agriculture and Food

The area of Cropland grew during this period, as did that of Tame or Seeded Pasture and All Other Land between 1991 and 1996, mainly as Summerfallow was reduced. Natural Land for Pasture stayed the same. Expansion of All Other Land and Tame or Seeded Pasture is deemed beneficial for wildlife, because these types support more habitat use units.

The irregular distribution of farmland in the Boreal Plains allows nonagricultural habitats, for the most part, to be readily available to wildlife. Farmland is generally mixed with the dominant forest cover types, such as

- coniferous forest (51% of the ecozone's land base)
- mixedwood forest (23%)
- deciduous forest (17%).

This mix of forest and farmland benefits most wildlife species by providing edge habitat, forest interior habitat, and proximity to both food and cover.

Prairies

Today almost 93% of the Prairies ecozone is agricultural land. All that remains of the original native vegetation is an estimated

- 1% of tall grass prairie
- 19% of mixed grass prairie
- 16% of aspen parkland.

Thus, wildlife must co-exist with agriculture, often using agricultural and neighbouring lands as habitat.

In the Prairies, the area of Cropland, Tame or Seeded Pasture, and All Other Land increased between 1981 and 1996 mainly because of the 3% expansion of total farmland (by 1.3 million hectares) and reductions in Summerfallow. Natural Land for Pasture remained the same (less than 5% change). These changes have taken place as farmers move to continuous cropping and permanent cover to improve productivity and net income and prevent soil degradation.

Most habitat use units are found in All Other Land and Natural Land for Pasture, the agricultural habitat types most beneficial for wildlife which together account for about 29% of farmland in this ecozone. As a result, most habitat use units are associated with a growing land base. Because agricultural land in the Prairies

makes up about 62% of Canada's farmland and is much more extensive than in any other ecozone, this improvement is significant for some wildlife species. However, reductions in some native habitats, including prairie wetlands, continue, and agricultural conservation through land stewardship is essential to maintain these valuable resources.

Boreal Shield

The Boreal Shield Ecozone covers 18% of Canada's land area, but agriculture occupies a very small portion of the land base (less than 1%). The area of farmland decreased by 24% between 1981 and 1996. Although four out of the five agriculturals habitat types also decreased in area, All Other Land remained steady. This situation is beneficial for many wildlife species, since All Other Land supports 75% of the habitat use units. Farmland is well dispersed among forested areas of the Canadian Shield, ensuring the availability of woodland habitat next to most farmland.

Mixedwood Plains

Cropland and pasture make up a significant portion (about 55%) of this ecozone, but mixedwood and other types of forest are also regionally abundant. However, the forested area is not equally distributed, and the loss of forest habitat is particularly marked in southwestern Ontario. For example, Essex County has only 4% of its original forest remaining. In contrast, many fields and farms in eastern Ontario have been abandoned in the past 30 years, resulting in beneficial change in habitat for some species. This trend now appears to be reversing itself as select crop prices rise.

Wetlands are still abundant in eastern Ontario, but an estimated 90% of wetlands have been drained in southwestern Ontario. Much of the original Carolinian Forest found there, which supports many species typical of a more southerly climate, has been subjected to intensive agriculture. As a result, many wildlife species have declined in number and are classified as rare, threatened, or endangered.

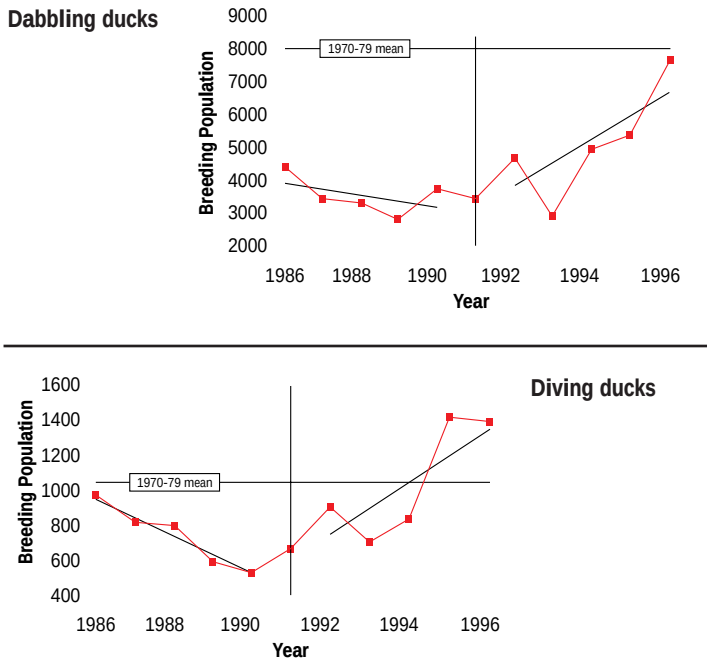
More than half of Canada's human population lives in the Mixedwood Plains, and urban areas have been encroaching on agricultural land and other wildlife habitat at a growing rate. Conservation of agricultural areas can help to maintain biodiversity in the face of urban pressures on habitat.

Waterfowl recovery

In the 1980s, waterfowl populations in North America began declining at an alarming rate. Concern for this situation led Canada, United States, and later (1994), Mexico to develop an initiative to restore continental waterfowl populations to 1970s levels by conserving the habitat for these and other wetland-dependent wildlife. The North American Waterfowl Management Plan, signed in 1986, is now the largest conservation program in the world. In Canada the plan focuses on key habitat areas for waterfowl, particularly in the Prairies, which provide breeding habitat for almost 40% of the continent's duck population. Goals of the program include the conservation and restoration of wetland and upland habitats. To achieve these goals, a landscape approach is taken and agreements made with farmers and other landowners to modify their land use and land management practices for the benefit of both their operations and wildlife. Another major component of the program is the reform of land use policy to remove the pressures to convert natural land into agricultural production.

Initially the objectives of the plan seemed too optimistic to many. But 10 years into the program, dabbling duck populations had nearly reached the 1970's average, though there was still much to be done for other species, such as the Pintail. Provincial surveys of the socioeconomic impacts of the plan show that landowners and the general public have a positive attitude toward wetland and waterfowl conservation and that communities benefit economically through jobs and greater tourism opportunities associated with the plan.

Trends in North American duck populations



B. Robinson, Environment Canada

Total farmland expanded by 10% and Cropland grew by 35% between 1981 and 1996. There were reductions in Tame or Seeded Pasture and All Other Land habitat types. The analysis shows that most habitat use units are associated with a declining area of the more valuable habitat types. Natural Land for Pasture fortunately stayed constant.

Trends in the abundance of breeding birds in two ecozones

The Breeding Bird Survey (BBS) is a large scale survey of North American birds that started in 1966. Trends in the abundance of all common bird species in the surveyed regions were recently calculated for 1966 to 1996. Survey results are presented here for the Prairies and Mixedwood Plains ecozones, where agriculture exerts a dominant pressure on wildlife habitat and wildlife species.

Prairies: BBS survey data for Saskatchewan were used as a proxy for this ecozone. Of 101 birds listed in the survey, 59 have declining numbers and 42 have growing numbers. The decline averaged over all species was small (–0.18%), but the large number of species in decline is cause for concern. Grassland species (e.g., Sprague's Pipit and Le Conte sparrow) are generally on the decline, possibly because of the decreased area in Natural Land for Pasture. Although Tame or Seeded Pasture is increasing in area, it provides a lesser-quality habitat than Natural Land for Pasture for many of the species in this guild. Wetland species increased in number in south-central and central Saskatchewan, but decreased elsewhere. The shrub/successional guild of birds is declining in southeastern Alberta and southeastern Saskatchewan, but growing in southwestern and central Saskatchewan and southern Manitoba. Woodland bird numbers are currently increasing over most of the Prairies.

Mixedwood Plains: BBS survey data for Ontario were used as a proxy for this ecozone. Of 141 birds listed in the survey that were used to construct the habitat matrices, 70 are increasing in numbers and 71 are declining. When the Canada Goose and House Finch (two species that greatly benefit from agriculture and have increased in numbers by more than 50%) are removed, the numbers have grown on average by 0.03%. Although many species are in decline, many factors apart from agriculture are likely involved. Grassland birds are generally on the decline, except for in the Frontenac Axis between Kingston and Ottawa. Wetland birds are generally growing in numbers. Shrub/successional and woodland birds are declining over about half the ecozone and increasing in the other half (including eastern Ontario, where abandoned farmland may be a factor, and the Grey–Bruce area in southwestern Ontario).

For more information on the Breeding Bird Survey, visit their website at http://www.mbr-pwrc.usgs.gov/bbs/

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Atlantic Maritime
The Atlantic Maritime ecozone contains a wide variety of habitats, including extensive mixedwood and coniferous forests and wetlands. The influence of agriculture on habitat is much less here than in the major agricultural ecozones. Still, agriculture's occupation of the zone's most productive sites, especially river valleys, means that wildlife is affected in these areas.

Although the area in total farmland shrank by 20% between 1981 and 1996, the area in Cropland remained steady and All Other Land increased by 13%. Reversion of abandoned farms to forest may benefit some species, but the land base of this ecozone is 88% forest, so farmland may provide the variety in habitat needed to support greater biodiversity.

Response Options

The Availability of Wildlife Habitat on Farmland indicator requires reasonable habitat goals in order for us to establish performance objectives. We need a clearer idea of how much more optimal farmland habitat is needed, if any. This information is best gathered regionally, and then planners can work with landowners to

- set habitat goals that recognize the needs of targeted groups of species (*guilds*) found in that region and establish habitat thresholds below which wildlife cannot be sustained
- identify habitat and ecosystem objectives that will help meet these regional wildlife goals.

Because farmland is usually privately owned, response options usually involve the voluntary participation of landowners. Most farmers understand the value of conserving wildlife and wildlife habitat, but education and incentive programs can further this understanding and encourage the use of land management practices that favour wildlife use. These practices include

- conservation tillage systems
- delayed haying
- winter cover cropping
- rotational grazing systems
- integrated pest management
- woodlot management
- planting shelterbelts and hedgerows
- management of riparian areas
- conservation of wetlands and wetland buffers
- conservation of remaining natural (native) lands.

Conclusion

Agricultural lands offer a variety of habitats for wildlife, but some types are superior to others, especially All Other Land and Natural Land for Pasture. Farmland is not expected to expand much more in Canada, but even small expansions at the expense of natural landscapes pose a risk to wildlife locally. Agricultural habitat for wildlife is superior to the habitat offered in more developed settings, such as urban sites and roadways.

Changes in agricultural land use from less-intensive to more-intensive practices, such as bringing marginal land into crop production, create pressures on wildlife by making one or more of the habitat resources they depend on more scarce or otherwise unavailable. On the other hand, reductions in Summerfallow and conversion of marginal cropland to other uses such as Tame or Seeded Pasture will benefit wildlife. In general, from 1981 to 1996 agricultural habitat for wildlife shows positive or neutral trends for some species in all ecozones except the Pacific Maritime and Mixedwood Plains. These two regions are noted for the intensity of their agriculture.

How farmland is used is largely dictated by economics, particularly commodity prices. In good years, producers may put more land into production, including marginal land that may be best left in permanent cover and is more suited to wildlife use. The recent trend to reduce Summerfallow and to convert Cropland to permanent cover is a positive trend for wildlife, but one currently driven more by economic factors than interest in wildlife.

By and large, farmers have an interest in protecting the environment and conserving wildlife. Most recognize that agroecosystems are part of the broader environment and that farms can operate, not only to produce food, but also to serve other purposes, including provision for wildlife. Because few economic incentives currently exist to encourage farmers to conserve wildlife and their habitat, farmers must usually shoulder the cost of these activities on their own.

Stewardship programs of the Alberta Fish and Game Association

The parkland and grassland regions of central and southern Alberta are among the most intensively developed landscapes in the world. Over the last 100 years since European settlement, the combined effects of cultivation, livestock grazing, urbanization, road construction, petroleum and natural gas developments, irrigation, mining, and other human land uses have eroded away 75% of native mixed grass prairie, 90% of the northern fescue grasslands, and 95% of native parkland habitats. Of the 31 species at risk in Alberta, 24 (77%) rely on these grassland and parkland habitats.

What remains of the Alberta parkland and grassland regions is controlled mainly by landowners and will likely be subject to further degradation unless these owners are provided with incentives to retain these habitats. These incentives may be as simple as recognizing the role of private land stewardship in the conservation of our prairie and parkland wildlife, providing landowners with the resources to make their own informed land use decisions, and promoting the economic benefits of integrating wildlife habitat within an overall strategy of sustainable farming.

The Alberta Fish and Game Association, with funding support from Wildlife Habitat Canada, has developed two programs to address the wildlife conservation needs in the intensively managed grassland and parkland regions of Alberta. Since 1989, Operation Grassland Community has involved landowners in voluntary habitat protection agreements to conserve prairie habitat for the Burrowing Owl, Loggerhead Shrike, and other prairie wildlife species. Currently, 226 participants are conserving more than 20 007 hectares of prairie habitat in southern Alberta. Since 1996, the Parkland Stewardship Program has registered 63 farm families representing more than 3443 hectares of wildlife habitat on 7695 hectares of farmland. Besides their commitment to ensure the conservation of their remnant parkland habitats, more than half of participating landowners have undertaken steps to enhance their farms for wildlife by planting shelterbelts, placing nesting structures, fencing riparian areas, and developing livestock watering systems.

Both stewardship programs involve active participation by individuals, local communities, and industry. They focus on the conservation of all native habitat remnants, including wetlands, upland range, woodlots, and riparian areas, as well as incorporate landowner education and farm planning to improve wildlife habitat in the surrounding agricultural landscape.

J. Fortune, Wildlife Habitat Canada

Related Indicators

Because soil organisms and species that eat them are affected by soil quality, the Availability of Wildlife Habitat on Farmland indicator is linked to all the soil quality indicators: Risk of Water Erosion, Risk of Wind Erosion, Risk of Tillage Erosion, Soil Organic Carbon, Risk of Soil Salinization, and Risk of Soil Compaction. Many management practices that are used to control erosion, such as planting shelterbelts, also improve wildlife habitat. Keeping residues on the soil surface also improves habitat, linking this indicator to Soil Cover by Crops and Residue. Wildlife habitat can be devalued by the presence of agricultural chemicals, making a connection to Management of Farm Nutrient and Pesticide Inputs. Wildlife species dependent on wetland, riparian, or aquatic habitats will be affected by increases in the Risk of Water Contamination by Nitrogen and the Risk of Water Contamination by Phosphorus. Climate change has a tremendous potential to affect elements of agricultural habitat and thus biological diversity, linking this indicator to the Agricultural Greenhouse Gas Budget indicator.