Habitat Loss and Fragmentation

3.4

A simple glance out the window provides evidence of habitat loss. Farmland, human settlements, and highways have replaced much of southern Ontario's once extensive temperate forest ecosystem (Figure 1). A view from the top of the CN Tower reveals a human-dominated landscape. Little of the original natural forest remains.

Figure 1 Approximately 80 % of southern Ontario's original forest cover is gone.

Loss and Fragmentation of Terrestrial Ecosystems

An extreme example of habitat loss is the conversion of large areas of natural ecosystems into farmland and urban developments. Figure 2 illustrates historic changes in the natural landscape of southern Ontario. In Canada, most of the habitat loss occurred during the nineteenth and early twentieth centuries when land was cleared for farmland. More recently, natural habitat has been lost to urban sprawl and transportation routes.

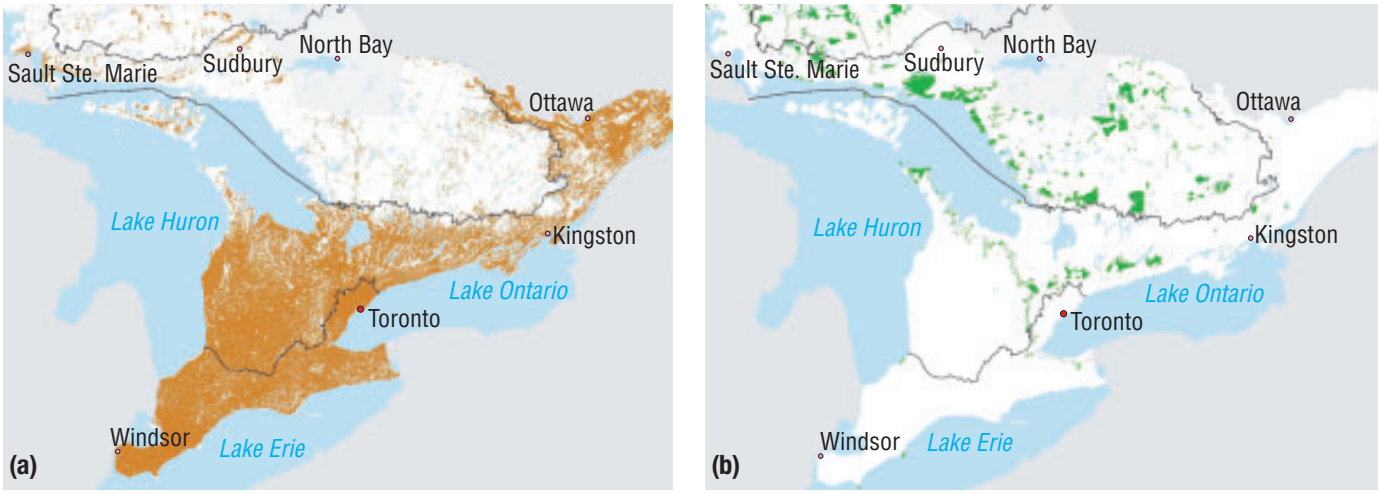


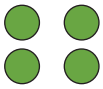
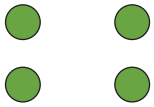
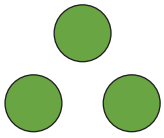
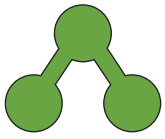
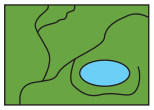
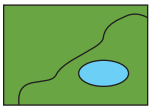
Figure 2 (a) Most of southern Ontario has been converted from natural ecosystems to human uses (orange area). (b) Only some of the remaining natural ecosystems are protected in parks and protected areas (green areas).

Fragmentation of natural ecosystems reduces their sustainability. Fragmentation is the dividing up of a region into smaller parcels or fragments (Figure 3). In a fragmented ecosystem, a larger area of the habitat is exposed to damaging outside influences such as pollution.

Figure 3 When large ecosystems become fragmented, species with large home ranges may not have enough area to survive.

Table 1 describes key factors that enhance ecosystem sustainability. These factors are considered when deciding which areas should be set aside to protect wildlife and ecosystems.

Table 1 Factors that Improve the Sustainability of Habitat Fragments

Factor	Poorer option	Better option	Explanation
size			Large blocks support larger and more stable populations and communities.
number			One large area is better than an equal area composed of many smaller areas because there is less outside influence.
proximity			The closer ecosystem fragments are to each other, the greater the chance populations will be able to use the entire area.
connectedness			Interconnected areas provide wildlife corridors and permit migration between larger blocks.
integrity			Access by roads and trails can increase pollution, hunting, and fishing.

On a global scale, habitat loss and fragmentation are second to climate change as the most serious threats to the sustainability of natural terrestrial ecosystems. Habitat loss is most pronounced in Africa, Latin America, and the Caribbean (Figure 4). Expanding human populations are placing pressure on the land base to supply more food and raw materials.

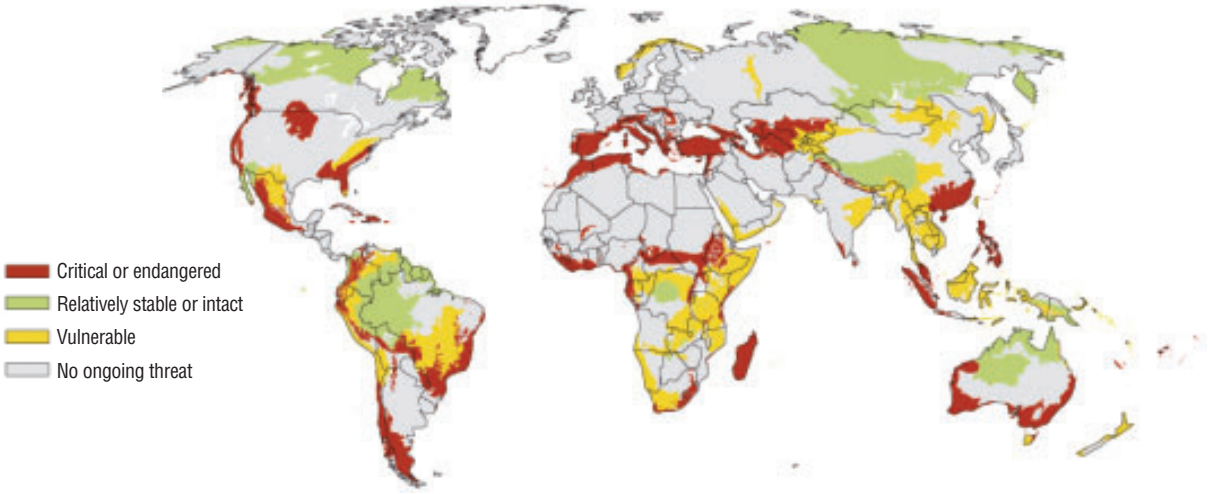


Figure 4 Many of Earth's ecosystems are vulnerable or critically endangered.

In the Amazon, which is the world's largest remaining rainforest, clearing and burning are the greatest threats to the ecosystem's sustainability. This is most often done to create pasture for cattle sold to foreign markets.

If we reduce the demand for agricultural products produced in tropical regions, we can reduce rainforest habitat loss (Figure 5).

Ontario is no longer experiencing a rapid loss of native ecosystems, but there is still reason for concern. The remaining threatened areas require wise management. As citizens of a wealthy country, our use of Earth's resources has far-reaching impacts.

The loggerhead shrike is threatened by habitat loss. The range of this small predatory bird once covered much of southern Ontario (Figure 6). Over the past 50 years, changes in agricultural practices have caused the loss of nesting habitat for the shrike. Once a common bird, the population reached a low of 17 breeding pairs in Ontario in 1997. The Loggerhead Recovery Team has developed a habitat conservation plan to promote habitat restoration.

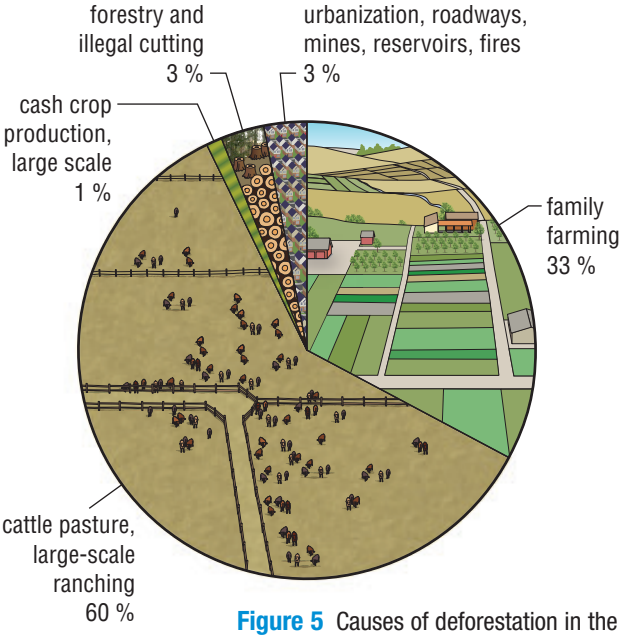
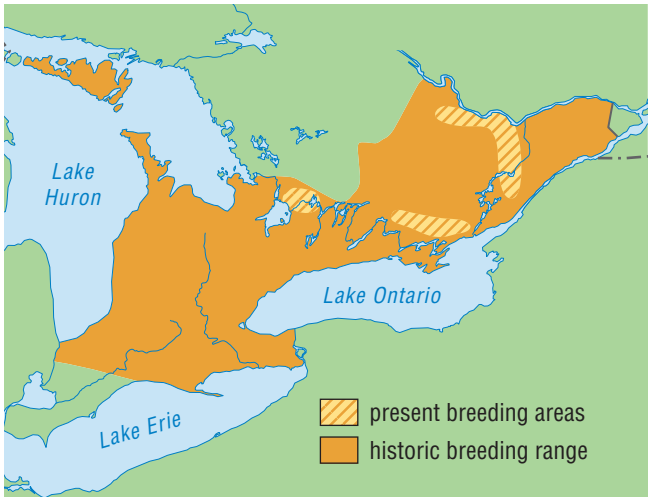
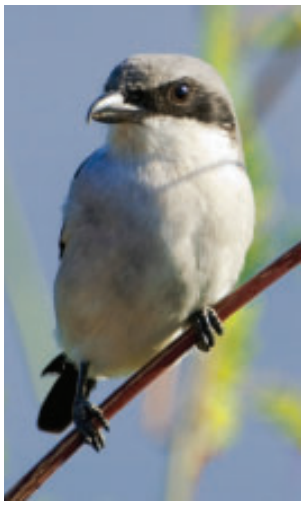


Figure 5 Causes of deforestation in the Amazon, 2000–2005





To learn more about the loggerhead shrike and its recovery program,
GO TO NELSON SCIENCE

Figure 6 The former and current distribution of the loggerhead shrike

RESEARCH THIS SWEET GRASS GARDENS

SKILLS: Researching, Analyzing the Issue, Communicating

SKILLS HANDBOOK 4.B.

The Six Nations people, living in the Grand River region of Ontario, have a close connection with native species and are commited to protecting their local natural ecosystems. This includes the largest remaining stand of Carolinian forest in Canada. In 1996, two members of the Six Nations, Ken and Linda Parker, started Sweet Grass Gardens. This is the first Native-owned and -operated plant nursery in North America.

1. Use the Internet to research Sweet Grass Gardens and Six Nations' initiatives.

GO TO NELSON SCIENCE

A. Sweet Grass Gardens specializes in growing native plant species. In what ways are native plants particularly significant for Six Nations people? How many species does the nursery grow? T/I
B. Describe how this nursery works with the community to enhance education and training related to the environment. A
C. Write a summary describing why you think this particular nursery has been so successful. C A
D. The Six Nations has an eco-centre that runs a forest education program with students. Describe how the program is used to provide plants for restoration projects. T/I C
E. List two other ways the eco-centre is helping the environment. T/I

Loss of Wetlands and Aquatic Ecosystems

Human activities also threaten aquatic ecosystems. In many cases, human activities along shorelines damage neighbouring aquatic ecosystems. Table 2 lists some of the key actions that damage coastlines and aquatic ecosystems.

Figure 7 Over 80 % of Ontario's carrots are grown on the Holland Marsh, located 50 km north of Toronto.

Table 2 Impact of Human Activities on Wetland and Aquatic Ecosystems

Human activity	Impacts on ecosystem
replacing natural vegetation along coastlines and waterfronts	• habitat destruction; shoreline erosion; loss of some species; loss in breeding areas such as fish spawning beds
dredging to create deeper water for boats	• disruption of bottom-living organisms and spawning beds; habitat destruction
sediment runoff from land-clearing, agricultural, and forestry operations	• sediments may smother natural habitats
commercial fishing	• bottom trawlers and drag lines injure and kill bottom-dwelling organisms; damage to abiotic features
draining wetlands for urban expansion and agriculture	• loss of wetland habitats and associated species

Figure 8 To date, Bruce Murphy, a local high school teacher, and his students have banded more than 10 000 birds at the Hilliardton Marsh.

Natural wetlands are flat and often have deep, nutrient-rich soil with an abundant water supply. These conditions are ideal for agriculture. The result is that most large wetlands in populated parts of Ontario have been drained and converted to farmland (Figure 7).

There is a push to reverse this trend and re-establish wetlands. Creating new wetlands makes valuable habitats for wildlife and waterfowl. One success story is the 725 hectare Hilliardton Marsh in northeastern Ontario. Constructed on abandoned farmland, the marsh is now a breeding location for two species of at-risk birds, the coot and the black tern (Figure 8).

UNIT TASK Bookmark

You can apply what you learned in this section on how habitat fragmentation puts species at risk to the Unit Task described on page 156.

IN SUMMARY

- Most of southern Ontario's original natural ecosystems have been replaced by agricultural land and urban centres.
- Habitat loss is one of the most serious threats to Earth's ecosystems.
- Fragmentation reduces ecosystem sustainability.
- The size, proximity, connectedness, and integrity of terrestrial ecosystems will influence their overall sustainability.
- Because of their rich soil, many wetlands have been converted into farmland.

CHECK YOUR LEARNING

1. Explain why one large park is a better refuge than several smaller parks of the same total habitat area. K/U
2. Describe what is being done to reverse the continued loss of wetland habitat in Ontario. K/U
3. Identify the benefits to native species of joining similar habitats with corridors. K/U
4. In what regions of the world is habitat loss most rapid? K/U
5. Describe three human activities that threaten aquatic habitats. K/U
6. Explain why wetland habitats are often preferred for converting to new agricultural land. K/U
7. Do any of your own behaviours or habits contribute to habitat loss or fragmentation? Explain. A