Frontline

Forestry Research Applications

Canadian Forest Service–Ontario

Technical Note No. 56

THE MAIN BLACK SPRUCE DOMINATED VEGETATION TYPES IN NORTHWESTERN ONTARIO

H.M. Kershaw and R.A. Sims

CATEGORY: Forest ecology
KEY WORDS: Black spruce, forest ecosystem classification, vegetation types

INTRODUCTION

Northwestern Ontario's Forest Ecosystem Classification (NWO FEC) was developed by Forestry Canada, Ontario Region and the Ontario Ministry of Natural Resources to provide a framework for improved communication about forest ecosystems in northwestern Ontario (Sims et al. 1989). The NWO FEC recognizes 38 vegetation types (V-types) defined by the presence/absence or relative abundance of indicator species, as well as 22 soil types (S-types) defined principally on the basis of soil texture class, moisture regime, and depth to bedrock. Each V-type and S-type describes an average stand or soil condition.

This technical note summarizes information from the field manual (Fig. 1) on the 11 V-types in which black spruce (*Picea mariana* [Mill.] B.S.P.) is a dominant overstory species. S-types are not described here. Examples of broad management limitations and opportunities associated with these V-types are summarized in another note in this series (Sims and Kershaw 1994).

Figure 1. Three FEC related field manuals prepared by Forestry Canada, Ontario Region and the Ontario Ministry of Natural Resources.

THE MAIN CLASSIFICATION UNITS

Black spruce stands occur in association with a wide variety of soil and site conditions in northwestern Ontario, ranging from thin, mineral soils overlying bedrock to poorly drained, organic wetlands, and from relatively nutrient-poor to nutrient-rich conditions. Balsam fir (*Abies balsamea* [L.] Mill.), jack pine (*Pinus banksiana* Lamb.), white spruce (*P. glauca* [Moench] Voss), tamarack (*Larix laricina* [Du Roi] K. Koch), balsam poplar (*Populus balsamifera* L.), white birch (*Betula papyrifera* Marsh.), and trembling aspen (*P. tremuloides* Michx.) are common overstory associates. In many black spruce dominated stands, the tall shrub and herb/dwarf shrub vegetation is poorly developed. Extensive and repetitive forest fires, cyclical insect infestations and diseases, and forest harvesting operations all have an ongoing influence on the ecology of boreal black spruce forests. Figure 2 shows a series of "stand silhouettes" for black spruce dominated V-types, organized across a slope sequence from left to right. Many of the 11 V-types described in the following sections are included.

UPLAND BLACK SPRUCE / FEATHERMOSS VEGETATION TYPES

Upland black spruce V-types 19, 20, 30, 31, 32, and 33 occur as conifer or mixedwood stands across a broad range of soil and site conditions. Black spruce and/or jack pine are the

main canopy species. Minor overstory elements include trembling aspen, white birch, and balsam fir. Black spruce, balsam fir, and ericaceous (heath) species are common shrub layer elements, but the understory is variable in structure, abundance, and species composition. Understory conditions in V20, V32, and V33 are usually herb and shrub poor. Broadleaved species such as *Aralia nudicaulis* L., *Diervilla lonicera* Mill., *Aster macrophyllus* L., and *Corylus cornuta* Marsh. can be abundant in V19 and V31. Forest floor cover is a characteristic carpet of feathermoss with occasional pockets of *Sphagnum* in wet depressions. This carpet is broken by patches of litter in V19 and V31 and *Cladina* spp. ground lichens in V30.

V19. Black Spruce Mixedwood / Herb Rich

These mixedwood stands occur most frequently on fresh to moist mineral soils. Canopy closure ranges from closed to relatively open. Black spruce occurs with a variety of other species, most commonly trembling aspen, balsam fir, and jack pine. Broadleaved shrubs are typically absent from the understory and the herb/dwarf shrub layer is diverse.

V20. Black Spruce Mixedwood / Feathermoss

This V-type occurs on upland, fresh to dry, coarse-textured mineral soils. White birch is a common associate of these black spruce dominated mixedwoods. The understory is typically dominated by low, ericaceous shrubs with scattered clumps of black spruce. The forest floor consists of an extensive, often continuous, feathermoss mat.

V30. Jack Pine–Black Spruce / Blueberry / Lichen

These sparsely stocked jack pine and/or black spruce stands occupy dry to fresh, rapidly drained, coarse-textured, and usually shallow soils. Soils vary from shallow soil over bedrock to talus slopes and bare bedrock; infrequently, V30 develops on dry, very well drained, deep, coarse sandy soils. The understory often has scattered clumps of black spruce and abundant *Cladina* spp. ground lichens.

V31. Black Spruce–Jack Pine / Tall Shrub / Feathermoss

These black spruce–jack pine stands occur across a range of soil and site conditions, but are most common on deep, fresh, upland mineral soils. Balsam fir and black spruce are often abundant in the tall shrub layer and *Corylus cornuta* and *Alnus crispa* (Ait.) Pursh are occasionally abundant. The herb / dwarf shrub layer is usually poorly developed and the forest floor ranges from feathermoss to mainly litter.

V32. Jack Pine–Black Spruce / Ericaceous Shrub / Feathermoss

V32 stands typically consist of even-aged, fire-originated jack pine and black spruce mixtures occurring on fresh to dry, coarse-textured mineral soils. Scattered clumps of black spruce, and occasionally *Alnus crispa,* form a tall shrub layer. The herb / dwarf shrub layer is weakly developed and feathermoss usually forms a continuous carpet.

V33. Black Spruce / Feathermoss

Black spruce dominates the overstory of these stands. Jack pine, balsam fir, white spruce, and white birch sometimes occur as associates. V33 occurs most frequently on fresh, coarse-textured mineral soils. Ericaceous species occur in the herb / dwarf shrub layer, along with *Cornus canadensis* L. and other plant species. Feathermoss forms a continuous carpet.

TRANSITION UPLAND / LOWLAND BLACK SPRUCE VEGETATION TYPE

V34. Black Spruce / Labrador Tea / Feathermoss (*Sphagnum*)

This is a variable black spruce V-type. Occasionally white cedar, tamarack, jack pine, and other coniferous species occur with black spruce in the overstory. V34 occurs on moist to wet, lowland or lower slope positions, typically in

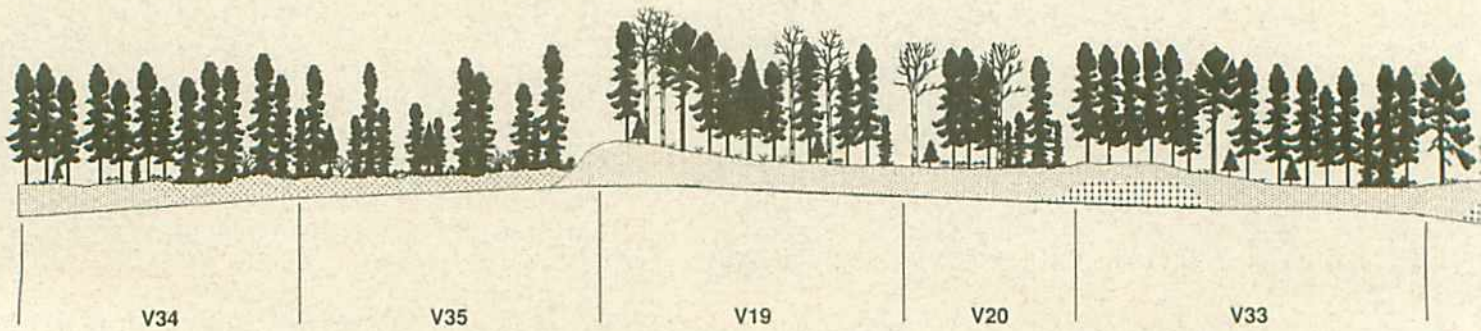


Figure 2. "Stand silhouette" cross section schematically shows some black spruce dominated V-types along a toposequence from left (upland, drier) to rig

association with organic soils or loamy- to fine-textured mineral soils. *Ledum groenlandicum* Oeder and other ericaceous species dominate the herb/dwarf shrub layer. Characteristically, the forest floor is a continuous feathermoss mat with patches of *Sphagnum*.

LOWLAND BLACK SPRUCE / *SPHAGNUM* VEGETATION TYPES

In these stands the dominant overstory species is black spruce; other conifer species occur only occasionally in the canopy of the Lowland Black Spruce / *Sphagnum* vegetation types, V35 to V38. These V-types mainly occupy wet organic soils, but can occur on moist mineral soils (especially V36 and V37) that are imperfectly to poorly drained. Understory conditions vary from herb and shrub rich (V35 and V36) to poor (V34 and V37). *Alnus rugosa* (Du Roi) Spreng. can be abundant in V34 and V35. Ericaceous species dominate the herb/dwarf shrub layer in all of these V-types. The forest floor of *Sphagnum* and/or feathermoss usually has a rolling to hummocky microrelief. As well, scattered wet or flooded depressions and patches of broadleaf or graminoid (grass and sedges) litter may occur on the forest floor, especially in V35 and V37.

V35. Black Spruce / Speckled Alder / *Sphagnum*

This wet V-type occurs on deep, fibric organic soils and often includes small pockets of standing water. *Alnus rugosa* is a characteristic component of the tall shrub layer. The understory ranges from a rich to poor mixture of herbs and shrubs. Forest floor cover consists of *Sphagnum* and feathermoss, often with patches of broadleaf litter.

V36. Black Spruce / Bunchberry / *Sphagnum* (Feathermoss)

These black spruce dominated stands occur on poorly drained, typically deep fibric organic soils in lowland depressions and flats. The herb / dwarf shrub layer supports a variety of herbs, but is dominated by ericaceous species, particularly *Ledum groenlandicum*. The forest floor consists of a continuous feathermoss–*Sphagnum* carpet.

V37. Black Spruce / Ericaceous Shrub / *Sphagnum*

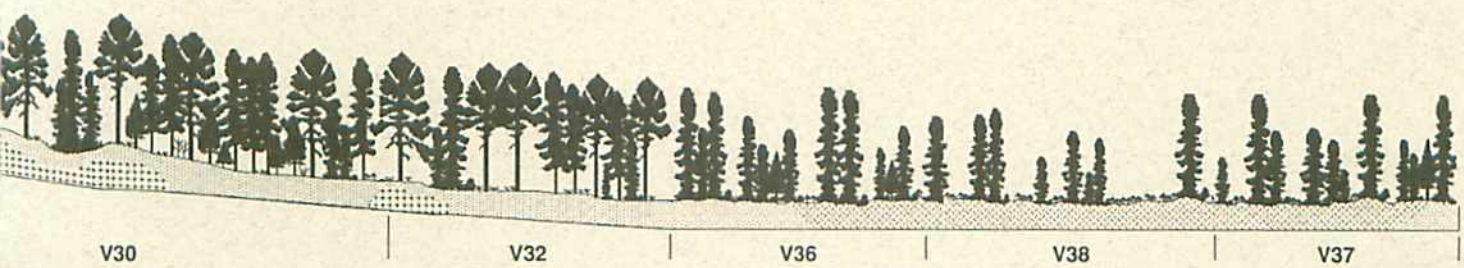
This V-type is typically a herb poor black spruce wetland community growing in depressions and flats on wet and poorly drained, deep fibric organic soils or very moist mineral soils. The dwarf shrub / herb layer is characteristically sparse and dominated by *Ledum groenlandicum*. The forest floor is a continuous *Sphagnum* or *Sphagnum*–feathermoss carpet.

V38. Black Spruce / Leatherleaf / *Sphagnum*

V38 consists of poorly stocked, unmerchantable black spruce on deep, wet, organic soils. V38 often forms in depressions or flats that are transitional to open wetlands. The dwarf shrub / herb layer is poorly developed although *Chamaedaphne calyculata* (L.) Moench, *Ledum groenlandicum*, and small black spruce are often abundant. The ground cover typically is a hummocky *Sphagnum*–feathermoss carpet.

ENVIRONMENTAL RELATIONSHIPS

The distribution of black spruce dominated V-types across environmental gradients can be interpreted from plotted diagrams that are derived from computer-assisted "ordination" analyses of vegetation data (*cf.* Sims et al. 1989). The ordination diagram (Fig. 3) represents an "executive summary" in two dimensions (general nutrient status along the horizontal axis, general moisture regime conditions along the vertical axis) of the abundant information for all vegetation species recorded in over 2,150 NWO FEC field plots.



d, wetter).

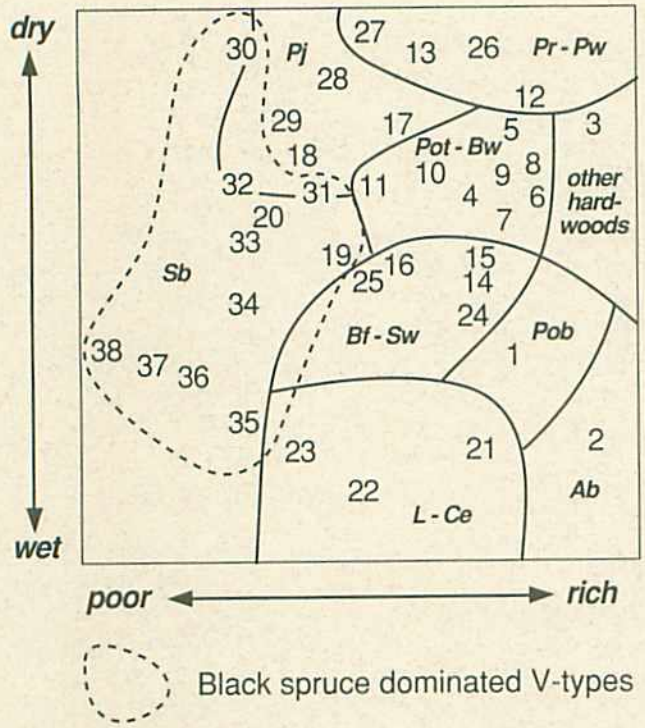


*Figure 3. Northwestern Ontario FEC ordination (*after *Sims et al. 1989) overlaid with the distribution of major tree species groupings (Ab = black ash, Bf = balsam fir, Bw = white birch, Ce = white cedar, L = tamarack, Pj = jack pine, Pob = balsam poplar, Pot = trembling aspen, Pr = red pine, Pw = white pine, Sb = black spruce, Sw = white spruce). The 11 black spruce dominated V-types are indicated by the hatched line.*

CONCLUSIONS

The classification of black spruce dominated stands into one of 11 NWO FEC V-types assists forest managers and resource planners in understanding the ecology of forest stand/vegetation/soils/site relationships in northwestern Ontario. The NWO FEC provides a simple, easy-to-use, standardized system for naming and describing forest stand conditions.

REFERENCES AND FURTHER READING

Sims, R.A.; Kershaw, H.M. 1994. Management of black spruce dominated vegetation types of northwestern Ontario. Nat. Resour. Can., Canadian Forest Service, Sault Ste. Marie, ON. Frontline Technical Note 57. 4 p.

Sims, R.A.; Towill W.D.; Baldwin, K.A.; Wickware G.M. 1989. Field guide to the forest ecosystem classification for northwestern Ontario. Ont. Min. Nat. Resour., Northwestern Ont. Forest Tech. Development Unit, Thunder Bay, ON. 191 p.

Maureen Kershaw

Richard Sims

Maureen Kershaw is owner of Devlin Consulting Services of Sudbury, Ontario. The firm specializes in forest ecology, forest management, earth science, and ecotourism. She prepared this technical note under contract.

Dr. Richard Sims is a research scientist with the Canadian Forest Service – Ontario and former leader of the now completed Black Spruce Ecosystem Silviculture Project. His research focuses on forest site classification and ecology and on geographic information systems.

NODA • EDNO
CANADA ONTARIO
Forestry • Foresterie
Natural Resources Canada / Ressources naturelles Canada
Canadian Forest Service / Service canadien des forêts
Ministry of Natural Resources / Ministère des Richesses naturelles
Ontario

The preparation of this note was funded under the Northern Ontario Development Agreement's Northern Forestry Program.

Additional copies of this publication are available from:

Natural Resources Canada
Canadian Forest Service – Ontario
Great Lakes Forestry Centre
P.O. Box 490
Sault Ste. Marie, Ontario
P6A 5M7
(705) 949-9461
(705) 759-5700 (FAX)

Catalogue No. Fo 29–29/56E
ISBN 0–662–22601–17
ISSN 1183–2762

This technical note is printed on paper containing recycled material.