# Chapter 1
# Introduction

## 1.1 Uses of Peat

In recent decades, peatlands have been the focus of much interest because of their potentially arable land and for their fuel peat and peat moss resources. Traditionally peat has been used for domestic heating and cooking in Ireland, Finland, Scotland, Germany, and the U.S.S.R. where the peat or "turf" was cut by hand and dried for use during the winter months. Increased demand placed on peat as an energy source, and as an inexpensive soil conditioner, has led to the mechanization of peat "mining" or "harvesting" to provide greater annual production at lower cost. The demand for peat has grown with production capabilities and with the increased availability of a variety of enhanced peat-based energy products such as pellets, briquettes, charcoal, and metallurgical coke. Other enhancement processes such as carbonization, liquefaction, and gasification have led to the development of products used both in the energy and chemical industries.

By far the bulk of peat produced worldwide is used to generate energy or is being sold as peat moss. World peat production in 1980 was in the order of 200 million tonnes, most of which was produced in the U.S.S.R. (Table 1.1).

The U.S.S.R. is by far the world's largest producer and consumer of peat, using some 200 million tonnes per year. By 1978 the Soviet Union had more than 80 peat-fired generating plants with a total capacity of over 6500 MW. The largest single generating unit has a capacity of 600 MW. Peat is also used in the form of sods and briquettes for small industries and household heating (Monenco Ontario Limited 1981).

In Ireland, the Irish Electrial Supply Board (Bord na Mona) produces about 8 million tons (7 million tonnes) of peat annually for use in electrical generation and home heating. Roughly 440 MW of power, about 40 percent of demand, is generated annually in 20 thermal plants using peat. Bord na Mona produces roughly 410,000 tons (380,000 tonnes) of peat moss annually. Almost all (80%) of the peat moss produced in Ireland is exported to other countries (McNearney 1982).

Finland has approximately 25 million acres (10 million ha) of peatland (about half of its land area). Roughly 4 million tons (3.6 million tonnes) of peat are produced annually, 85 percent of which is used for primary energy generation and the remainder for peat moss. There are roughly 20 generating plants operating or under construction which use peat as a primary source of energy. Peat is used in milled, sod, briquette, and pellet form to supply many markets in the country (Asplund and Okkonen 1982).

Canadian peat resources exceed those of the U.S.S.R. yet we produce less than half of one percent of the world's peat moss and little or no peat for fuel.

**Peat Moss Production**

Peat production in North America, and in Canada in particular, is almost entirely for horticultural purposes. Canada produces some 880,000 tons (800,000 tonnes) of peat moss annually, most of which is exported to the United States, Europe, Africa and Japan (Bedard 1983; Statistics Canada 1985). Light fibrous peat moss is used as a growing medium, a soil conditioner, and as a component of products such as soil mixes, "grow boards", "grow bags", peat pots, and oil absorbents (Moores 1983). After the Second World War the number of Canadian peat moss producers doubled from 27 to 59 (Bedard 1983).

Bagged peat moss is commonly sold in 6 $ft^3$ (170 L) bales of compressed (2:1) product. Where peat is shipped over great distances the product can be compressed to 3:1 or even 7:1. Markets for Canadian peat moss are primarily in the United States (90-95%), Japan ( 3-5%) and Europe, Saudi Arabia, and Israel (Bedard 1983).

Soil mixes, fertilized peat, and "humus" or "composts" are derived from peat moss. They consist of varying amounts of added fertilizer, bark, perlite, vermiculite, or lime depending on the final product. Commonly sold in North America and Europe, these mixes are ideal for greenhouses and horticultural applications because they are considered "weed free" and have controlled nutrient levels to produce uniform plant growth (Bedard 1983).

| Country | Peatland Area (ha × $10^6$) | Peat Production (Tonnes × $10^3$) Fuel Peat | Moss Peat | Total |
|---|---|---|---|---|
| Canada | 170.0 | — | 488 | 488 |
| U.S.S.R. | 150.0 | 80 000 | 120 000 | 200 000 |
| U.S.A. | 40.0 | — | 800 | 800 |
| Indonesia | 26.0 | — | — | — |
| Finland | 10.0 | 3 100 | 500 | 3 600 |
| Sweden | 7.0 | — | 270 | 270 |
| China | 3.5 | 800 | 1 300 | 2 100 |
| Norway | 3.0 | 1 | 83 | 84 |
| Malyasia | 2.4 | — | — | — |
| U. K. | 1.6 | 50 | 500 | 550 |
| Poland | 1.4 | — | 280 | 280 |
| Ireland | 1.2 | 5 570 | 380 | 5 950 |
| West Germany | 1.1 | 250 | 2 000 | 2 250 |
| Total | 417.2 | 89 771 | 126 601 | 216 372 |
| Total Approx | 420 | 90 000 | 130 000 | 220 000 |

Table 1.1
World peat resources and annual peat production (Kivinen & Pakarinen, 1980)

Peat pots, grow bags, and grow boards are specialty products that are fairly inexpensive and disposable making them attractive for domestic and some commercial gardening operations.

In Nova Scotia, one active peat moss producer working a deposit in the Annapolis Valley ships products such as compressed peat moss, soil mixes, and grow bags to the U.S. and Japan.

The production of peat moss and soil mixes in Nova Scotia was first initiated in Berwick at the current site of Annapolis Valley Peat Moss Limited in 1949. The initial production method was hand block cutting. After the peat had dried, it was shredded, cleaned, and bagged for shipment to markets in New England. Early peat production from the site was in the order of 2,000 to 5,000 bales annually. Vacuum harvesters were first used at the site in 1954 and production jumped to 35,000-50,000 bales. Current peat moss production, including soil mixes and various peat products, totals approximately 200,000 bales annually (pers. comm., Annapolis Valley Peat Moss Limited, 1986).

During the mid to late sixties, peat production on a limited scale was attempted by Eastern Peat Moss in Guysborough County. At least one bog in the Canso area and possibly a second bog in Country Harbour were harvested using wet harvesting and artificial drying to produce peat moss. However this operation lasted only a few years.

**Fuel Grade Peat Production**

Production of higher density or fuel grade peat is quite extensive in the U.S.S.R., Finland and Ireland. This form of peat is not often suitable for horticultural use because of its reduced water holding capacity. However, it is best suited for the production of energy or as industrial products.

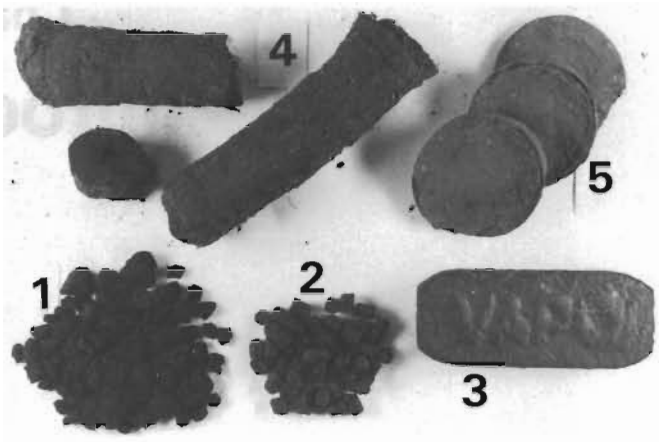


Figure 1.1
Peat products derived from fuel grade or humified peat.

The bulk of fuel peat production in countries such as the U.S.S.R., Ireland, and Finland, is used for thermal stations for the generation of electricity for central heating plants. The U.S.S.R. produces over 90 million tons (80 million tonnes) of fuel peat annually for energy production (Kivinen and Pakarinen 1980). Ireland is second in world peat production, deriving 20 percent of its national energy supply from peat. Finland derives about 3 percent of its energy supply from peat with its annual production exceeding 4 million tons (3 million tonnes) (Technopeat 1984; Kivinen and Pakarinen 1980).

In Europe, where large diverse markets exist, peat is processed into a number of energy products such as pellets, briquettes, charcoal, and metallurgical coke. (Figure 1.1).

The U.S.S.R. produces about 6 million tonnes of briquettes (Technopeat 1984), Ireland about 350,000 tonnes, and Finland about 100,000 tonnes (Asplund and Okkinen 1982) annually for sales in domestic markets. The production of high quality metallurgical coke from peat is possible due to the high reactivity and porous nature of the material. Peat coke is used for producing activated carbon and household barbeque briquettes and is preferred for non-ferrous electro-metallurgical processes (Fushman 1980).

Peat can also be enhanced through liquefaction and gasification processes that produce a number of by-products such as synthetic natural gas, methane, synthetic liquid fuels, and bitumen as well as base products for chemical processing such as phenols, tars, and waxes (Monenco Ontario Limited 1981; Fushman 1980).

Peat is also used in the distilling processes of some alcoholic beverages, and as a substrate for biomass cultivation (yeast, bacteria etc.) to yield medicinal and industrial products (Chornet 1984; Fushman 1980).

The production of sod and milled fuel peat is being carried out on a very limited scale in the Atlantic Provinces. Sod peat is currently used for home heating in eastern Newfoundland and milled peat has been used in a boiler of a pulp mill in the north central part of that province. With rising energy costs and increasing demand for energy, the Province of Nova Scotia has started to broaden its energy mix, looking at peat as a potentially viable fuel in industrial applications. The potential of this application is discussed in detail in Chapter 3.

## 1.1.2 The Peat Resource

### World Peat Resources

Roughly 80 percent of the world's peatland resources can be found in Canada and the U.S.S.R. (810 million acres [320 million ha]) (Punwani 1980). World peat production in 1980 was nearly 240 million tons (216 million tonnes) of which 100 million tons (90 million tonnes) were used for energy production (equivalent to 152 million bbl oil) (Kivinen and Pakarinen 1980) (Tables 1.1 and 1.2).

| Country | Resource Hectares ($\times 10^6$) | % of World Resources |
|---|---|---|
| Canada | 170.0 | 41 |
| U.S.S.R. | 150.0 | 36 |
| U.S.A. | 40.0 | 10 |
| Indonesia | 26.0 | 6 |
| Finland | 10.0 | 2 |
| Sweden | 7.0 | 2 |
| China | 3.5 | 1 |
| Norway | 3.0 | 1 |
| Malaysia | 2.4 | * |
| United Kingdom | 1.6 | * |
| Poland | 1.4 | * |
| Ireland | 1.2 | * |
| West Germany | 1.1 | * |
| Total | 417.2 | 100 |

*Less than 1% of world resources
(Kivinen and Pakarinen [1980] from Monenco Ontario Limited [1981])

Table 1.2
World peat resources

### Canadian Peat Resources

Peat can be found in all regions of Canada, from north to south and coast to coast. Canada has roughly 420 million acres (170 million ha) of peatland yet only 0.2 per cent of the world's peat production (Table 1.3).

Until recently, North American peatlands were generally considered to be wastelands. However, interest in peatlands increased in the post war period and a substantial peat moss industry developed in eastern North America, particularly in Quebec, New Brunswick, Maine and Nova Scotia (Bedard 1983).

Nova Scotia has approximately 400,000 acres (162,000 ha) of peatland (Table 1.4). Peat deposits are found throughout the Province, but the majority of the resource is concentrated in a small number of regions.

| Province/Territory | Inferred Resource Hectares ($\times 10^3$) | % of Canadian Resources |
|---|---|---|
| Alberta | 12 673 | 11 |
| British Columbia | 1 289 | 1 |
| Manitoba | 20 664 | 19 |
| New Brunswick | 120 | |
| Newfoundland | 6 429 | 6 |
| NW Territories | 25 111 | 23 |
| Nova Scotia | 158 | |
| Ontario | 22 555 | 20 |
| P.E.I. | 8 | |
| Quebec | 11 713 | 11 |
| Saskatchewan | 9 309 | 8 |
| Yukon Territory | 1 298 | 1 |
| Total | 111 328 | 100 |

(C. Tarnocai [1984], "Peat Resourcess of Canada")

Table 1.3
Canadian peat resources

| County | Resource Area (Hectares) | % of Nova Scotia Resources |
|---|---|---|
| Yarmouth | 9 843 | 6 |
| Shelburne | 25 640 | 16 |
| Queens | 19 031 | 12 |
| Digby | 7 852 | 5 |
| Annapolis | 15 715 | 10 |
| Kings | 4 451 | 3 |
| Lunenburg | 8 835 | 5 |
| Halifax | 14 114 | 9 |
| Cumberland | 5 984 | 4 |
| Colchester | 1 993 | 1 |
| Hants | 5 851 | 3 |
| Pictou | 1 818 | 1 |
| Guysborough | 14 403 | 9 |
| Antigonish | 922 | 1 |
| Victoria | 3 184 | 2 |
| Inverness | 6 187 | 4 |
| Cape Breton | 10 108 | 6 |
| Richmond | 5 879 | 3 |
| Total | 161 810 | 100 |

Table 1.4
Nova Scotia peat resources
(Nova Scotia Soil Surveys)

# 1.2 Peat and Peatlands

To most people, peat is the "peat moss" which they use in the garden as a soil conditioner or use directly as a growing medium for potting plants. But there is much more to peat than we meet in everyday experience. In the following section we outline in general terms the uses of peat, its global distribution, natural history of peat and peatlands, and aspects of the technology that currently exist for peat harvesting.

## 1.2.1 Peat

**Origin**

Peat is the partially decomposed remains of plants and animals which have accumulated in oxygen poor, water saturated freshwater environments. Nova Scotia deposits formed since the last glacial period (about 11-13,000 years ago) and have accumulated at a rate of 1 foot per thousand years (Auer 1930).

Partial decomposition of organic debris which occurs at the time of deposition is referred to as "humification". Humification is a decomposition and transformation process which breaks down the structural integrity of the parent organic material. In normal soil forming environments, humification transforms organic debris to "humus". However in a water logged environment, poor in nutrients and oxygen, the organic debris is transformed into "peat". Humification is believed to be the initial stage of coalification; in geological terms, peat is a very young coal (Kopstein 1979).

The availability of oxygen, nutrients, and water to the freshwater system where peat is forming, directly affects the chemical composition of the peat and the rate at which peat will accumculate. Poorly or weakly humified peat, commonly referred to as moss grade peat, can be orange-brown in colour and retain many of the characteristics of the organic material from which it formed (Figure 1.2).

Well humified peat (fuel grade) resembles dark brown to black muck (Figure 1.3). Its high bulk density and good combustion characteristics (Table 1.5) have led to its use as a fuel. The degree of humification of peat can be described on a scale of 1 to 10 using the "von Post" humification scale (see Chapter 2).

**Constituents of Peat**

Peat is commonly formed from *Sphagnum* moss, sedges (*Carex* spp), reeds, shrubs, wood, and other organic matter. Usually peat contains a mixture of organic remains which reflects the types of plants growing in the bog or wetland at the time of deposition.

Figure 1.2
Poorly humified peat (peat moss).

Figure 1.3
Highly humified fuel grade peat.

| | Moss Grade Peat | Fuel Grade Peat |
|---|---|---|
| Colour | light orange brown-dark brown | dark brown-black |
| Texture | rough, fibrous, bulky | smooth to rough, greasy matrix |
| Constituents | moss and plant structure quite evident | plant structure less evident; only shrub pieces and pieces of sedge can be noted |
| Bulk density | 120-170 Kg/M³ (50% M.C.) | 300-400 Kg/M³ (50% M.C.) |
| Heat Content | (7950-8200 BTU/lb) 4450-4550 Kcal/Kg | (8950-9500 BTU/lb) 4970-5280 Kcal/Kg |

Table 1.5
Physical characteristics of peat moss and fuel grade peat (Nova Scotia Department of Mines and Energy Peatland Inventory data)

**Mosses**

Mosses, predominantly *Sphagnum* spp. are the major constituents of Nova Scotia peat. There are approximately 45 species of *Sphagnum* moss known to occur in North America of which 75-80 percent are found in Nova Scotia (Wolfgang Maas, National Research Council, Halifax).

*Sphagnum* moss plants grow from two inches to one foot in length. The longer species tend to be pioneer species which grow in the wettest portions of bogs, while shorter species can usually be found in the drier or more ombrogenic (nutrient poor) areas of the bog (Pollet 1968; Barber 1981). The moss plants usually form dense mats covering the entire surface of the bog.

Each moss plant has many branchlets arising in clusters around the stem. Each branchlet is covered with small leaflets. These leaflets remain in clusters along the stem beneath the surface of the bog as the moss plants grow. The only living part of the moss is the cluster of branchlets near the top of the plant (Figures 1.4 and 1.5).

The leaflets are composed of large hyaline hydrocysts, cells surrounded by smaller cells which contain the vital organs of the plant (Figure 1.4). The hydrocysts hold much of the plant's water. When the plant dies the small cells form canals or pores allowing movement of water and dissolved minerals between the large hydrocysts. The cells of the *Sphagnum* moss plant will hold up to 30 percent of the water in the moss while the other 70 percent is held in the extracellular spaces as well as between the leaflets (Scagel et al 1965).

Moss plants can retain up to 27 times their weight of water, (Swinnerton 1958). The fibrous nature, sterility, and water holding capacity of poorly humified *Sphagnum* peat moss make it an excellent soil conditioner. Peat can provide increased aeration or pore space in clayey soils, and increased water and nutrient retention in sandy soils (Leverin and Cameron 1949; Sutherland and Shea 1976).

Other mosses that contribute to peat formation occur in isolated instances in Nova Scotia. Members of the Order Bryales, *Dicranum* and *Polytricum*, have been catalogued at several sites. Bryales peats were found in poorly humified, nearly pure layers, near the bottom of the peat strata of a number of bogs.

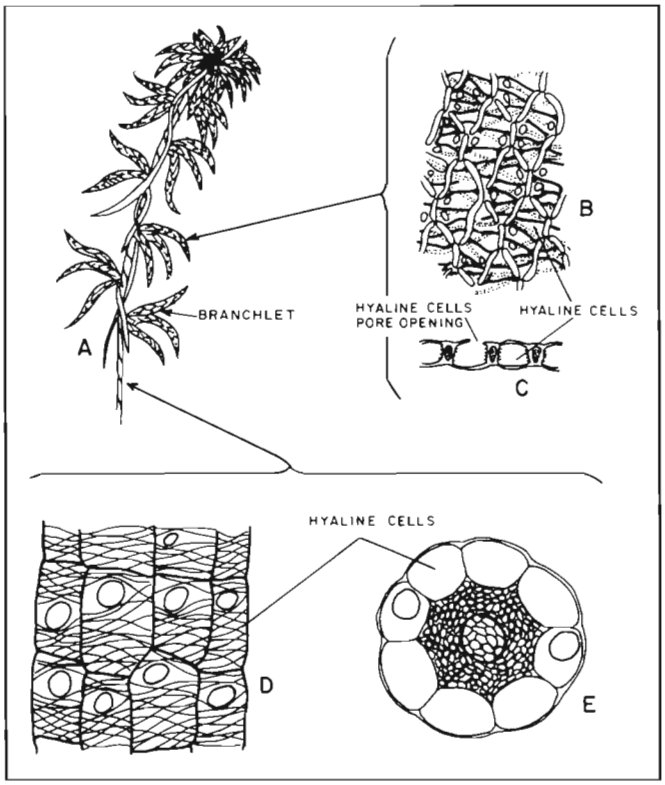


Figure 1.4
Morphology of *Sphagnum* mosses.

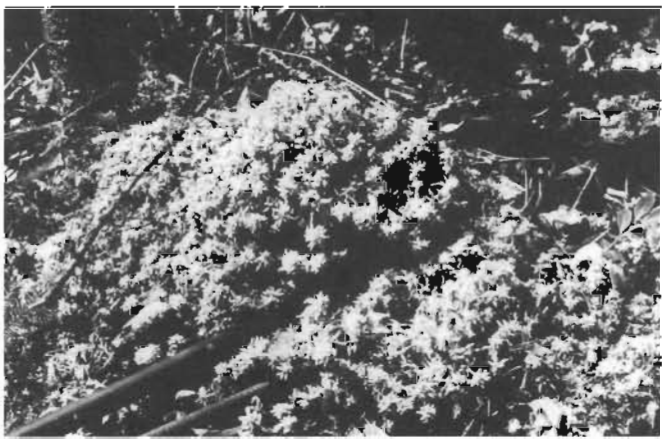

Figure 1.5
*Sphagnum* moss hummock.

**Grass-like Plants**
Several species of sedges, reeds, and grasses are found in peatlands in Nova Scotia. The most notable are deer-grass (*Scirpus caespitosus*), cotton-grass (*Eriophorum spissum*), white beak grass (*Rhycospora alba*), and several species of sedges (*Carex* spp.) (Figure 1.6).

These plants have variable amounts of lignin within their cell walls which make them resistant to breakdown in the humification process. Often the matrix of the peat is far more humified than the fibres of the sedge-like plants. This is particularly true where the roots of deer-grass (*Scirpus caespitosus*) are prevalent.

Sedge dominant peats are typically found in mineral rich peatlands or in the lower strata of *Sphagnum* dominated bogs. These peats are generally accompanied by minor occurrences of shrubs or pieces of wood and tend to be poorly humified. Sedge peats have a low water retention capability but have a fairly high bulk density which tends to increase their potential for use as fuel rather than for horticultural applications.

**Shrubs and other Woody Plants**
These are minor constituents in most peat types. The remains of woody plants occur thoughout the entire peat depth profile. The most common are ericaceous shrubs such as sheep laurel (*Kalmia* spp.), leatherleaf (*Chamaedaphne calculata*), rhodora (*Rhododendron canadense*) and labrador tea (*Ledum groenlandicum*) (Figure 1.7). Woody plant remains found in peat are derived from trees or tall shrubs, usually black spruce (*Picea mariana*), larch (*Larix larcina*), red maple (*Acer rubrum*), or speckled alder (*Alnus rugosa*), which grew in the peatland at the time of deposition. The occurrence of these remains in large quantities in the peat tends to lower the economic potential of the deposit for either peat moss or fuel peat.

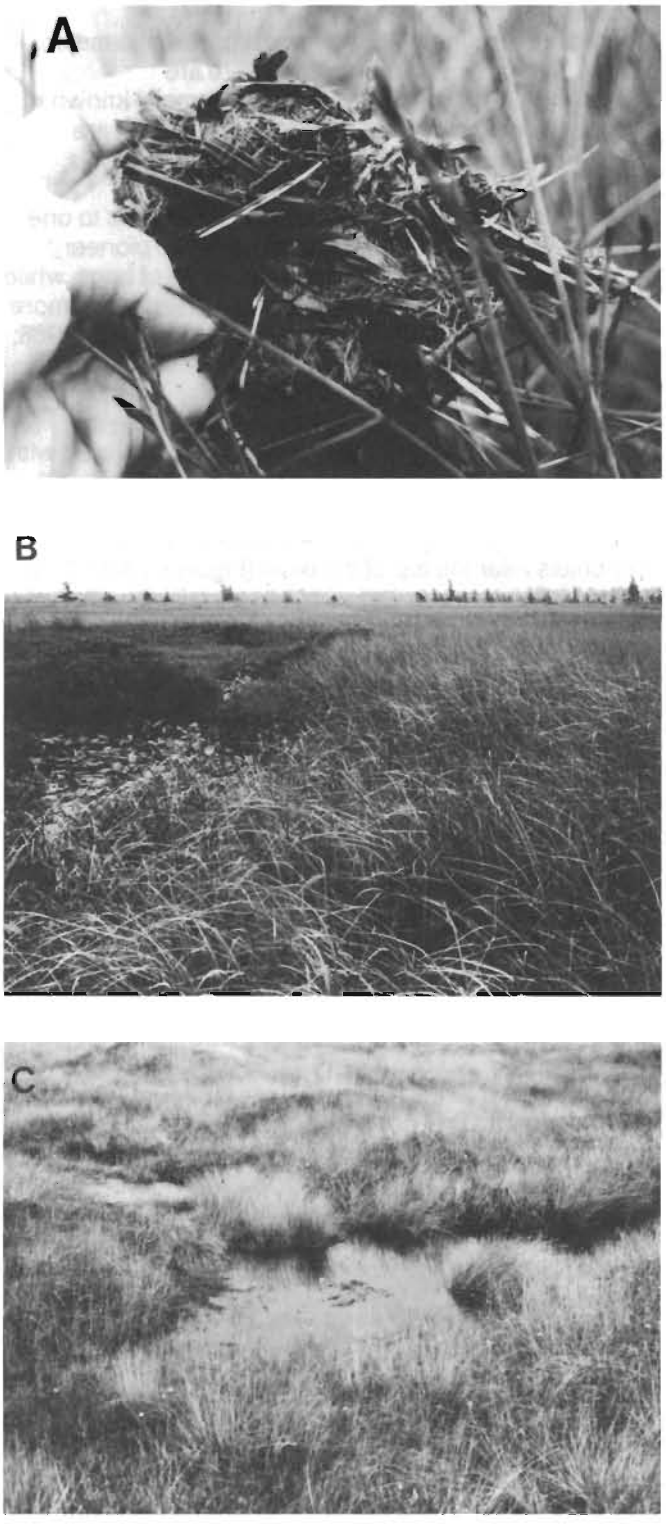


Figure 1.6
Grass-like plants. A. Reed-sedge peat (shallow marsh). B. *Carex* species (graminoid fen). C. Deergrass (*Scirpus caespitosus*) (graminoid bog).

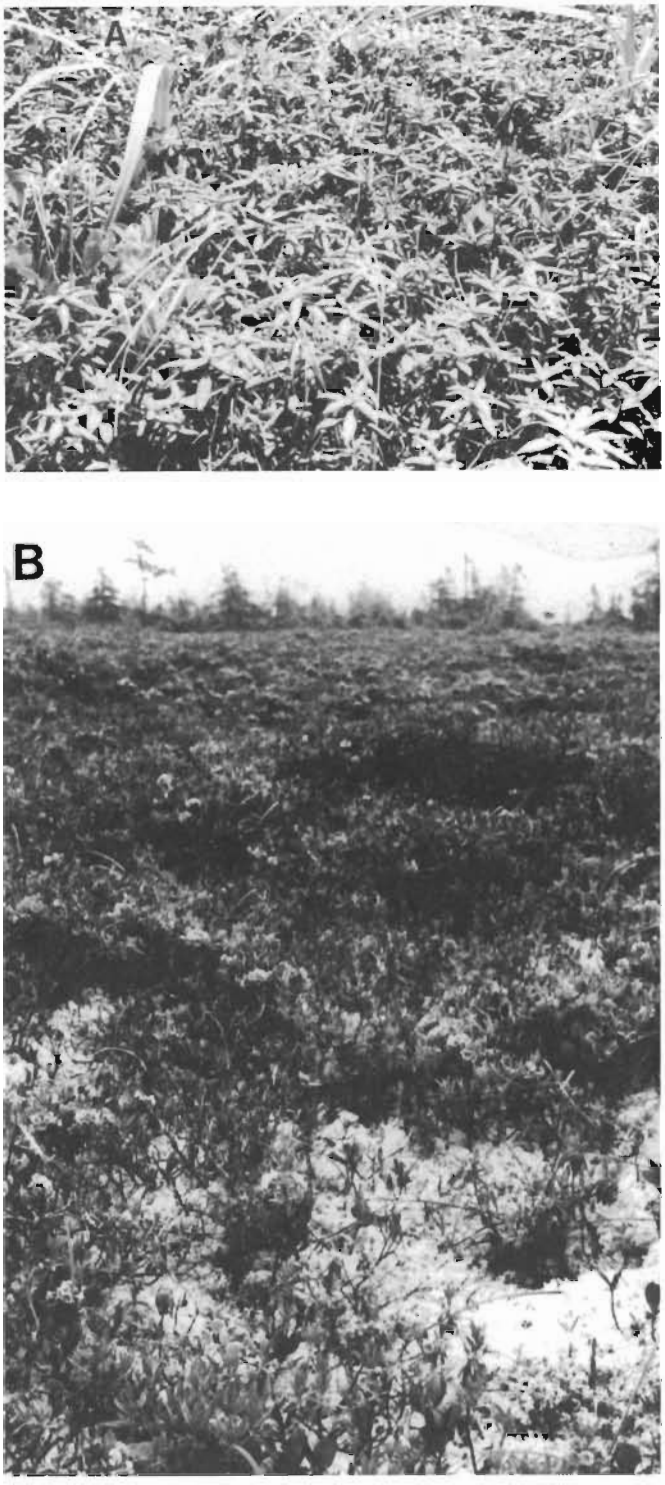


Figure 1.7
Shrubs and woody plants. A. Bog laurel (*Kalmia* spp.) and Leatherleaf (*Chamaedaphne* spp.), low shrub bog. B. Labrador tea (*Ledum groenlandicum*), low shrub bog.

## 1.2.2 Nova Scotia Peatlands

Peatlands are a type of wetland in which peat has accumulated to form a substantial layer. Familiar terms for these areas are "bogs", "swamps", "savannahs", "heaths", and "meadows".

Development or formation of a peatland takes place in two phases, infilling, and expansion. "Infilling" is the primary or initial successional stage which leads to the development of an organic mat within a wetland system (Auer 1930; Moore and Bellamy 1974). For the purposes of this report, peat accumulations within a body of water or wetland are not considered peatlands until they reach the surface of the water table and exceed one foot (30 cm) in depth. Once accumulation exceeds the level of the water table the "expansion" phase of the peat deposit begins.

Peat growth above the original water table or water level will retain precipitation, or by capillary action draw water upward, maintaining the water table just beneath the surface of the peatland. As peat accumulates, the water table rises. The deposit thus raises the water table near its margin. The change in water level at the peatland margin causes "paludification" of the surrounding soil, a lateral expansion of the peat deposit (Auer 1930) (Figure 1.8). This is the primary stage where peatland differentiation takes place (Moore and Bellamy 1974).

There are three basic peatland forms found in Nova Scotia; bogs, fens, and swamps. The distribution of the peatlands is related to the topography, drainage, and, to some extent, the climate of the region (Figures 1.9 and 1.10).

**Bogs**

The most common peatlands in Nova Scotia are "bogs". Bogs are relatively nutrient poor and acidic accumulations of peat derived from *Sphagnum* moss and other minor plant debris. Several bog types occur in the Province, ranging from extensive blanket bogs in northern Cape Breton to small flat deposits found throughout Nova Scotia (Figures 1.10 and 1.11).

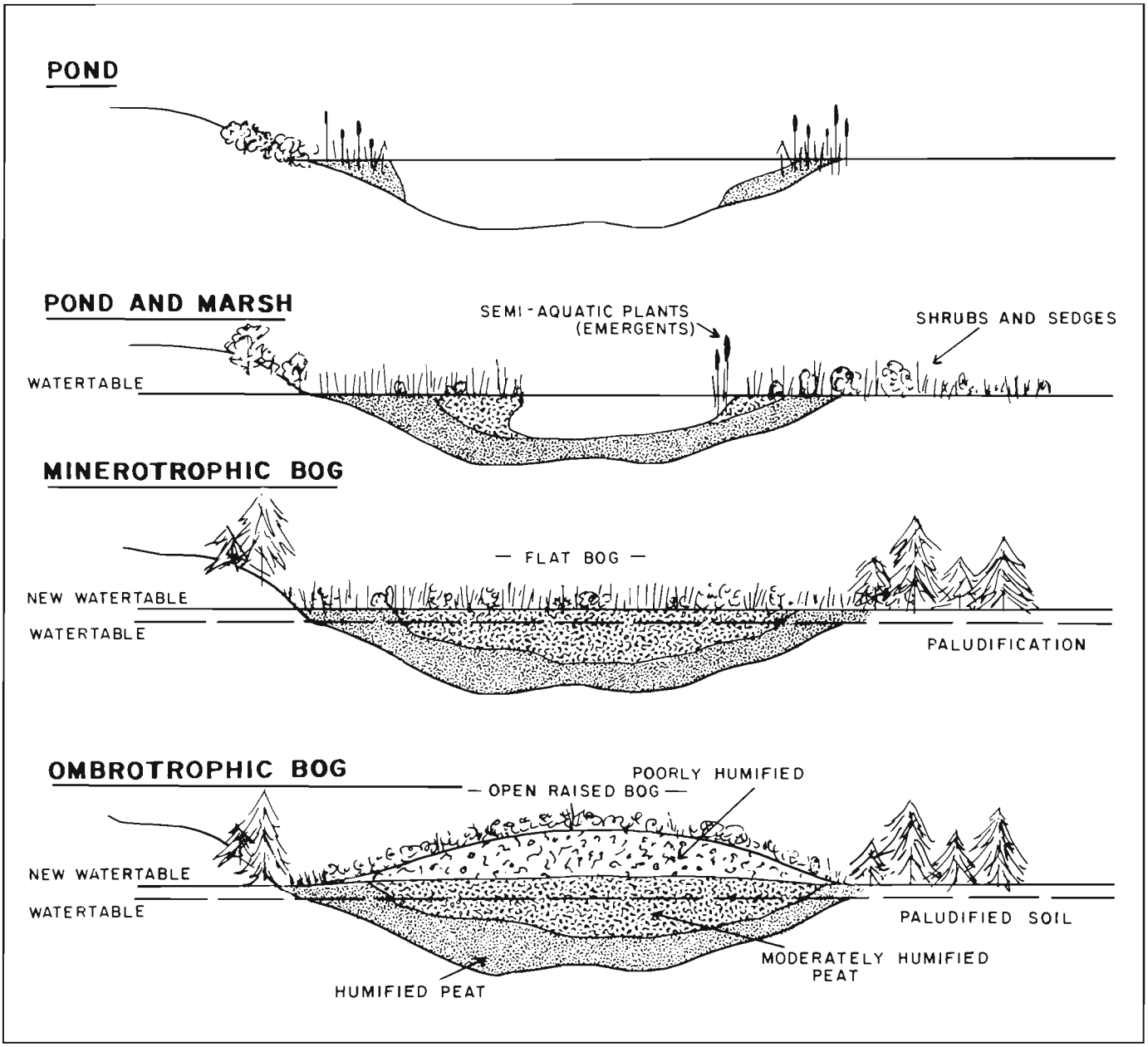


Figure 1.8
The successional stages of peatland formation.

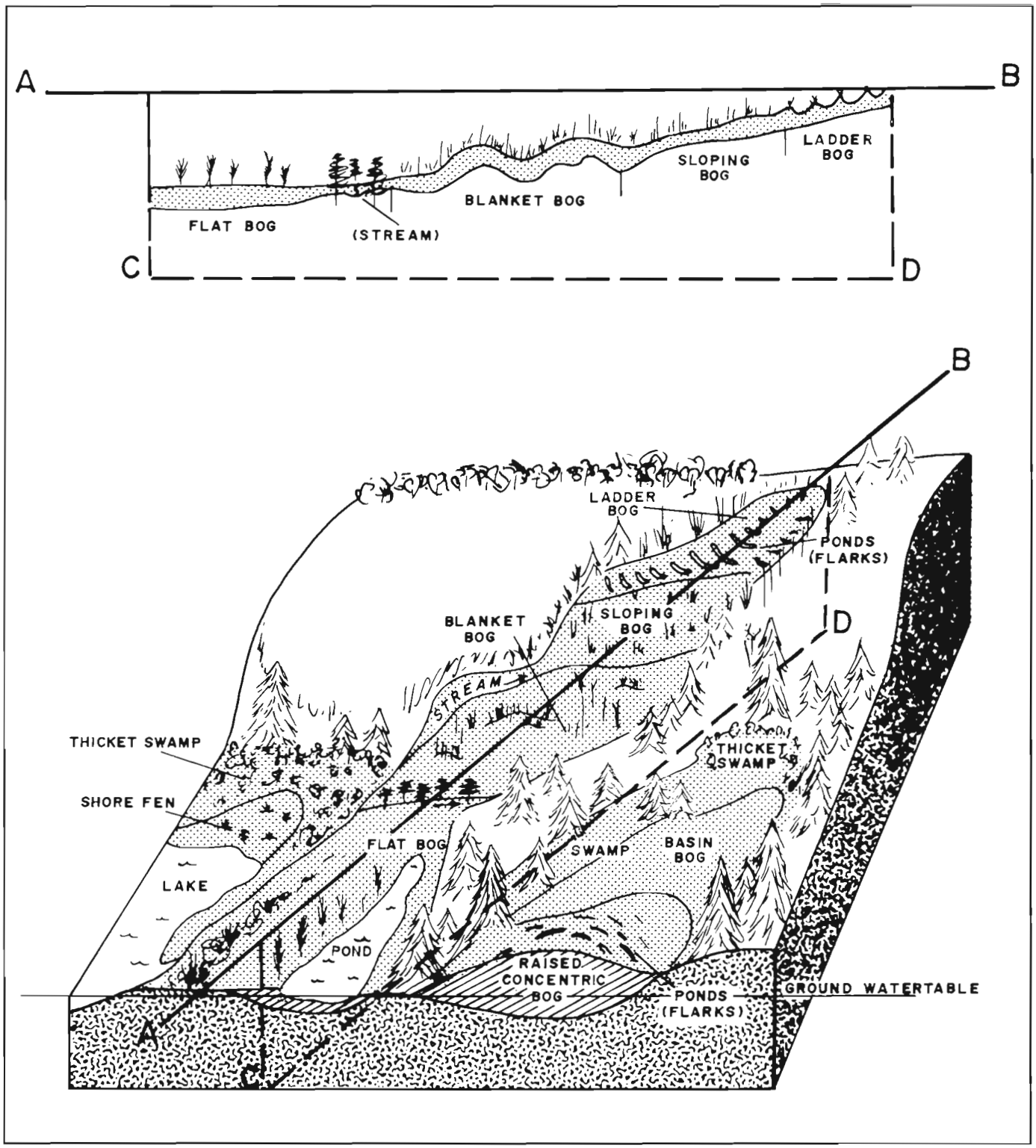


Figure 1.9
Typical peatland formations.

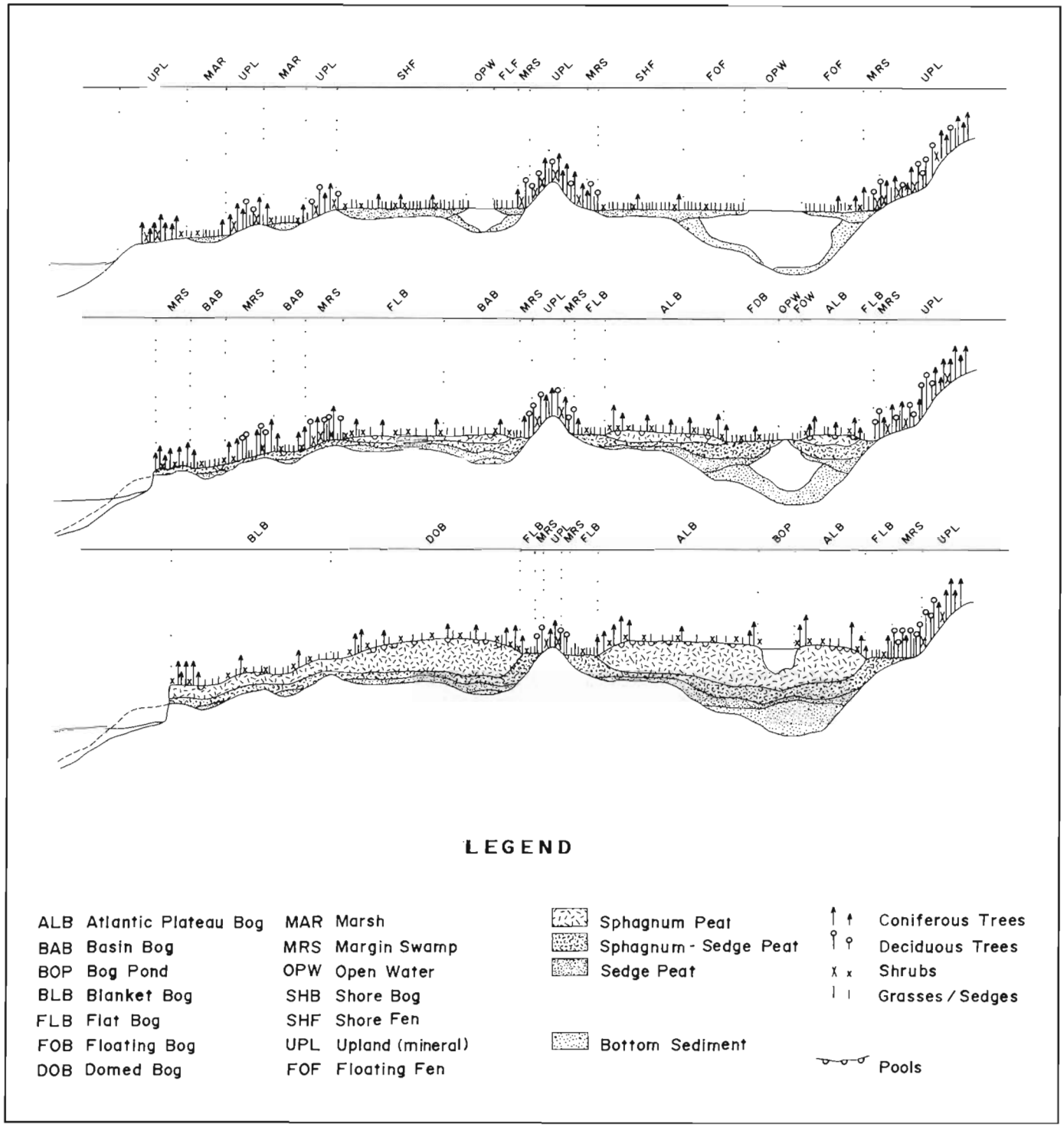


Figure 1.10
Dynamics of peatland formation.

**Raised or Domed Bogs**
As a peatland develops in size and depth, vegetation growing near the centre becomes partially isolated from nutrient influx from groundwater systems. There is a gradual replacement of minerotrophic mosses and plants with more ombrotrophic plants (plants which obtain their nutrient needs from precipitation, rain, or snow melt) (Dansereau and Segados-Vianna 1952). Oxygen and nutrient deficient water from precipitation and the consequent slow biological degradation results in the "rapid" accumulation of poorly humified peat, creating a dome or raised centre in the bog (Auer 1930; Dansereau and Segados-Vianna 1952; Moore andBellamy 1974; Barber 1981).

Domed bogs occur throughout Nova Scotia. The change in elevation from the margin to the centre of the bog may only be a few feet (1 m) to as much as 12-15 feet (4-5 m) depending on the stage of development and the physiography of the region. In domed bogs the slope is usually fairly constant from the margin to the centre (Figure 1.9).

"Coastal Raised Bogs" or "Atlantic Plateau Bogs" are common in the southern coastal regions of the Province. Found primarily along the coast, they are typically different from domed bogs in that their domes are "steep" sided, rising up to 12 feet (4 m) within a few hundred feet of the bog margin. They then level out like a plateau with only a slight rise towards the center.

**Flat Bogs**
Flat bogs (Figures 1.10 and 1.11) are rarely truly flat and usually slope slightly from one margin to the next. These deposits are found throughout Nova Scotia and may be considered as weakly developed or immature bogs. Although flat bogs may have begun to form at the same time as raised deposits,they do not have thick accumulations of peat-a result of unfavourable topography or environmental conditions. Generally, flat bogs are moderately shallow (3 to 10 feet (1 to 3 m) in depth), and tend to be fairly minerotrophic, often associated with high ground water systems and flowing or open bodies of water. Several types of flat bogs are found in Nova Scotia of which basin bogs, shore bogs, and stream bogs are the most common.

**Sloped Bogs**
Peat accumulating on inclined terrain often develops into a "sloped" bog. Peat depth may often be fairly uniform throughout the deposit, ranging from 3 to 10 feet (1 to 3 m) in depth. Sloping bogs often develop striking surface patterns of vegetation and ponding. A similar or related type of patterning is often found on raised bogs and some types of fens (Figures 1.9 and 1.10).

Sloped bogs are usually restricted to areas with cool, moist, climate where there is poor to imperfect drainage, allowing peat to accumulate on the side of a hill or in shallow seepage tract. A number of sloped bogs are found in Cape Breton and Guysborough County.

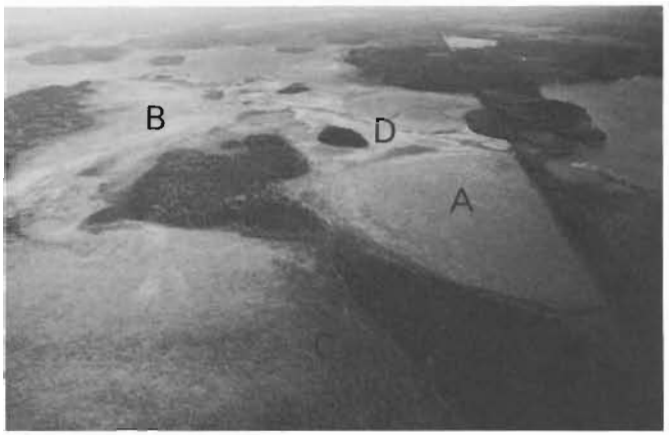


Figure 1.11
Peatland complex. A. Slightly domed bog. B. Flat bog. C. Peat margin swamp. D. Stream fen.

**Blanket Bog**
Blanket bogs are usually restricted to areas of relatively thin soils, in cooler and wetter areas of the Nova Scotia (chiefly the Atlantic coast from Halifax to Sydney and Cape Breton Highlands). Peat deposits in blanket bogs are usually quite shallow, rarely exceeding 6 feet (2 m) except where ombrotrophic domes have formed. Blanket bogs differ from sloped and flat bogs in that they follow the contour of the land, have fairly constant depth, and cover the mineral terrain like a "blanket" (Figures 1.9 and 1.10). Quite often blanket bogs have large rocks protruding through their surface and have numerous ponds.

**Fens**
The primary difference between bogs and fens, according to Jeglum *et al.* (1974), is the type of vegetation contributing to the peat matrix. In fens, the primary forms of vegetation are comprised of sedges, grasses, and reeds mixed with shrubs and minor amounts of mosses, usually *Hypnum* (brown) mosses. In bogs, the primary component is *Sphagnum* moss.

In North America, minerotrophic bogs may also be called fens (Davis *et al.* 1985). Fens may be sloped but normally are flat and very minerotrophic.

From sampling data collected during the present survey program it was evident that fens were common in the early development of peatlands. Thick layers of sedge dominated peat were found at the bottom of many deposits. Although less common today, most fens in the Province border on, or are near, flowing or open bodies of water (Figures 1.10 and 1.12).

Figure 1.12
Stream fen at margin of a flat bog in Hants County.

**Swamps**

Swamps and thicket swamps are often nutrient rich peatlands dominated by a standing cover of merchantable trees (Figures 1.10 and 1.13). Thicket swamps are peatlands dominated by tall shrubs such as alders (*Alnus* spp.) or similar plants. These peatlands receive frequent inundations of mineral rich waters from streams and/or runoff. They can be found throughout Nova Scotia in poorly drained sites near streams and lakes or at bog margins. They can also be found in hollows or on poorly drained slopes. Peat depth is usually very shallow, usually no more than 3 feet (1 m).

Figure 1.13
Peat margin swamp (mixed), Yarmouth County.