



# Forestry in Ontario



Wildlands League

a chapter of the Canadian Parks and Wilderness Society

This series of fact sheets has been produced to increase public understanding of forestry in Ontario and to present innovative ideas on how it can be improved. Forestry is the single largest use of public lands in Ontario and forestry activities can have a major impact on ecosystems. The Wildlands League is committed to improving forestry practices and reducing the ecological impact of logging by working directly with government and industry and by improving public awareness and involvement in forestry issues.

## Lessons for Canadians from Swedish Forests

### INTRODUCTION

The long history of human use and intensive forest management in Sweden has had severe impacts on forest ecosystems, resulting in remnant natural forests with threatened natural biodiversity. In Canada, the shorter history of industrial activity in the forest means that we still have large, intact areas of natural forest and managed forests that still maintain much or many of their natural attributes. It is important to understand the impacts of forestry on Sweden's forests to guide our actions in similar Canadian forests so like mistakes are not made here.

This fact sheet will discuss the ecological impacts of forestry in Sweden and the conservation efforts that are underway to mitigate those impacts and restore the natural characteristics of the forest. It will then compare the situation in Sweden with Canada, and highlight opportunities that exist to take a different approach to forest conservation here.

### SWEDISH FORESTS

Approximately 60% of Sweden is forested, covering an area of 23 million hectares. There are three main forest types: northern coniferous forest (boreal), southern coniferous forest (hemiboreal) and southern deciduous forest (nemoral). The two dominant indigenous coniferous species are Norway spruce and Scots pine, which presently account for 83% of the standing volume of Sweden's forests<sup>1</sup>. Birch and aspen are found throughout Sweden,



Top: The growth in this Sundsvall clearcut is six years old. Bottom: The only large patches of old-growth forest in Sweden occur in the Jokkmokk mountain region.

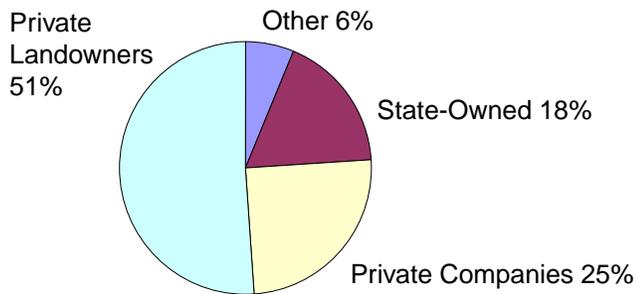
and oak, beech, and ash are found in the south. The flora of Sweden's forests includes a great diversity of mosses, lichens, fungi, grasses and shrubs. Historically, natural disturbances such as fire and insect outbreaks would have created a mosaic of stand types and structures.

Ninety-five percent of Sweden's forested land is currently being used for commercial forestry purposes<sup>2</sup>. Figure 1 (see next page) illustrates the ownership of forested land in Sweden. There are approximately 350,000 private landowners in Sweden with an average woodlot size of just under 50 hectares<sup>3</sup>. The private landowners hold 51% of Sweden's forests and account for 60% of roundwood production. Six large, integrated private companies own 25% of Sweden's forest. Consolidation within Sweden's forest industry between 1980 and 2000 has resulted in fewer private companies owning the land and a reduction in the number of pulp, paper and saw mills.

### HISTORY OF SWEDISH FOREST USE

Human activities have altered the forest landscape in Sweden from one dominated by natural processes to one dominated by human activities<sup>4</sup>. There have been three phases of exploitation of Sweden's forest resources: local use, pre-industrial activities and industrial forestry. The first phase of development consisted mainly of local use and included the collection of firewood and building materials and the clearing of

**Figure 1**  
**Swedish Forest Land Ownership**



land for agriculture. The impact of local use was proportional to the local population density, and therefore affected southern Sweden to a greater extent than the north. For several centuries, farmers in southern Sweden burned forests for short-term cultivation, reducing the forest cover and depleting soil nutrients<sup>5</sup>.

In the south and central regions, pre-industrial use of the forest began as early as the Middle Ages. The mining industry was the most important sector during Sweden's industrial development, and the forests supplied charcoal, a critical raw material for mining processes. Wood was also used to produce potash and tar. By the end of the eighteenth century, northern Swedish forests were still primarily influenced by low impact local uses<sup>6</sup>. During the nineteenth century, however, timber harvesting for charcoal, potash and tar production moved into northern Sweden, as did the quest for large pine and spruce for the sawmill industry<sup>4</sup>. This phase of exploitation has been referred to as "timber mining" because selective cutting removed most large trees from the forest as the timber frontier pushed further north. By the turn of the century, Sweden was the largest exporter of wood and most of the accessible forests had been affected by selective harvest<sup>4</sup>.

By the beginning of the twentieth century, the Swedish forest industry faced a timber shortage<sup>6</sup>. In response, the government introduced the *Forestry Act*, which stipulated that harvested areas must be regenerated to ensure a sustained yield of timber<sup>5</sup>. This led to plantation forestry and the planting of abandoned agricultural land and has resulted in an increase in the standing volume of timber and the overall growth rate. In order to increase productivity, forest practices during the twentieth century have involved large-scale clearcutting, soil scarification, fertilization and ditching to drain wet soils<sup>7</sup>. This has been followed by planting monocultures of Norway spruce and Scots pine, the removal of any competing vegetation, including deciduous trees, and multiple thinnings of the planted trees. The silvicultural

treatments employed have allowed the forest to be harvested at a younger age (80 years) and increased the yield of timber per hectare. The cost, however, has been the conversion of natural forests to even-aged monocultures, and the loss of all but 2% of the country's primary forests<sup>2</sup>.

## THREATS TO BIODIVERSITY

### Forest Changes at the Landscape Level:

The long-term implementation of an industrial forestry model in Sweden has resulted in the large-scale conversion of natural forests to even-aged, single species plantations. This has drastically reduced the diversity of forest types across the landscape relative to the forest structure and age class distribution generated by natural processes. In particular, forest management has led to the reduction of:

**1. Older forests:** The amount of older forest has drastically declined because stands are harvested as soon as they are mature. As a result, less than 5% of Sweden's forests are classified as old growth. The remaining old growth patches are generally very small (less than a couple of hectares).

**2. Deciduous and mixed wood forest:** The amount of mixed wood and deciduous forest has been reduced by silvicultural practices aimed at eliminating trees that compete with "economic" species (spruce and pine). Between 80-90% of harvested areas are regenerated by planting spruce and pine.

**3. Uneven-aged forests:** The dominance of clearcutting and tree planting has eliminated uneven-aged forests and the unique habitat they provide.

**4. Wetlands:** Drainage and subsequent conversion to tree plantations has decreased the abundance of wetlands and moist forests.

**5. Burned forests:** Intensive fire suppression during the twentieth century has nearly eliminated fire from the landscape<sup>8</sup>. Between 1992-1996, an average of 1,300 hectares of forest burned per year<sup>9</sup>.



A 110-year-old stand in Sundsvall.

As a cumulative result of the above actions, remnants of old growth forest and relatively undisturbed areas are now generally restricted to small patches amidst the industrial forest landscape. The only large patches of old growth forest occur in the mountain region in the northwest and in the Jokkmokk region of northern Sweden. Only 3.7% of Sweden's productive forest is legally protected, the majority of which lies within the montane forests of northwestern Sweden. Less than 1% of the productive forests outside this region are legally protected<sup>7</sup>. Although the Swedish government has spent a lot of money (\$14.3 million Canadian per year during the 1990s) to establish new protected areas, the process has been difficult because of the high proportion of private ownership and the absence of large patches of relatively intact forest<sup>7</sup>. The lack of a representative protected areas network to provide a baseline regarding the natural forest condition makes it difficult to assess the cumulative

impacts of human activities and to set targets for restorative forest management.

### Forest Changes at the Stand Level:

Swedish forest management has disrupted natural processes and altered many habitats at the stand level. The emphasis on increasing productivity, leading to a forest management regime consisting of clearcutting, scarification, planting and thinning of forest stands, has resulted in the loss of many important structural characteristics including:

**1. Living old, large trees:** Earlier selective logging targeted large, old trees and, until recently, live trees were not retained within clearcut areas. In northern Sweden, 13.6% of trees within the protected forest are of large diameter, compared to 3.2% within the industrial forest <sup>7</sup>.

**2. Standing dead trees:** Two factors have contributed to the decline of standing dead trees or snags. First, the removal of living, old trees means that few trees are available to become snags. Second, there has been a policy to remove dead trees from forest stands to prevent insect outbreaks and to “clean” the forest <sup>4</sup>. Forest companies are now artificially creating snags by leaving high stumps since there are too few old, dying trees to meet habitat needs.

**3. Coarse woody debris:** The lack of standing dead trees and the practice of cleaning the forest has dramatically reduced the amount of coarse woody debris. For example, the level of dead wood in an area of central Sweden was estimated to have decreased from 13 m<sup>3</sup>/ha in 1890 to 0.1 m<sup>3</sup>/ha in 1966 <sup>2</sup>.



All the trees in this forest are less than 40 years old.

The disruption of natural successional processes has impacted the understory plant community. Logging favours certain plant communities that are able to out-compete species that normally grow following natural disturbances.

### Impacts of Changes on Wildlife – Red-Listed Species:

Of the 58,000 known species in Sweden, 20,000 have been assessed to determine their endangerment status. Of these, 4,120 have been placed on the red list as either threatened (IUCN categories: regionally extinct, critically endangered, endangered, vulnerable) or near threatened <sup>10</sup> and 258 species have become regionally extinct. The number of red-listed forest dependent species has continued to rise during the past decade from 1,487 in 1994 to 2,100 in 2000, 300 of which are at risk of extinction. Half of the species of concern require forest habitat and have been impacted by logging practices. In particular, there are high numbers of species of fungi, lichens, mosses and insects such as beetles and flies on the red-list that are forest-dependent (Figure 2). Sixty-five percent of red-listed mammals and 90% of red-listed fungi live in the forest.

**Figure 2**  
Number of Red-Listed Species in Various Groups that Are Forest-Dependent

Group	Total	Forest-Dependent	% Forest-Dependent
Fungi	609	550	90
Lichens	254	209	82
Mosses	238	102	43
Beetles	1123	623	55
Flies	172	126	73
Mammals	23	15	65
Birds	88	38	43
<b>Total</b>	<b>4120</b>	<b>2100</b>	<b>51</b>

Source: Gardenfors, Ulf, ed. 2000. The 2000 Red List of Swedish Species. Swedish Threatened Species Unit, SLU, Uppsala.

Many of the red-listed forest-dependent species rely on forest characteristics that have been altered or lost as a result of logging. Half of the species rely on dead wood either in the form of snags or logs on the ground. Old living trees and deciduous trees are required by many species, and forest age is the most important factor contributing to the occurrence of red-listed species in an area <sup>2, 11</sup>. The presence of burned habitat and undisturbed hydrology are also important characteristics of natural forests that have been reduced and are required habitat for some species.

The number of threatened forest species clearly demonstrates that the

Swedish model of forestry has significantly impacted the health of the forest ecosystem and the ability of species to persist within the managed landscape.

### LESSONS FROM SWEDEN

Although efforts are being made to improve forest management and restore critical characteristics that have been lost, the forests of Sweden have been drastically altered and will be difficult to restore to their natural conditions. As industrial development proceeds in our natural forests, it is essential to understand the impacts of forestry on Sweden’s forests to help guide decisions about our forest resources and so that we can take a different approach than has been taken in the past. There are several important lessons we can draw on:

**Protected areas network:** Establish a representative protected areas network to provide baseline information on the natural forest condition and a refuge for species sensitive to logging. We have the opportunity in Canada to determine conservation-focused land uses for our public forests, whereas Sweden faces constraints to change because of existing land use and private land ownership.

**Maintain older forests:** The impact of the loss of old forests on biodiversity in Sweden has been severe and restoring older forests will take time and effort. We need to ensure that forest management maintains a natural level of older forests across the landscape to provide habitat for species that require it.

**Maintain diversity of species composition:** Sweden illustrates that a healthy forest ecosystem requires a diversity of forest types. Forest management needs to maintain this diversity across the landscape and within stands.

**Retain structure on harvested sites:** Standing live and dead trees and coarse woody debris are important habitat elements for many of the threatened species in Sweden. Once eliminated it is difficult to restore them; therefore, logging practices in Canada need to retain adequate levels of residual structure following harvesting to provide sufficient habitat.

**Collect detailed information on species' habitat requirements:** Forest management should be guided by an understanding of the habitat requirements for forest-dependent species. In Sweden, lichens, mosses, fungi, and insects represent the greatest number of species threatened by logging. In Canada, we need to improve our knowledge of these species and the impact of harvesting on them in order to assess whether our current forest-management practices are threatening species diversity.

## SUMMARY

The experience of Sweden should be recalled when considering how to best design forest management regimes in Canada. In particular, the lessons learned there should inform our decisions about land allocation between use and protection and also should help raise awareness of the ecological implications of any move to intensify silviculture. Fortunately, Canadians, unlike the Swedes, have the opportunity to focus on retaining critical forest characteristics instead of attempting to restore them once lost.

*Fact sheet written by Gillian McEachern and Tim Gray*



*This clearcut left high stumps for snags.*

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## WILDLANDS LEAGUE

*a chapter of the Canadian Parks and Wilderness Society*

The Wildlands League was founded in 1968 to protect wilderness in Ontario. It became a chapter of the Canadian Parks and Wilderness Society (CPAWS) in 1980. We are solutions oriented and we get results. We are respected for our science-based campaigns to establish new protected areas, our efforts to ensure that nature comes first in the management of protected areas, and success at addressing issues of resource management and community development.

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## Forestry in Ontario

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