T12.10 PLANTS AND RESOURCES

Nova Scotia's native plants and their use by humans have been a major factor in shaping cultural customs, landscape features and the provincial economy. In addition, the many wild and cultivated plants growing in Nova Scotia today that are exotic, introduced species have also played a part in the province's history.

HISTORICAL CONTEXT

Before European Contact

The use of Nova Scotia's native plants is a part of the cultural history of first peoples in the province. The Mi'kmaq used the bark, roots and wood of trees to make birchbark canoes, shelters and utensils, and tapped maples for syrup. Barren, forest and aquatic-habitat species were extensively used for food and medicine. Plant species were an essential part of their hunting-gathering culture; however, the human population was relatively small and the use of plants is not thought to have had significant effect on habitat composition and species distribution. (Mi'kmaq people maintain traditional uses of plants for food and medicine.)

> *Native people made a significant contribution to early colonial medicine. For example, in the 1600s, they introduced French settlers to spruce tea as a treatment for scurvy.*

1600s and 1700s: Coastal Plants

The first Europeans settled mainly along the coasts of Nova Scotia and used plants found in coastal habitats. The French dyked the extensive tidal marshes (see H2.5) along the Northumberland Strait and Bay of Fundy. The process of creating farmland by dyking removed the natural vegetation typical of tidal-marsh communities (see Figure T12.10.1). Salt

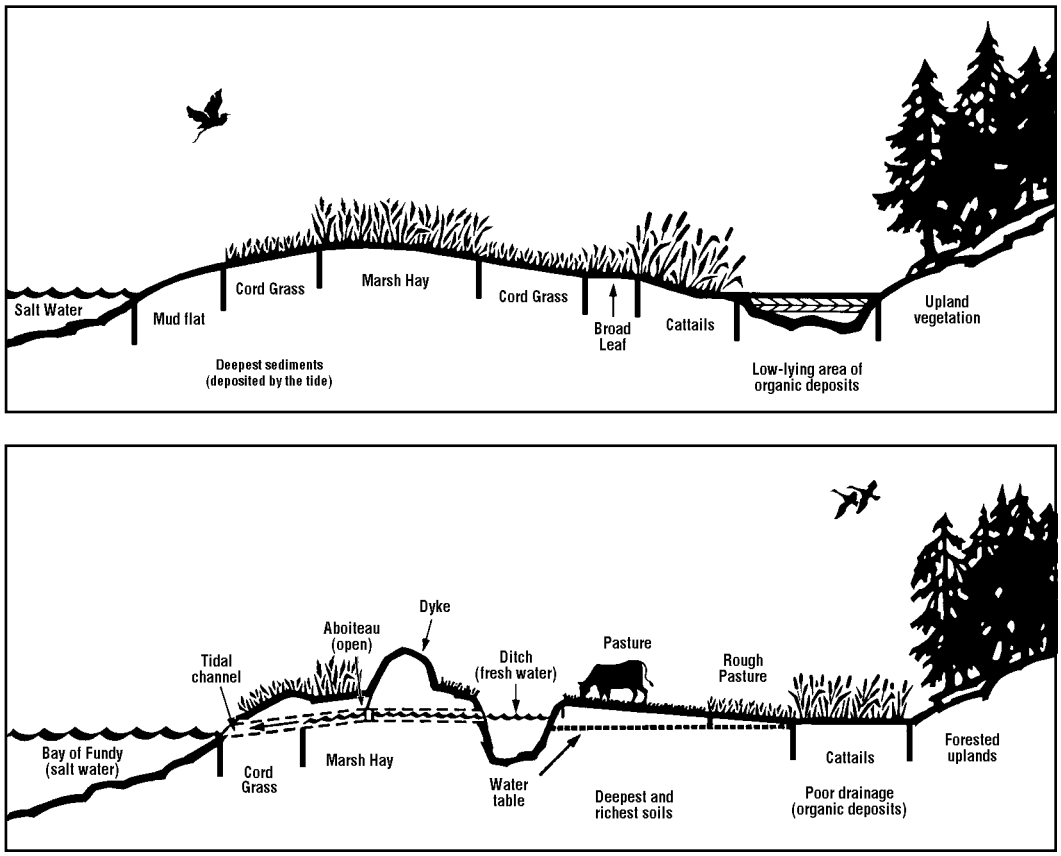

Figure T12.10.1: Changes in species composition and landscape features in undyked (a) and dyked (b) salt marsh in the Inner Bay of Fundy (Unit 913). Adapted from Howell et al.[1]

Plate T12.10.1: Land conversion near Pictou in 1817. This Woolford watercolour shows the extensive hardwood forest in the West River valley (sub-Unit 521a) being cut and the stumps removed prior to cultivation. The native forest vegetation is replaced by an introduced herbaceous vegetation associated with agriculture. Historical plate: N.S. Museum, Museum Services Division.

marsh grasses, particularly Marsh Hay (*Spartina patens*) (see T10.5), were cut and used as hay. (See T12.7 and T12.9 for more information on dyking.) As settlement expanded, marine Eelgrass beds were harvested and used as insulation in Maritime homes, both inside walls and outside buildings for use as winter "banking".

Following the deportation of the Acadians by the British in 1755, land clearing began in earnest. Large stands of old-growth forests were cut along navigable rivers to accommodate the influx of New Englanders in the 1760s. This was followed by the clearing and burning of large tracts of forests along the coast and inland.

1600 and 1700: Forestry

Nova Scotia's forests have been subjected to a longer span of activity by Europeans than any in North America (see T10.1, T10.2). Forests provided the fuel, the construction materials, the export staples and the pastures on which the settlement frontier was founded. Timber was the colony's chief export after fish, providing cash income to many settlers. In the early era of forestry, stands were highgraded for the best lumber and trees suitable for ship masts (see T12.6). The Broad Arrow Policy of 1728 reserved by law large pine trees for use as masts and spars for the Crown. Hemlocks were often cut and stripped of their bark for use in tanneries, while the tree bole was left behind to rot. These practices continued for many years and were later followed by clear-cutting methods when the demand for pulpwood increased. Prior to this, inferior and unmerchantable trees were left standing and so provided much of the genetic stock required for regrowth.

In the late 1700s, uncontrollable fires threatened Liverpool. In the wake of such repeated fires, large areas of pioneer hardwoods, such as aspen and birch, sprang up, especially in the eastern counties, only to give way to even-aged stands of spruce and fir.

1800 and 1900: Forestry

Nova Scotia's forests have been cut over for 300 years, but intensive forestry operations have occurred during the past 150 years. Many of our forests have been cut over three times (see Plate T12.10.1).

Timber was exported, and a considerable amount was used for the booming shipbuilding industry of the mid-1800s. At this time, 1 400 sawmills were in operation, the majority of which were powered by water.[2] In some areas, concern was ex-

pressed over the effects of sawmill dams, log drives and sawdust pollution on freshwater fish (see T12.8). Between 1800 and 1818, annual exports of Nova Scotia fir and oak timber alone rose from 604 to 28 082 shiploads. While the lumber trade fueled the economy, the land was transformed; by 1837–38, the original-growth pine was already exhausted.[3]

With the old stands gone, successive forests were exploited for pulp-and-paper production, a process that was invented in 1839 by Charles Fenerty of Upper Sackville. Over time, this new use has created significant impact on the landscape, as many mixed forests have been transformed by forestry practices into large stands of even-aged softwoods.

At the beginning of the twentieth century, Dr. B.E. Fernow, in his survey of Nova Scotia forests, undertaken for the Commission of Conservation concluded that the province's forests were being cut at a rate exceeding their ability to regrow.[4] The opening in 1928 of the Bowater Mersey Ltd. paper mill in southwestern Nova Scotia greatly increased the impact of forest harvesting as a change agent for Nova Scotia's forests (see T10.1). In the early and mid-1960s Nova Scotia Forest Industries and Scott Maritime Ltd. mills opened in the central and eastern regions, continuing to accelerate the process of species composition and distribution change.

Introduced fungi and insects wrought other changes (see T11.16). White Pine Blister Rust, imported on nursery stock in the 1900s, degraded the few remaining White Pine stands. In the 1930s, stands of beech, once a fairly abundant component of the ancient Acadian forest, were severely depleted by beech bark disease, which entered via Halifax around 1890. Balsam Woolly Aphid, arriving from Europe some time before 1910, slowly stunted the growth of many Eastern fir stands. Finally, a native insect, the Spruce Budworm, proved to be a most powerful influence, consuming at fairly regular intervals whole tracts of overmature spruce and fir, so that they reverted to immature stands, which in turn became fodder for the same insect a few decades later. The natural increase of fir after forest harvesting and of White Spruce after farm abandonment have exacerbated this problem.

Barren Species

The lowbush blueberry (*Vaccinium augustifolum*) has long been picked for its fruit and has commonly grown on abandoned farmlands or disturbed habitats—often where forest fires have left many acres of barren land. Burning blueberry barrens with flash fires was a practice that came into use over a long period of time, beginning in Nova Scotia in the late 1890s. The intent was to prune plants to improve their growth. However, by 1904, fire-ranger reports confirmed that burning for the cultivation of blueberries had become widely practised and, indeed, somewhat of a problem, since it resulted in the loss of many valuable acres of timber. This was particularly true in southwestern Nova Scotia. Some areas, notably the drier granitic sites of the western counties, were permanently degraded by fire to heathland and rock barren, as nutrient-poor soils and climatic conditions inhibited future forest growth (see H5.1).

By the 1940s, sufficient knowledge had been gathered and laws passed to make the practice of periodic blueberry bush-burning a viable and safe system of cultivation. In Cumberland County, forest fires in the 1920s left large areas of blueberries growing in abundance, and people began to exploit this newly found source of wealth.[5]

Bog Species

The commercial cranberry industry also has a long history in Nova Scotia. Experiments in the cultivation of this berry began in 1871, when William MacNeil, of Annapolis County, planted a small area on the edge of a peat bog. By the late 1800s, cartloads of cranberries were being shipped to Boston, Montreal and Britain. Interest in cranberry production was renewed in the 1960s, and old cranberry bogs were brought back into operation. Commercial cranberry farms now operate in several parts of the province.

Coastal and Marine Plants

The extensive logging and farming (see T12.9) occurring as a result of increased settlement in Nova Scotia created sediment banks along the coast and in estuaries. The sediments were colonized by marsh grasses and eventually developed into tidal marshes (see T12.7). Historical records show a similar pattern all along the Atlantic coast of North America, where many streams that once were clear and free of sediments and river systems that were once navigable have been filled by sediments and developed into marshes.

The harvesting of Irish Moss from the ocean bottom started as a cottage industry in the 1930s. Prior to 1940 it was collected in the Antigonish area. Harvesting intensified during the Second World War, when traditional sources of supply from Europe and Japan were no longer available to the United States.

Traditionally, rockweed was used as an agricultural fertilizer and soil conditioner. In the past thirty years, it has been used for the production of alginate

(a food additive that stiffens products such as ice cream and milkshakes), seaweed meal to condition soils and a fertilizer that is applied to leaves. Commercial exploitation began in the early 1960s in southwestern Nova Scotia.

PLANTS AND RESOURCES TODAY

Forestry

Over the years, most of the old-growth forest types (see H6 Introduction), dominated by White Pine, Red Spruce, Eastern Hemlock, Sugar Maple and Yellow Birch, have given way to early-successional stands dominated by Balsam Fir, Red Maple, aspen and White Birch (see T10.2). The overall structure and composition of the current forest and associated plant communities bears little resemblance to those of 200 years ago.

From a forestry perspective, the forests of Nova Scotia are capable of yielding significantly more than current yields from existing mature stands. Only in the last couple of decades has the government introduced initiatives to restore our forests to a more productive and healthy state and to meet the challenge of sustainable forestry. The Department of Natural Resources indicates that, at current levels of management, industrial harvest based mainly on the softwood species could be increased by more than fifty per cent by the year 2025.[6]

While the forestry sector in Nova Scotia is dominated by pulp-and-paper manufacturing, many other products are produced, including sawlogs and lumber, Christmas trees, maple syrup, firewood, poles and pilings. Forest products comprise thirty per cent of provincial exports.[7]

Technology

Prior to mechanization, forestry was a more labour-intensive industry than it is now. By the early 1970s, large forestry companies were replacing the pulp cutter with mechanized harvesting and massive clear-cutting, considered by industry to be the most economically viable harvesting method.[7] Major environmental impacts have occurred as a result of forestry activities such as clear-cutting, and, although ninety per cent of Canada's forests are clear-cut, questions remain surrounding the long-term ecological sustainability of this practice. It has been argued that partial or selective cutting practices are preferable.

Insecticides and Pesticides

Chemical weeding practices, such as herbicide spraying, are used to destroy the fast-growing hardwoods, like birch and maple, that are the first to appear on clear-cut areas and compete with regenerating softwood species. Bt (*Bacillus thuringiensis*), a bacterium lethal to Spruce Budworm, has been used as a biological agent to control budworm outbreaks in the province. The impacts of insecticide and herbicide use in forestry are of potential significance and have generated debate over possible environmental effects on terrestrial and aquatic systems and human health.[8]

Genetic Degradation

The impact of forest activities that is hardest to quantify is genetic degradation. That this has occurred seems almost certain, considering the extent of highgrading at every stage of forest exploitation in the past—first the best pine was taken for masting timber, then the best pine and spruce for select deal logs and finally the best softwood stands for prime lumber and pulpwood. The effect has been to leave inferior specimens as breeding stock. Thus, the long-lived, shade-tolerant pine, Sugar Maple, Yellow Birch, Hemlock and Red Spruce, which were the main components in the original forest, have been degraded.

Erosion

Erosion has occurred on many clear-cut watersheds, resulting in a degradation of water quality and fish habitat, and loss of soil and some soil nutrients (see T12.9). The effects of erosion are greatly decreased by following established environmental guidelines for forest harvest, including the use of uncut woodland buffer strips or greenbelts to protect streambanks from disturbance and the careful planning and construction of roads, especially road stream crossings, with culverts placed to allow the passage of fish.[9] Loss of soil nutrients can also occur as a result of leaching (see T12.9).

Wildlife

Wildlife habitats can also be affected by forestry. In general, the use of larger clear-cuts (greater than 10–15 hectares) produces greater effects than smaller ones, particularly if the latter are spaced so as to produce a mosaic of habitats. As long as suitable winter range conditions remain, species such as White-tailed Deer, Moose and Snowshoe Hare benefit from some forest-harvest practices, largely owing to the production of browse on regenerating clear-cuts. Particular forest birds may be either positively or

negatively affected, depending on their ecological requirements. Freshwater fish habitats have been greatly affected by the harvesting of some watersheds, which has resulted in erosion, siltation and increased water temperature; however, leaving uncut greenbelts alongside streams alleviates this.[10]

Over two-thirds of the forests in the province are privately owned, a consequence of early colonial policies that liberally dispensed land grants to attract settlers, leaving less than thirty per cent for Crown land. This private-sector ownership comprises small-woodlot owners, who possess fifty per cent of forest land, and forestry and lumber companies, who own an additional twenty-one per cent. Although forestry and lumber companies also lease Crown land, eighty per cent of the total harvest comes from privately owned lands. Slightly less than three per cent of the forest is vested in the two national parks, Kejimkujik and Cape Breton Highlands.

In addition to their importance to the economy, Nova Scotia's forest lands are immensely important to a wide variety of people who use them for such activities as hiking, bird-watching, boating, camping and hunting.

Blueberry Harvesting

Although blueberries are now grown commercially in many parts of Nova Scotia, 75 per cent of the cultivation takes place in Cumberland County. The many millions of kilograms of blueberries produced each year have transformed the blueberry into one of the most important horticultural crops in the province.

Barren areas that have resulted from forest fires or cutting support natural growth of lowbush blueberry. These areas are regularly burned to stimulate growth and to deter natural succession (see Plate T12.10.2).

Plants of Coastal and Marine Habitats

Irish Moss, Dulse and Knotted Wrack or Rockweed are harvested from tidal or shallow subtidal zones (see T10.9 and H1.2) with mechanical or manually operated rakes or cutting devices.

In the southern Gulf of St. Lawrence (Unit 914), Irish Moss is harvested by dragging rakes along the ocean floor behind boats. Off southwestern Nova Scotia (Unit 911), harvesting is carried out by handraking from small dories. Carrageenin, which is extracted from the moss, is used as a jelling, emulsifying and stabilizing agent in foods, drugs, paints, etc. The three Maritime provinces account for about three-quarters of the world's supply of Irish Moss.

Plate T12.10.2: Blueberry fields near Folly Mountain (Unit 311). Photo: R.Lloyd

Rockweed is also harvested in southwestern Nova Scotia and is processed into alginic products. Dulse, which is gathered around the province, is dried and eaten by humans.

Proper spacing of the tines on the harvesting rakes permits the holdfast to remain attached to the rocks and allows the plant to continue growing. Ice remaining in areas such as the Northumberland Strait in late spring can affect harvesting by scraping the bottom and removing plants. Irish Moss beds are slow to recover from damage caused by dragging or ice, as new plants re-establish from spores. The National Research Council of Canada has developed a fast-growing strain of Irish Moss for aquaculture in seawater tanks. Rockweed requires two to five years to recover from harvesting, depending on the degree of harvesting and local productivity. The development of rockweed harvesting in the 1980s has resulted in competition for access to local resources, local overharvesting and the breakdown of harvesting strategies.

The gathering of Irish Moss is considered a fishing activity since it is harvested from the sea, primarily by lobster fishermen during the closed season.

INTRODUCED PLANTS

Approximately 400 new species of vascular plants have been reported since about 1800. Introduced plants are, for the most part, related to human activities. When anthropogenic habitats revert to natural ones, shading by native shrubs and trees eliminates most introduced flora or at least restricts their numbers to naturally maintained, open, disturbed ground, such as that bordering rivers and streams and at the landward margin of coastal cobble beaches. Fields left fallow are covered first with grasses and weeds, but within a few years, alders and White Spruce take hold in sufficiently moist sites (see H 5.2), or lichens and grasses in sandy, rocky or otherwise drier sites.

Introduced plants are here to stay. The more permanent ones are said to be "naturalized", that is, originally coming from a foreign area but now thoroughly established. Imperfectly naturalized plants are described as "adventives". But, whether naturalized or adventive, introduced species will continue to be with us for as long as there are humans to clear away shading trees and shrubs and to maintain areas of open, disturbed ground.

Weeds

The most commonly encountered introduced plants are the weeds, a convenient grouping of the more aggressive species that grow where people do not want them. Most weedy species were not introduced intentionally. A major source of continuing introduction from earliest settlement times up to the beginnings of this century was impure agricultural seed. The advent of modern seed-screening techniques, inspection programs and strict import regulation is relatively recent. Previous to this, seeds from crop plants in Europe gathered for export included the seeds of whatever weeds were growing in the same fields.

Weeds were also introduced in packing material consisting of dense masses of dried vegetation or dunnage, in animal foodstuffs and in straw bedding. Alien plants and other associated organisms (see T12.11) were also unintentionally introduced in ship ballast unloaded on Nova Scotia's shores. One Nova Scotia ballast dump site was beside Steele's Pond by Point Pleasant Park, Halifax. Here, intrepid Nova Scotia naturalist John Erskine and his botanist son, David Erskine, collected a number of exotic rarities included in the second edition of *The Flora of Nova Scotia*. The Northumberland Straits area, with old ballast dumps at Pictou and elsewhere, includes the sites for a number of well-established introductions, many still more or less limited, however, to this part of the Gulf of St. Lawrence. Introduced into this region, for instance, are two species of *Atriplex*, a genus of mostly salt-loving plants. One *Atriplex* species has become an integral component of the local salt vegetation; the other is widely scattered on most sandy beaches bordering the Gulf of St. Lawrence.

Most of the noxious weeds were introduced from Europe into regions of North America that, like Nova Scotia, were originally covered by forest. When humans first began to clear the forests and till the soil, they provided an environment particularly well-suited to these inhabitants of unshaded, naturally disturbed ground. Weeds quickly took to colonizing the freshly exposed unsettled soils. The most successful species were those whose original environment matched most nearly their new one. Native woodland species, accustomed to a moist, rich cover of humus, higher humidity, reduced sunlight and other factors associated with a woodland environment, were unable to persist very long after the land had been cleared.

Weeds have grown in cultivated land for so long that they have become particularly well adapted to managed environments. This is believed to be one reason why introduced weeds tend to be more aggressive and persistent than most native species. Another reason is that in travelling abroad, plants often left behind many of their natural adversaries such as insects that fed upon them. Tansy Ragwort is a cattle-poisoning weed particularly abundant in Pictou County and northeastwards into Cape Breton. Larvae of the European Cinnabar Moth feed exclusively on ragwort in its homeland, but none arrived with their foodplant. Some years ago, the Cinnabar Moth was purposely introduced into northern Nova Scotia, where it is now helping limit the spread of ragwort (see T12.10).

As well as competing with cultivated plants, a large number of weeds act hosts for fungi, bacteria and viruses, causing diseases that are transferred to crop plants. Some of the disease-causing organisms attack both the crop plants and closely related weeds. In other cases, a number of parasitic fungi that attack crop plants spend part of their life cycle on botanically unrelated weed hosts. A well-known example is the fungus that causes Black Stem-rust of wheat, oats and barley. Part of its life cycle is spent on the European Barberry. From infected barberry leaves, the fungus produces spores that infect wheat and the other two cereals.

Some introduced plants, such as Daphne and Poison Hemlock, while uncommon, are deadly poisonous; the bright-red berries of Nightshade, a ubiquitous climbing city weed, although only mildly poisonous, seem especially attractive to children. Ragweed pollen is the major cause of late summer and autumnal hayfever in eastern North America. The plant itself, introduced from western parts of the continent, is now particularly widespread along roadsides in Kings and Annapolis counties.

Not long after they were established in eastern North America, introduced weeds were presented with two new ideal habitats: railways and roadsides. The weeds were quick to occupy the newly disturbed open ground, which also provided them with convenient corridors for westward travel. Later, these same routes were to facilitate the eastward spread of weedy native species from western grassland regions. Such natural agents as wind, water and wildlife continue to help disseminate those weeds first brought here by humans.

Cultivated Species

Most cultivated plants, such as Horse-chestnuts and lindens and many garden flowers, require more or less constant tending to persist. Given a head start, they may outstrip their competitors or else, as in many lawns, coexist with native plants. More often, though, cultivated plants need help to survive and flourish.

Many garden species brought from abroad and cultivated early in Nova Scotia, escaped cultivation and are now known as "garden escapes". Some spread widely; others stubbornly persisted, often spreading vegetatively by underground stems. One of the best-known examples is Japanese Knotweed. Originally from Asia, it was introduced into Great Britain as an ornamental; from there it probably came into Nova Scotia and other parts of eastern North America. Heather is another persisting introduced plant occurring in scattered localities throughout the province.

Lupines were introduced from western North America and now grow well along roadsides. Likewise, Black-eyed Susan, a native of the central United States, grows along highway margins. Other widespread ornamentals include Moneywort, Bellflower, Muskmallow, Ground-ivy, Goutweed, Queen-of-the-meadow, and the succulents stonecrop and Live-forever.

About 100 years ago, "wild" heather in Point Pleasant Park was investigated by Dalhousie botanist George Lawson. He found it spreading from an old garden where it had earlier been planted. He reported his findings in the Proceedings of the Nova Scotian Institute of Science. *Park authorities, however, prefer the more romantic myth that the heather originated from seeds shaken from the mattress ticking of Scottish soldiers who encamped in the park after arriving from Scotland.*

Some garden species can coexist with with native species in unmanaged habitats. For example, European Columbine grows in rich wooded intervale soils along with native wildflowers.

Herbs also escaped cultivation. Wild Caraway is the most frequent escape, occurring most commonly around fishing villages. The mints, peppermint and spearmint, are scattered around the province but remain very local in places where they were previously cultivated. A few plants, cultivated as vegeta-

bles, such as Wild Parsnip and Chicory, are common in some parts of the province. Drug plants such as Celandine, Wormwood, Comfrey and Tansy can be found persisting in areas where they were formerly planted. Forage crops, some still cultivated, are common escapes found in fields and roadsides. These include legumes such as the White and Yellow Sweet-clover, and numerous European grasses, the best known of which is Timothy, now well established in North America.

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