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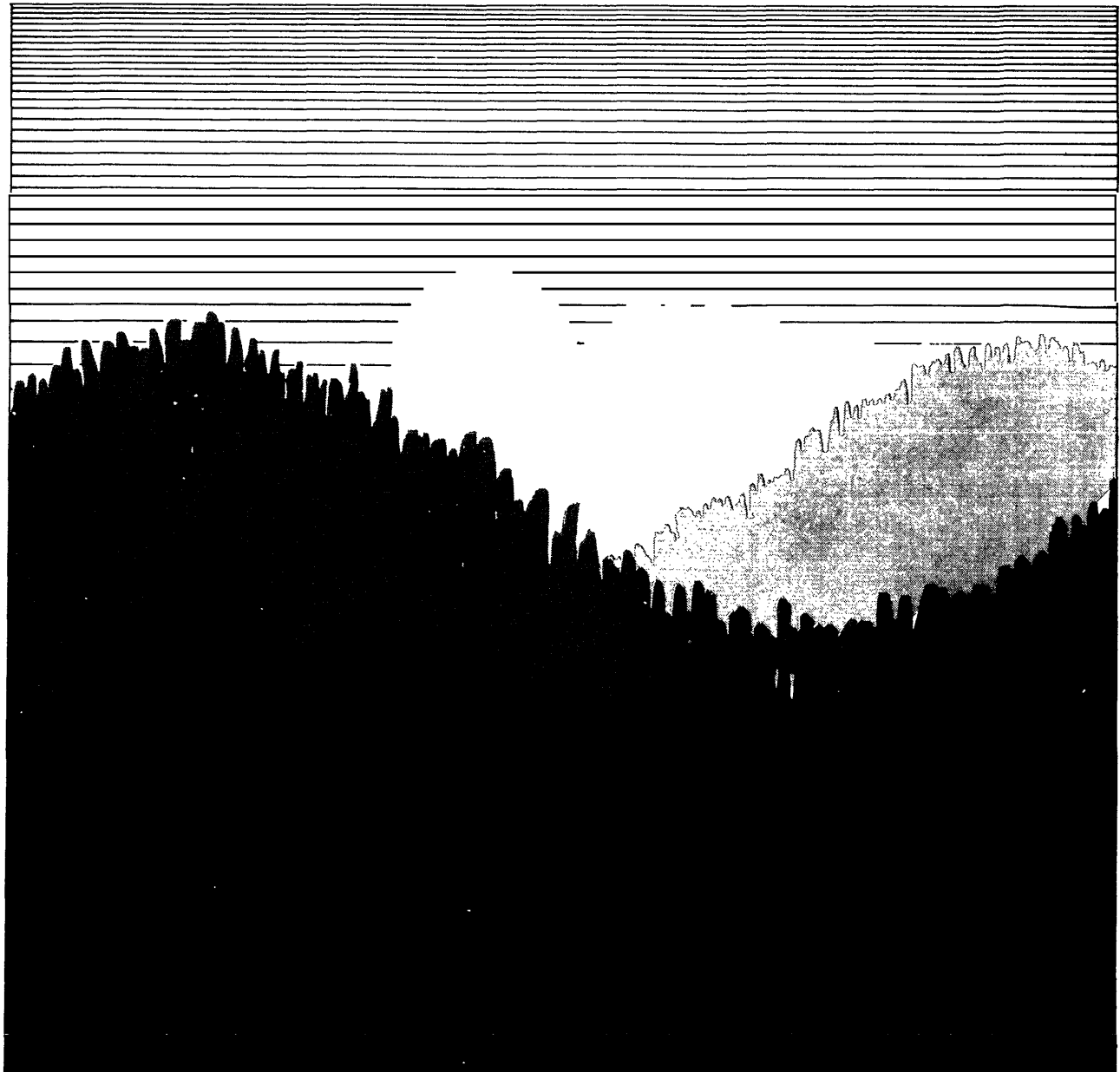
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Forest Community Classification of the Porcupine River Drainage, Interior Alaska, and Its Application to Forest Management

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Abstract

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The forest vegetation of 3 600 000 hectares in northeast interior Alaska was classified. A total of 365 plots located in a stratified random design were run through the ordination programs SIMORD and TWINSpan. A total of 40 forest communities were described vegetatively and, to a limited extent, environmentally. The area covered by each community was similar, ranging from 0.29 to 4.29 percent. A large number of mixed spruce communities were described and suggested to be the result of the study area's proximity to the northern limit of black spruce (*Picea mariana* (Mill.) B.S.P.). Average aboveground tree biomass and productivity were estimated for each community. Values for trees ranged from 0.2 kilogram per square meter aboveground biomass and 4.0 grams per square meter per year mean annual increment for a woodland black spruce Community to 23.4 kilograms per square meter and 195 grams per square meter per year for a closed white spruce community. The potential productivity of the study area was estimated on the basis of 100-percent stocking of each community with trees. A total of 42.9 percent of the area was estimated to have potential to support commercial forests.

Keywords: Classification (forest communities), biomass, Alaska (Porcupine River drainage).

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Introduction

Interior Alaska is developing at an ever increasing pace. In **1977** the Trans-Alaska Oil Pipeline was the first large project to cross the interior taiga, and it indicated a definite need for basic ecological information about taiga ecosystems. Future development might include a natural gas pipeline and extensive land clearing for agricultural development, plus a need to supply the increasing demand for forest products initially in the local market and eventually in the world market.

Wise management of taiga ecosystems will require substantially more basic ecological knowledge than is available for interior Alaska. It will also require that this knowledge be effectively organized and disseminated. Classification of ecosystems into relatively homogenous groups to aid in the description and interpretation of ecological data is probably the most commonly used technique. The complexity of the classification then varies by the size of the study and its objectives. When enough information is available, the classifications are linked. Viereck and Dyrness published a preliminary classification of Alaska vegetation in **1980**.

Few studies have been carried out in the Alaska taiga. The basic ecological effects of forest fires on vegetation, soils, hydrology, and wildlife were studied by Lutz (**1956**). He used a simple vegetation classification by dominant overstory tree to organize and present results. He presented successional patterns after fire and showed the tremendous effect that forest fires have on vegetation in the taiga of Alaska. Drury (**1956**) used a more detailed classification of the physiographic processes that influence the vegetative structure of the bog flats of the upper Kuskokwim River.

The use of quantitative methods to classify the vegetation of interior Alaska and then to interpret the classification structure in an environmentally meaningful way is also limited to a few studies. Taiga communities in northwest Alaska were described and compared with other arctic regions by Hanson (**1953**). Foote^{1/} (**1979**) classified and described communities in interior Alaska and suggested a general pattern of forest succession. A vegetation classification was also developed for a portion of northeast Alaska as part of the environmental studies before construction of the Trans-Alaska Oil Pipeline (Hettinger and Janz **1974**).

A study of the structure and function of taiga ecosystems in the vicinity of Fairbanks, Alaska, has focused on the effect of cold soil temperatures as a major factor controlling the distribution and structure of taiga ecosystems (Van Cleve and others **1983**). The effect of soil temperature on production and nutrient cycling in two black spruce (*Picea mariana* (Mill.) B.S.P.) ecosystems has been presented by Van Cleve and others (**1980**). These studies represent an attempt to start with a hypothesized control over community structure and function before sampling. Vegetation-environment studies can then be designed to test the hypothesis rather than formulate a hypothesis as is the case in many vegetation classification studies.

^{1/} Foote, J. Classification, description and dynamics of plant communities following fire in the taiga of interior Alaska. 1976. 211 p. Final report for the Bureau of Land Management, U.S. Department of the Interior. On file at Institute of Northern Forestry, Fairbanks, Alaska.

During the summer of 1977 and 1978, a multiresource inventory of a 3 600 000-ha area of northeastern interior Alaska resulted in an opportunity for gathering vegetation and environmental data on a large scale. Work in such an extensive area could confirm that the relationships between vegetation structure and function and the environment were similar to patterns observed and hypothesized in detailed studies from a limited area around Fairbanks.

The first paper from the study was a detailed report of the fire cycles in the study area (Yarie 1981). The objective of this phase of the study was to prepare a detailed vegetation classification of the forest communities and to relate the community structure to the potential for forest management.

Study Area

The 3 600 000-ha study was centered around the Porcupine and Upper Yukon River drainages (fig. 1). The area corresponds to the Porcupine inventory unit of the USDA Forest Service. The area has four physiographic divisions (Wahrhaftig 1.965). The two major divisions are the Yukon Flats and the Porcupine Plateau (fig. 1).

The Yukon Flats consists of marshy lake-dotted flats ranging in elevation from 91 to 275 m. The northern part is made up of gently sloping outwash fans of the Sheenjek River or nearly flat flood plains. Rolling silt- and gravel-covered marginal terraces rise above the flats and slope gradually to altitudes of about 460 m. Permafrost underlies most of the section except rivers, recently abandoned meander belts, and large thaw lakes.

The Porcupine Plateau is dominated by low ridges with gentle slopes and rounded to flat summits 460 to 762 m above sea level. Valley floors are broad and valley patterns irregular. The entire section is underlain by continuous permafrost.

The other two divisions occupy only small areas near the Canadian border and are not described.

The climate is continental subarctic. Temperature extremes vary widely; Fort Yukon had a record high of 37.8°C and low of -61°C in 40 years of recordkeeping. Weather data from other locations in the area are minimal; only four locations reported data with a period of record ranging from 4 to 6 years. The climate is relatively uniform over the study area, with a slight decrease in mean annual temperature from the southwestern to the northeastern portion. Annual precipitation is low, averaging less than 25.4 cm a year. The average annual precipitation for Fort Yukon is 15.4 cm. This combination of low precipitation and high summer temperatures results in the most extreme fire climate in Alaska (Trigg 1971).

Methods

Field sampling was done during the forest inventory of the Porcupine area. A stratified random sampling design was used (Hegg 1974, Hegg and Sieverding 1979). A total of 529 0.4-ha sample plots were visited during the survey period.

Vegetative Cover

A reconnaissance plot approach (Franklin and others 1970) was used to obtain percent cover for all vascular and nonvascular plants in each 0.4-ha sample plot. Understory plants were identified by genus and species when possible. Identification was made in the field, except for a few samples that were sent to Fairbanks for identification at the USDA Forest Service Institute of Northern Forestry or the University of Alaska Herbarium.

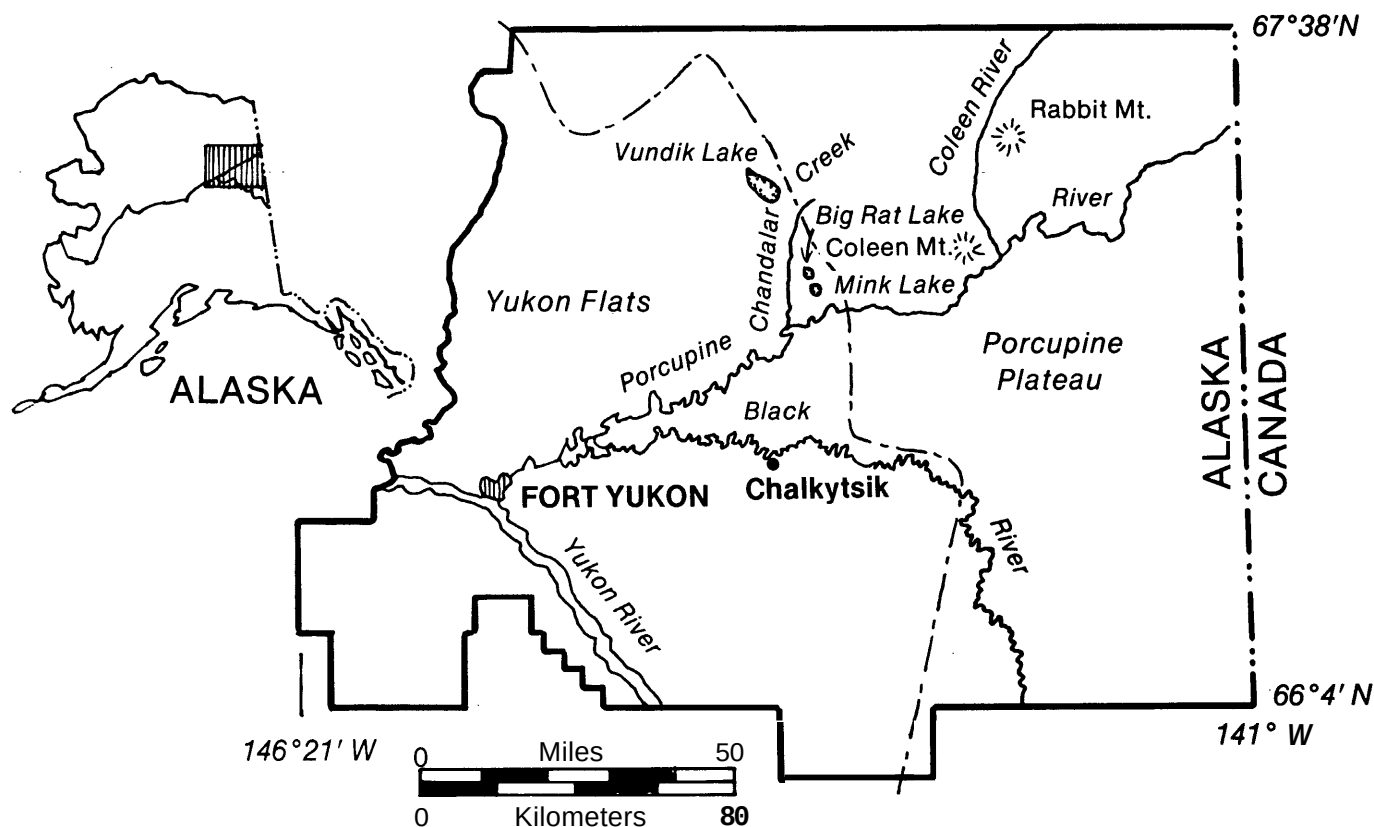


Figure 1.—The Porcupine study area. The dashed line (---) is the approximate delineation between the two major physiographic sections, Yukon Flats and Porcupine Plateau.

Percent cover for overstory trees was estimated from the tree measurements taken by the forest survey crew, using the Domin-Krajina scale (Krajina 1933). Cover values represented the midpoint of a range of values. Cover values for the understory species were adjusted to represent the midpoint of the appropriate range.

Values for species were coded into a vegetative layer based on overstory or understory height:

Layer	Description
A1	Dominant and codominant trees
A2	Intermediate trees
A3	Suppressed trees
B2	Tree seedlings
C	Shrubs between 2 and 10 m in height
DH	Shrubs and woody plants between 15 cm and 2 m in height
DW	Small, woody plants less than 15 cm and all herbaceous plants
DR	Bryophytes, lichens, and ground cover

Environmental Parameters

Physiographic section was determined from maps prepared by Wahrhaftig (1965). Elevation was determined from appropriate U.S. Geological Survey quadrangles. Slope gradient was determined in the field with a clinometer and aspect with a compass. Soil order, suborder, and associations were estimated from maps prepared by Rieger and others (1979). Soil particle size was estimated in the field and checked on selected plots by standard procedures (Black 1965). The depth to restrictive horizon was measured with a permafrost probe. The restrictive horizons were classed as either permafrost or gravel. Early season measurements of depth to permafrost were actually depths to seasonal frost. The percentage of coarse fragments was estimated at the time soil descriptions were taken. Landform was estimated on the plots and coded by standard forest survey codes. Rooting depth was measured at the soil pit and included 80 percent of all roots. Soil temperature was estimated at five points throughout each plot at three depths below the mineral soil-organic layer interface (1977 field season) or below the surface of the organic layer (1978 field season). Soil drainage was estimated and coded by standard forest survey codes. Thickness of the humus horizon was estimated at five points in each plot. Humus pH and carbon-nitrogen ratios were determined in the laboratory from five samples from selected plots; standard procedures were used (Black 1965). Mineral soil pH was determined by use of a field test kit.

Stand age was determined from increment cores taken from three to five dominant trees in each plot. Growth class or site class and site index were determined by Farr's (1967) tables for balsam poplar (*Populus balsamifera* L.), white spruce (*Picea glauca* (Moench) Voss), and black spruce; and those of Gregory and Haack (1965) for birch (*Betula papyrifera* Marsh.) and aspen (*Populus tremuloides* Michx.). Number of stems per hectare, basal area per hectare, and average stand diameter at breast height (d.b.h.) were calculated by use of standard forest measurational formulas. A metric version of Reineke's Stand Density Index (SDI) (1933) was calculated by the formula of Daniel and others (1979). Strata and ground coverage were calculated by adding the average cover value of each species in a stratum. Strata are defined as:

- A layer—trees over 5 m in height (A1, A2, A3)
- B layer—saplings, shrubs, and woody plants from 5 m to 15 cm (C, DH)
- C layer—small woody plants less than 15 cm and all herbaceous plants (82, DW)
- D layer—mosses and lichens (DR)
- H layer—humus layer
- MS layer—mineral soil
- DW layer—decaying wood
- R&S layer—rocks and coarse fragments

Overstory Biomass and Production

Sampling methods were similar to those described by Barney and others (1978). Only one plot was used for each stand. The stands were chosen to represent as broad a range of sites as possible. Fresh weights of samples were determined in the field with an autopsy balance to the nearest 10 g and with a spring balance to the nearest 2.3 kg. Subsamples of each crown third and the bole were returned to the laboratory for determination of fresh-to-dry-weight ratios. Samples were dried to constant weight at 65°C.

Crown subsamples were used to determine the ratios of foliage, branch wood, and current annual growth to total branch weight. Bole subsamples were used to determine wood, bark, and last-5-year-wood-increment weight ratios to the total bole sample weight.

A weighted least squares regression routine was used to determine the relationship between the component biomass and d.b.h., height, d.b.h. squared, and d.b.h. squared times height. The weighting variable was d.b.h. squared.

The derived equations for white and black spruce and birch were then used to determine standing biomass and annual production from tree data collected during the forest survey. Biomass and production equations for trembling aspen and balsam poplar were derived from unpublished data for the Fairbanks area.^{2/} Biomass and production were determined for all trees with a d.b.h. of 2.54 cm and greater.

Statistical Analysis

Initial classification runs were made on all stands 40 years of age and older by use of an indicator species analysis similar to that published by Hill and others (1975). The program used was TWINSpan (Hill 1979). Results were also used to develop a vegetative key to the described communities (see appendix).

SIMORD (Dick-Peddie and Moir 1970) was then used to check the within group similarities and to define the relationship between the environment and the vegetation. The final environment and vegetation tables^{3/} were based on the results of the TWINSpan and SIMORD analyses. The final groups were named and compared with previously described plant communities in the preliminary classification for Alaska vegetation (Viereck and Dyrness 1980).

Finally, all stands less than 40 years old were classified by the procedures described above. The young communities were first compared with the older communities to determine if they represented a young phase of a previously described vegetative association. Similar communities were described separately to avoid confusion when trying to relate field conditions to the classification.

^{2/} Personal communication from Keith Van Cleve, 1979, on file at the Forest Soils Laboratory, University of Alaska, Fairbanks, Alaska.

^{3/} Klinka, K., J. P. Kimmins, J. T. Standish, and S. Phelps. Initial data synthesis in the synecological classification. Part 2. Environmental vegetation tables and a summary vegetation table by a computer program. Mimeogr. 1977. 56 p. University of British Columbia, Vancouver, B.C. (Copies of the individual stand environment and vegetation tables are available from John Yarie, Forest Soils Laboratory, University of Alaska, Fairbanks, Alaska 99701.)

Results—vegetation Classification

A total of 365 plots were classified into 40 plant communities (table 1); 4 plots were of single unrelated types. Only summary tables of community vegetation (tables 2-6) and environment (tables 7 and 8) are presented. Individual stand tables for each community are available on request.^{4/}

After the initial description the plant communities will be referred to by a code (table 1) The code contains the main overstory species:

A—aspen
BP—balsam poplar
B—birch
WS—white spruce
BS—black spruce

A range of numeric designations indicate the canopy closure and community number: 1 to 9 for closed communities, 10 to 19 for open communities, and 20 plus for woodland communities (for example, WS1—closed white spruce community one). The letter Y before the community number indicates a young community (for example, WSY5—closed white spruce young community five). Therefore, communities WS5 and WSY5 are thought to be the same community with only minor differences in vegetation because of differences in average stand age.

Closed Black Spruce Forests

***Picea mariana*/Ledum palustre/Vaccinium vitis-idaea/Cladonia spp. (BS1).**—Overstory cover for this community averages 78 percent and is dominated by black spruce. Black spruce regeneration is abundant. The tall shrub layer is well developed with an average cover of 89 percent, although no species is consistently dominant. The low shrub layer is dominated by Labrador-tea (*Ledum palustre* L.)—14 percent cover; and bog blueberry (*Vaccinium uliginosum* L.)—15 percent. The herbaceous layer contains a number of species; the most prominent are mountain cranberry (*V. vitis-idaea* L.) and crowberry (*Empetrum nigrum* L.), with average cover of 24 and 27 percent, respectively. The moss and lichen layer is only moderately developed—average cover, 57 percent. It is dominated by *Hylocomium splendens* (Hedw.) B.S.G., *Cladonia* spp., and *Sphagnum* spp.

This community occurs at higher elevations in the Porcupine Plateau, on poorly drained to somewhat poorly drained Histis Pergelic Cryaquepts found on level and undulating plains. Elevation averages 414 m and ranges from 280 to 615 m. This community has been found in swamps and marshes with less canopy cover and along small, upland stream terraces. Average depth to permafrost is 33 cm, and the organic layer is 8 cm thick. The mineral soil is acid with an average pH of 5.8. Average stand age is 130 years.

The average number of stems greater than 2.5 cm d.b.h. is 3,608/ha; average d.b.h. is 6.0 cm. Reineke's (1933) SDI is 365. Stand biomass averages 2.4 kg/m²; the current annual increment (CAI) averages 35 g/m² per year. The CAI per square centimeter of basal area averages 37 g/yr.

This community was not described by Viereck and Dyrness (1980)

^{4/} Request tables from John Yarie, Forest Soils Laboratory, University of Alaska, Fairbanks, Alaska 99701.

Table 1—Community names and codes for Porcupine River drainage, interior Alaska

Code ^{1/}	Community
BS1; BSY1	<u>Picea mariana/Ledum palustre/Vaccinium vitis-idaea/Cladonia</u> spp.
BS2	<u>Picea mariana/Rosa acicularis/Equisetum/Cladonia rangiferina</u>
WSBS1	<u>Picea glauca-Picea mariana/Salix</u> spp./ <u>Arctostaphylos</u> spp.
WSBS2; WSBSY2	<u>Picea glauca-Picea mariana/Salix</u> spp./ <u>Vaccinium vitis-idaea/Hylocomium splendens</u>
WSBS3	<u>Picea glauca-Picea mariana/Salix</u> spp./ <u>Vaccinium vitis-idaea/Lichen</u>
WSBS4	<u>Picea mariana-Picea glauca/Salix</u> spp./ <u>Ledum palustre/Empetrum nigrum</u>
WSBSY5	<u>Picea mariana-Picea glauca/Salix</u> spp./ <u>Potentilla fruticosa/Rubus arcticus-Arctostaphylos</u> spp.
WS1	<u>Picea glauca/Rosa acicularis-Shepherdia canadensis/Linnaea borealis</u>
WS2	<u>Picea glauca/Alnus</u> spp./ <u>Arctostaphylos uva-ursi</u>
WSY2	<u>Picea glauca/Mertensia</u> sp./ <u>Graminae</u>
WS3	<u>Picea glauca/Shepherdia canadensis/Arctostaphylos</u> spp./ <u>Peltigera</u> spp.
WS4	<u>Picea glauca/Rosa acicularis/Equisetum</u> spp.
WS5	<u>Picea glauca/Shepherdia canadensis/Equisetum</u> sp. <u>-Arctostaphylos</u> spp.
WSY5	<u>Picea glauca/Shepherdia canadensis-Rosa acicularis/Arctostaphylos</u> spp.- <u>Equisetum</u>
WS6	<u>Picea glauca/Alnus crispa/Rosa acicularis/Arctostaphylos rubra</u>
WS7	<u>Picea glauca/Rosa acicularis-Shepherdia canadensis/Arctostaphylos rubra-Linnaea borealis</u>
BS10	<u>Picea mariana/Arctostaphylos rubra-Empetrum nigrum/Cladonia</u> spp.
BS11	<u>Picea mariana/Betula nana-Potentilla fruticosa/Carex</u> spp.
BSY11	<u>Picea mariana/Betula nana/Carex</u> spp.
BS12	<u>Picea mariana/Alnus crispa/Betula nana/Vaccinium</u> spp./ <u>Cladonia</u> spp.
BS13	<u>Picea mariana/Vaccinium uliginosum/Empetrum nigrum/lichen</u>
BSY13	<u>Picea mariana/Vaccinium uliginosum/Arctostaphylos rubra/Dicranum</u> sp.
BSY14	<u>Picea mariana/Salix/Potentilla fruticosa/Arctostaphylos rubra/Peltigera</u> spp.
WSBS10	<u>Picea glauca-Picea mariana/Vaccinium uliginosum/Arctostaphylos rubra/Dicranum</u> sp.

1/ A = aspen; BP = balsam poplar; B = birch; WS = white spruce; BS = black spruce; Y = young community; 1 to 9 = closed community; 10 to 19 = open community; >20 = woodland community.

Table 1—Community names and codes for Porcupine River drainage, interior Alaska, continued

Code <u>1/</u>	Community
WSBSY10	<u>Picea mariana-Picea glauca/Betula nana/Arctostaphylos rubra-Vaccinium uliginosum</u>
WSBSII	<u>Picea mariana-Picea glauca/Ledum palustre/Petasites spp./Dicranum sp.</u>
WSBSY12	<u>Picea mariana-Picea glauca/Shepherdia canadensis/Epilobium spp./Peltigera spp.</u>
WSIO	<u>Picea glauca/Salix bebbiana/Rosa acicularis/Equisetum sp.-Epilobium sp./Lichen</u>
WS11	<u>Picea glauca/Salix/Shepherdia canadensis/Vaccinium vitis-idaea</u>
WSY11	<u>Picea glauca/Salix/Ledum palustre/Vaccinium vitis-idaea</u>
BS20	<u>Picea mariana/Betula nana/Eriophorum spp./Sphagnum spp.</u>
BS21	<u>Picea mariana/Salix/Hylocomium splendens-Cladonia rangiferina</u>
A1	<u>Populus tremuloides/Salix spp./Drepanocladus sp.</u>
BP1	<u>Populus balsamifera/Alnus-Salix/Rosa acicularis/Equisetum</u>
BPY1	<u>Populus balsamifera/Rosa acicularis/Equisetum sp.-Pyrola spp.</u>
BP2	<u>Populus balsamifera/Arctostaphylos uva-ursi/Peltigera spp.</u>
ABP1; ABPYI	<u>Populus tremuloides-Populus balsamifera/Rosa acicularis</u>
ABYI	<u>Populus tremuloides-Betula papyrifera/Rosa acicularis/Arctostaphylos uva-ursi/Lichen</u>
A10	<u>Populus tremuloides/Salix spp./Arctostaphylos uva-ursi/Graminae</u>
AYIO	<u>Populus tremuloides/Salix spp./Arctostaphylos uva-ursi--Epilobium spp.</u>
AWS1; AWSYI	<u>Populus tremuloides-Picea glauca/Salix/Epilobium</u>
AWS2; AWSY2	<u>Populus tremuloides-Picea glauca/Salix/Arctostaphylos uva-ursi</u>
ABSY 1	<u>Populus tremuloides-Picea mariana/Salix/Rosa acicularis/Equisetum sp.</u>
ABSY 2	<u>Populus tremuloides-Picea mariana/Salix/Lupinus spp.</u>
WSB1	<u>Picea glauca-Betula papyrifera/Alnus-Salix/Galium boreale</u>
WSBY 1	<u>Picea glauca-Betula papyrifera/Salix/Epilobium spp.</u>
BSBYI	<u>Picea mariana-Betula papyrifera/Arctostaphylos uva-ursi/lichen</u>
BSBY2	<u>Picea mariana-Betula papyrifera/Ledum palustre/Vaccinium vitis-idaea</u>
ABSY 10	<u>Populus tremuloides-Picea mariana/Vaccinium uliginosum/Polytrichum sp.</u>

1/ A = aspen; BP = balsam poplar; B = birch; WS = white spruce; BS = black spruce; Y = young community; 1 to 9 = closed community; 10 to 19 = open community; >20 = woodland community.

Table 2—Average cover and constancy of selected species in communities dominated by mature black spruce^{1/}

Layer and species 2/	BS1	BS2	BS10	BS11	BS12	BS13	WSBS1	WSBS2	WSBS3	WSBS4	WSBS10	WSBS11	BS20	BS21
	Percent													
A1:														
<i>Picea mariana</i>	78(100)	44(80)	60(100)	32(82)	44(100)	20(87)	64(50)		62(100)	73(100)	20(60)	31(100)	9(50)	19(100)
<i>Picea glauca</i>		18(50)	1(20)	17(46)		7(50)	6(75)	20(100)	11(60)	27(50)	4(80)	14(50)		1(25)
<i>Betula papyrifera</i>		1(40)	2(20)		2(17)									1(25)
<i>Populus tremuloides</i>		1(20)	1(13)								9(20)			
<i>Populus balsamifera</i>														
A2:														
<i>Picea mariana</i>		30(50)				3(13)	46(25)	28(100)	19(20)					
<i>Picea glauca</i>		1(20)		4(9)		8(13)	13(38)	41(100)	9(20)		6(20)			
<i>Betula papyrifera</i>		1(10)						+(17)						
<i>Populus tremuloides</i>														
<i>Populus balsamifera</i>								+(17)						
B2:														
<i>Picea mariana</i>	24(100)	21(90)	24(100)	19(91)	27(100)	19(88)	16(88)	18(83)	23(100)	24(100)	17(80)	21(100)	13(100)	7(100)
<i>Picea glauca</i>	2(20)	3(30)	+(7)	3(36)	+(17)	1(50)	2(63)	8(83)	3(60)	10(50)	6(100)	4(50)		1(25)
<i>Betula papyrifera</i>		1(40)	+(7)	+(9)	6(50)		2(13)	+(17)				2(50)	2(100)	
<i>Populus tremuloides</i>		1(10)	+(7)								2(40)			
<i>Populus balsamifera</i>		+(10)						1(17)						
C:														
<i>Salix arousculoides</i>	8(40)	3(10)	2(13)	2(27)	10(50)			2(33)	6(40)	10(50)	1(20)	10(50)		
<i>Salix alaxensis</i>	18(20)			3(18)					6(20)					
<i>Salix obovata</i>		18(40)	7(27)	1(9)	20(67)			8(67)	1(20)					
<i>Salix scouleriana</i>		1(20)			2(17)			+(17)	8(40)			3(25)		
<i>Salix glauca</i>				4(18)			18(13)	6(33)	3(20)			22(75)		
<i>Alnus crispa</i>	1(20)	18(50)	14(40)	+(9)	39(83)	11(38)	21(38)	4(33)		1(25)	2(20)	-7(25)	4(50)	
<i>Betula nana</i>	18(20)		7(13)					4(17)					9(50)	28(100)
<i>Salix</i> spp.			2(20)		2(17)	19(63)	23(75)			23(100)		3(25)		
DH:														
<i>Rosa acicularis</i>	8(50)	18(100)	6(73)	3(18)	17(83)	1(25)	2(13)	4(67)	3(80)	1(50)	1(20)	2(75)		3(25)
<i>Shepherdia canadensis</i>		4(20)	15(13)		+(17)		2(13)	9(33)	13(80)		1(20)	4(50)		
<i>Ledum palustre</i>	18(100)		1(7)	6(46)	4(17)	19(88)				22(100)	2(20)	21(100)		
<i>Vaccinium uliginosum</i>	19(80)	2(20)	10(40)	10(55)	1(17)	24(88)		10(50)		42(75)	28(100)	8(50)	2(50)	
<i>Potentilla fruticosa</i>		2(10)	1(13)	11(73)		1(38)		3(33)	3(40)	4(50)	11(80)	4(50)	4(50)	
<i>Viburnum edule</i>		1(10)					5(25)	2(17)						
<i>Juniperus communis</i>		1(10)								25(100)	13(80)	3(25)	40(100)	12(25)
<i>Betula nana</i>				16(82)	12(67)	23(75)	22(50)		1(20)	1	19(60)		13(100)	27(50)
<i>Ledum</i> spp.			7(33)	7(36)		4(25)	21(63)	4(17)	8(40)					
DW:														
<i>Arctostaphylos rubra</i>	14(60)	1(20)	18(80)	13(91)	17(67)	14(88)	35(100)	12(100)	18(80)	18(75)	17(100)	26(100)	9(50)	
<i>Arctostaphylos</i>														
<i>uva-ursi</i>		14(40)	1(7)	1(9)		1(25)	25(88)	4(33)			1(40)	2(25)		24(75)
<i>Vaccinium</i>														
<i>vitis-idaea</i>	24(80)	10(60)	21(73)	12(55)	23(83)	18(88)		18(100)	21(100)	21(100)	18(80)	15(100)	11(100)	19(75)
<i>Empetrum nigrum</i>	27(80)	6(30)	18(80)	4(18)	7(33)	20(88)	41(88)	18(83)	15(80)	38(100)	18(80)	14(25)		24(75)
<i>Ericetum</i> spp.		18(80)	3(33)	5(73)	12(83)	2(50)	22(75)	4(33)		17				
<i>Linnaea borealis</i>		15(60)		4(17)				12(67)	2(60)		4(40)	1(25)		
<i>Petasites</i> sp.	3(40)	+(10)	+(7)	5(82)	2(33)	2(50)	18(25)	+(17)	1(20)	1(50)		4(100)	1(50)	
<i>Rubus chamaemorus</i>				2(36)		1(25)		+(17)						
<i>Epilobium</i>														
<i>angustifolium</i>		1(20)	+(13)	3(18)	2(33)	+(12)		+(17)	1(20)			1(25)		
<i>Rubus arcticus</i>	8(20)	1(10)	+(7)	1(27)	2(17)		2(25)	4(17)		1(25)	1(60)			
<i>Pyrola</i> spp.			3(27)	1(27)	6(67)	1(25)	9(38)	1(50)	2(40)	1(25)	1(20)	14(75)	9(50)	
<i>Geocaulon lividum</i>		6(60)	1(7)	+(9)	+(17)			1(17)	3(60)		2(40)	1(25)		
<i>Carex</i> spp.				28(100)	7(33)	24(88)					1(20)		4(50)	
DR:														
<i>Hylocomium splendens</i>	18(60)	54(90)	22(73)	20(64)	13(50)	11(50)	23(63)	32(100)	29(80)	8(50)	21(100)	23(100)		46(75)
<i>Cladonia rangiferina</i>	11(60)	15(90)	17(47)	2(36)	4(33)	7(25)	41(75)	2(33)	13(80)	19(100)	20(80)	1(25)		33(75)
<i>Cladonia</i> spp.	40(20)	4(40)	18(80)	2(36)	13(83)	14(62)	17(75)	6(33)	4(60)		3(60)	2(50)		6(25)
<i>Peltigera</i> spp.	8(20)	8(60)	7(46)	4(18)	20(67)	2(50)	11(63)	2(33)	7(60)	2(50)	1(20)	3(75)	9(50)	
<i>Cetraria</i> spp.	8(40)	2(60)	1(27)	1(36)	3(67)	+(13)	15(88)	1(50)	3(60)		1(20)	2(75)		12(25)
<i>Dicranum</i> spp.	18(20)	3(40)	20(53)	3(36)	8(33)	4(25)	6(50)	6(50)	10(60)		23(100)	22(100)		
<i>Polytrichum</i> sp.		2(20)	+(7)	1(9)										
<i>Drepanocladus</i> sp.	8(20)	2(10)	5(13)	3(18)	12(50)			+(17)	1(40)					
<i>Sphagnum</i> spp.	13(20)			3(27)	4(17)	2(25)		+(17)					44(50)	3(25)
<i>Autacomium</i> sp.		+(10)	3(7)	17(64)	10(33)	17(38)	24(88)	+(17)	1(20)	28(75)	9(60)	6(25)		
<i>Pleurozium</i> spp.		6(30)	2(13)		+(17)	4(13)				2(25)				
<i>Tomenthypnum nitens</i>		1(10)	1(9)	6(55)	20(50)	7(25)		1(33)	4(40)	3(25)	4(20)			
<i>Ptilidium ciliare</i>								8(50)	13(80)			1(25)		

^{1/} Constancy is shown in parentheses; + = less than 1 percent cover. BS = black spruce; WS = white spruce; 1 to 9 = closed community; 10 to 19 = open community; >20 = woodland community.

^{2/} A1 = dominant and codominant trees; A2 = intermediate trees; B2 = tree seedlings; C = shrubs between 2 and 10 m in height; DH = shrubs and woody plants between 15 m and 20 m in height; DW = small, woody plants less than 15 m tall and all herbaceous plants; DR = bryophytes, lichens, and ground cover.

Table 3—Average cover and constancy of selected species in communities dominated by mature white spruce^{1/}

Layer and species ^{2/}	WS1	WS2	ws3	ws4	ws5	WS6	WS7	WS10	WS11
	Percent								
A1:									
<i>Picea glauca</i>	49(100)	78(100)	58(84)	88(100)	60(100)	43(100)	65(100)	38(100)	41(100)
<i>Picea mariana</i>			+(17)						
<i>Populus tremuloides</i>	1(13)		1(33)				12(25)	8(20)	1(17)
<i>Populus balsamifera</i>		2(43)	+(17)	8(50)	4(21)				
<i>Betula papyrifera</i>		18(29)			+(7)				
A2:									
<i>Picea glauca</i>	75(25)				+(7)	63(75)			2(17)
<i>Picea mariana</i>									4(17)
<i>Populus tremuloides</i>	5(13)				+(7)				
<i>Populus balsamifera</i>					+(7)				
<i>Betula papyrifera</i>						1(25)			
B2:									
<i>Picea glauca</i>	18(100)	7(100)	16(100)		21(100)	10(100)	21(100)	14(100)	18(100)
<i>Picea mariana</i>	1(13)					4(25)			3(33)
<i>Populus tremuloides</i>	4(25)		4(50)		1(14)		1(25)	2(20)	
<i>Populus balsamifera</i>		1(14)			2(36)	2(50)	1(25)		
<i>Betula papyrifera</i>	5(25)	4(43)						2(20)	
C:									
<i>Salix arbusculoides</i>	8(25)						14(50)	17(80)	18(33)
<i>Salix alaxensis</i>					3(7)				4(17)
<i>Salix scouleriana</i>	12(38)		1(17)		1(7)		3(25)	2(20)	
<i>Salix bebbiana</i>	7(38)							22(80)	
<i>Salix glauca</i>	1(13)		2(17)				12(25)	13(40)	4(17)
<i>Salix spp.</i>	18(13)	27(86)	8(67)		34(93)	23(50)	7(50)		32(67)
<i>Alnus crispa</i>	22(25)	28(58)			2(14)	14(75)		18(40)	8(17)
<i>Alnus tenuifolia</i>		6(14)			4(7)				
<i>Alnus sinuata</i>		12(29)							
DH:									
<i>Rosa acicularis</i>	4(100)	42(100)	3(50)	75(100)	17(71)	4(100)	21(100)	12(100)	19(83)
<i>Shepherdia canadensis</i>	10(88)	6(14)	19(100)	2(50)	19(71)		26(100)	4(40)	19(100)
<i>Potentilla fruticosa</i>	1(25)				2(21)	18(25)	7(50)	2(40)	11(33)
<i>Viburnum edule</i>	1(13)	4(29)			4(14)	1(25)		12(40)	
<i>Vaccinium uliginosum</i>	8(13)								
<i>Cornus stolonifera</i>		6(29)			2(21)		1(25)	3(20)	
DW:									
<i>Linnaea borealis</i>	2(88)	4(29)	7(67)		6(43)	15(50)	20(100)	11(80)	18(33)
<i>Mertensia spp.</i>	2(75)	3(58)	4(67)	2(50)	6(57)	2(25)	4(75)	1(20)	5(33)
<i>Galium boreale</i>	2(25)	4(29)	1(33)	4(50)	4(43)		1(25)	1(20)	1(33)
<i>Epilobium angustifolium</i>	3(50)	+(14)	1(33)		3(29)	2(25)	4(50)	12(60)	
<i>Arctostaphylos rubra</i>	8(63)		12(100)		14(64)	9(75)	23(100)	12(60)	22(83)
<i>Arctostaphylos uva-ursi</i>	7(38)	8(58)	13(83)		18(64)		6(50)	6(40)	8(50)
<i>Geocaulon lividum</i>	12(63)	+(14)			3(50)	4(25)	19(50)	2(40)	
<i>Urtica dioica</i>									
<i>Vitis-idaea</i>	2(25)		+(17)			26(75)	12(25)	18(60)	25(100)
<i>Pyrola spp.</i>	1(25)	3(43)	+(17)		2(50)	13(50)	8(75)	18(40)	13(67)
<i>Equisetum spp.</i>		20(58)	1(33)	75(100)	18(71)	8(25)	18(75)	17(100)	24(67)
DR:									
<i>Hyloconium splendens</i>	27(88)	17(57)	9(33)		3(7)	13(50)	39(100)	21(40)	25(67)
<i>Cetraria spp.</i>	2(88)		+(17)				4(50)	3(80)	8(100)
<i>Parmelia spp.</i>	2(100)		+(17)		+(7)		9(100)	4(100)	18(33)
<i>Drepanocladus spp.</i>	10(88)	2(14)	6(50)		2(7)		12(25)	2(40)	+(17)
<i>Peltigera spp.</i>	7(75)		6(67)		+(7)		12(100)	3(60)	20(83)
<i>Cladonia spp.</i>	18(88)		4(33)		2(14)	2(25)	1(25)	4(60)	28(83)
<i>Rhytidiadelphus spp.</i>	7(50)							4(40)	9(17)
<i>Ptilidium ciliare</i>	4(38)		+(17)					2(20)	
<i>Pleurozium spp.</i>	3(25)		2(17)	8(50)		18(25)			1(17)
<i>bicranum spp.</i>	8(25)	15(14)	1(33)		+(7)	40(25)		2(40)	+(17)
<i>Polytrichum spp.</i>	2(25)							+(20)	
<i>Tomenthypnum nitens</i>	1(13)		+(17)				3(25)		
Moss					50(71)			+(20)	

^{1/} Constancy is shown in parentheses; + = less than 1 percent cover; WS = white spruce; 1 to 9 = closed community; 10 to 19 = open community.

^{2/} A1 = dominant and codominant trees; A2 = intermediate trees; B2 = tree seedlings; C = shrubs between 2 and 10 m in height; DH = shrubs and woody plants between 15 cm and 2m in height; DW = small, woody plants less than 15 cm tall and all herbaceous plants; DR = bryophytes, lichens, and ground cover.

Table 4—Average cover and constancy of selected species in communities dominated by young conifers^{1/}

Layer and species ^{2/}	BSY1	WSBSY2	WSBSY5	WSY2	WSY5	BSY11	BSY13	BSY14	WSBSY10	WSBSY12	WSY11
	Percent										
A1:											
<i>Picea mariana</i>	18(69)	10(50)	63(100)	+(10)		3(56)	10(71)		3(25)		
<i>Picea glauca</i>	1(13)	17(83)	18(60)	6(70)	18(67)	+(11)	2(14)	1(33)	1(25)		1(33)
<i>Betula papyrifera</i>	1(31)	2(33)		+(10)						2(20)	+(17)
<i>Populus tremuloides</i>	3(13)		3(20)	+(10)	1(13)			4(33)		3(40)	+(17)
<i>Populus balsamifera</i>			1(20)	+(10)	+(7)						
B2:											
<i>Picea mariana</i>	21(100)	19(83)	23(100)	+(10)	+(13)	7(100)	22(100)	35(100)	26(100)	23(100)	
<i>Picea glauca</i>	1(38)	18(100)	3(40)	18(100)	19(100)	1(56)	2(57)	4(33)	3(75)	18(100)	19(100)
<i>Betula papyrifera</i>	2(50)	3(33)	1(20)	4(30)	+(13)	1(22)	1(14)	3(67)		6(40)	18(67)
<i>Populus tremuloides</i>	3(44)	2(33)	1(40)	2(30)	1(40)	1(33)	1(14)	17(33)		18(80)	7(50)
<i>Populus balsamifera</i>	+(6)	2(33)	1(20)	+(10)	1(27)	1(33)		2(33)		6(80)	
C:											
<i>Salix alaxensis</i>	1(6)		18(60)		1(7)			9(33)			4(17)
<i>Salix arbusculoides</i>	8(32)	23(100)			1(13)			4(33)	7(50)	26(60)	21(67)
<i>Salix bebbiana</i>			37(60)		15(40)	4(22)		2(33)	7(25)	18(60)	19(67)
<i>Salix scouleriana</i>	1(6)				3(33)			2(33)		21(80)	
<i>Salix glauca</i>	2(6)	50(100)	19(60)		4(20)	6(22)		9(33)		28(60)	7(7)
<i>Alnus crispa</i>	16(38)		23(60)	8(30)	1(13)	+(11)				14(20)	17(33)
<i>Betula nana</i>	9(19)				9(47)	7(33)	2(14)				7(17)
<i>Betula glandulosa</i>	3(6)		6(20)								
<i>Salix spp.</i>				52(90)	19(33)		4(43)				2(33)
DH:											
<i>Ledum palustre</i>	18(69)	+(17)	9(20)	+(10)	2(26)	13(33)	10(57)	9(33)	7(50)	6(40)	10(50)
<i>Vaccinium uliginosum</i>	20(63)	2(17)	20(60)		+(7)	6(33)	23(86)	9(33)			8(33)
<i>Rosa acicularis</i>	7(56)	15(100)	2(80)	9(60)	8(87)	+(11)		19(67)	2(25)	6(80)	1(33)
<i>Potentilla fruticosa</i>	1(25)	7(33)	2(80)		9(47)	2(33)	2(43)	20(100)	4(75)	6(40)	+(17)
<i>Shepherdia canadensis</i>		50(100)	2(60)	18(60)	19(87)			9(33)		18(100)	+(17)
<i>Betula nana</i>						50(100)			24(100)	19(40)	
DW:											
<i>Vaccinium vitis-idaea</i>	15(75)	20(100)	5(60)	1(30)	3(13)	7(89)	16(43)	14(67)	14(75)	2(20)	18(50)
<i>Arctostaphylos rubra</i>	10(44)	21(100)	4(80)		22(87)	2(44)	14(100)	18(100)	15(100)	3(60)	1(33)
<i>Arctostaphylos uva-ursi</i>	2(6)	29(83)	13(80)	4(30)	10(80)		1(14)	1(33)		1(60)	4(33)
<i>Epilobium spp.</i>	2(50)	8(67)	1(20)	1(30)	4(60)	1(33)	+(14)	18(100)	1(25)	7(80)	1(33)
<i>Empetrum nigrum</i>	6(38)	15(67)			1(13)	4(33)	13(86)	2(33)	2(50)		
<i>Petasites spp.</i>	4(25)	+(17)		1(20)	1(13)	1(33)	+(14)	4(33)	1(25)	1(20)	+(17)
<i>Rubus arcticus</i>	2(19)		2(80)	1(20)	4(33)	1(33)			1(25)		1(33)
<i>Rubus chamaemorus</i>	3(25)				1(22)			2(33)	4(50)		+(17)
<i>Geocaulon lividum</i>	2(13)	+(17)			1(13)	1(22)					
<i>Linnaea borealis</i>	+(6)	6(33)	1(40)	1(20)	7(40)		8(43)	4(33)		1(20)	
<i>Pyrola spp.</i>	2(38)	3(50)	1(40)	4(30)	1(40)	4(44)	1(29)	1(33)	3(75)	1(20)	1(33)
<i>Mertensiana spp.</i>		4(67)	4(60)		1(22)			1(33)	1(25)	1(20)	
<i>Equisetum spp.</i>		10(67)	1(60)	11(40)	10(73)	2(44)	2(59)	1(33)	6(50)	1(40)	+(17)
<i>Galium boreale</i>			1(20)	1(30)	1(40)	+(11)		9(33)		1(20)	+(17)
<i>Carex spp.</i>						49(89)	9(43)	19(67)			4(17)
OR:											
<i>Hylocomium splendens</i>	2(25)	4(17)	10(40)	22(30)		1(11)	4(43)	14(67)	3(75)		
<i>Cladonia rangiferina</i>	2(31)	+(17)	6(40)	+(10)	1(27)		7(43)				
<i>Cladonia spp.</i>	12(69)	23(83)	15(60)	+(10)	1(20)	14(56)	6(71)	14(71)	18(50)	1(20)	6(50)
<i>Peltigera spp.</i>	11(63)	21(83)	9(80)	3(20)	12(33)	4(78)	2(59)	15(100)	11(75)	19(100)	+(33)
<i>Cetraria spp.</i>		1(33)	6(20)		1(40)			2(67)		1(60)	+(17)
<i>Dicranum spp.</i>	2(19)		6(40)	+(10)	+(7)	3(11)	19(86)		4(50)	1(20)	10(50)
<i>Polytrichum spp.</i>	11(19)				+(13)	9(44)				1(60)	21(17)
<i>Drepanocladus spp.</i>	1(13)		5(60)		4(13)					2(20)	4(17)
<i>Sphagnum spp.</i>	7(31)			+(10)		9(33)	4(29)				
<i>Aulacomnium spp.</i>	1(13)		13(60)		1(13)	18(56)	6(14)	1(33)		1(20)	4(33)
<i>Pleurozium spp.</i>					+(7)						
<i>Tomenthypnum nitens</i>			19(40)		2(13)						
<i>Rhytidadelphus sp.</i>		12(67)	6(20)								4(17)

^{1/} Constancy is shown in parentheses; + = less than 1 percent cover; BS = black spruce; WS = white spruce; Y = young community; 1 to 9 = closed community; 10 to 19 = open community.

^{2/} A1 = dominant and codominant trees; B2 = tree seedlings; C = shrubs between 2 and 10 m in height; DH = shrubs and woody plants between 15 cm and 2 m in height; DW = small, woody plants less than 15 cm tall and all herbaceous plants; OR = bryophytes, lichens, and ground cover.

Table 5—Average cover and constancy of selected species in communities of mature deciduous and mixed conifer-deciduous trees ^{1/}

Layer and species ^{2/}	A1	BP1	BP2	ABP1	A10	AWSI	AWS2	WSBI
Percent								
A1:								
<u>Picea glauca</u>				10(33)	1(50)	21(83)	25(63)	29(100)
<u>Picea mariana</u>								
<u>Populus tremuloides</u>	71(100)		21(50)	68(100)	50(100)	49(100)	13(88)	
<u>Populus balsamifera</u>	2(33)	88(100)	29(100)	13(100)	1(25)	3(33)	2(38)	
<u>Betula papyrifera</u>	21(33)				1(25)	+(17)	4(25)	29(100)
A2:								
<u>Picea glauca</u>			1(50)				18(38)	
<u>Picea mariana</u>								
<u>Populus tremuloides</u>			2(50)				6(25)	
<u>Populus balsamifera</u>			12(50)				1(13)	
<u>Betula papyrifera</u>								
B2:								
<u>Picea glauca</u>	3(100)	6(40)	2(100)	6(33)	2(25)	9(100)	12(100)	1(50)
<u>Picea mariana</u>	1(33)							
<u>Populus tremuloides</u>	8(100)		10(100)	12(100)	11(100)	4(83)	6(75)	
<u>Populus balsamifera</u>	2(67)	4(60)	5(100)	3(67)		4(43)	2(25)	
<u>Betula papyrifera</u>						1(17)	+(13)	2(50)
C:								
<u>Salix glauca</u>	18(67)					10(33)	1(13)	4(50)
<u>Salix bebbiana</u>						4(33)		1(50)
<u>Alnus crispa</u>	3(33)	8(40)					1(13)	45(100)
<u>Alnus tenuifolia</u>		27(60)						
<u>Salix alaxensis</u>		19(60)					1(13)	
<u>Salix spp.</u>			2(100)	42(67)	25(100)	+(17)	8(63)	
<u>Salix scouleriana</u>						10(33)	1(13)	
DH:								
<u>Rosa acicularis</u>	14(100)	21(100)	2(100)	10(100)	5(100)	6(100)	5(88)	19(100)
<u>Shepherdia canadensis</u>	21(67)	15(60)	10(100)	33(67)	10(100)	29(83)	12(88)	
<u>Vaccinium uliginosum</u>	1(33)						1(13)	13(50)
<u>Ledum palustre</u>	6(33)						2(13)	
<u>Viburnum edule</u>		6(80)					1(13)	8(50)
<u>Potentilla fruticosa</u>		1(20)	1(50)			3(17)		1(50)
DW:								
<u>Equisetum spp.</u>	2(67)	28(100)		1(33)	1(25)	+(17)	2(38)	9(100)
<u>Arctostaphylos uva-ursi</u>	18(67)		15(100)		47(100)	1(33)	5(63)	4(50)
<u>Arctostaphylos rubra</u>	1(33)	6(20)	1(50)		1(50)	4(50)	5(38)	
<u>Calamagrostis canadensis</u>	3(33)	4(40)		10(33)		+(17)	8(25)	13(50)
<u>Epilobium angustifolium</u>	1(33)	2(40)	2(100)	2(33)	1(50)	4(83)	2(50)	2(50)
<u>Linnaea borealis</u>	1(33)	1(20)	8(50)		2(50)	10(67)	2(38)	1(50)
<u>Pyrola spp.</u>	2(100)	1(40)				4(50)	+(25)	1(50)
<u>Empetrum nigrum</u>	1(33)				1(25)			4(50)
<u>Galium spp.</u>	1(33)	2(60)	1(50)	2(33)	2(75)	1(33)	2(38)	1(100)
<u>Vaccinium vitis-idaea</u>	1(33)				1(25)		+(13)	4(50)
<u>Mertensia spp.</u>		2(40)	1(50)	8(67)	2(75)	2(67)	2(63)	1(50)
<u>Geocaulon lividum</u>		1(20)						1(50)
DR:								
<u>Drepanocladus spp.</u>	2(67)					7(33)	2(25)	2(100)
<u>Cladonia spp.</u>	1(33)		1(50)		1(25)	2(50)	6(75)	4(100)
<u>Cetraria spp.</u>		1(20)				1(50)	+(13)	2(50)
<u>Polytrichum spp.</u>	1(33)							
<u>Rhytidadelphus spp.</u>								
<u>Pleurozium spp.</u>	1(33)	1(20)					1(13)	1(50)
<u>Peltigera spp.</u>	1(33)		2(100)			5(83)	6(88)	2(50)
<u>Cladonia rangiferina</u>	1(33)							1(50)
<u>Hylocomium splendens</u>	3(33)		1(50)			8(50)	3(25)	
Litter	50(67)	85(100)					10(25)	
<u>Dicranum spp.</u>				10(33)			7(25)	4(50)
<u>Aulacomnium sp.</u>							2(13)	1(50)

^{1/}Constancy is shown in parentheses; + = less than 1 percent cover. A = aspen; BP = balsam poplar; WS = white spruce; 6 = birch; 1 to 9 = closed community; 10 to 19 = open community.

^{2/}A1 = dominant and codominant trees; A2 = intermediate trees; B2 = tree seedlings; C = shrubs between 2 and 10 m in height; DH = shrubs and woody plants between 15 cm and 2 m in height; DW = small, woody plants less than 15 cm tall and all herbaceous plants; DR = bryophytes, lichens, and ground cover.

Table 6—Average cover and constancy of selected species in communities of young deciduous and mixed conifer-deciduoustrees 1/

Layer and species 2/	BPYI	ABPYI	ABYI	AYIO	AWSYI	AWSY2	ABSYI	ABSY2	WSBY1	BSBY1	BSBY2	ABSY10
	Percent											
A1:												
<i>Picea glauca</i>	1(25)	+(14)		2(29)	5(75)	1(15)	1(25)	1(33)	1(20)	1(20)	1(20)	
<i>Picea mariana</i>			1(25)	+(7)			22(75)	1(33)		31(100)	15(50)	
<i>Populus tremuloides</i>			15(50)	31(100)	43(88)	31(52)	40(100)	2(57)			3(10)	21(100)
<i>Populus balsamifera</i>	23(75)		1(25)	1(21)	4(50)	5(39)	1(25)					
<i>Betula papyrifera</i>			4(50)			+(8)	5(75)		17(10)	3(100)	5(40)	
A2:												
<i>Picea glauca</i>				4(14)	1(13)				2(20)			
<i>Picea mariana</i>												
<i>Populus tremuloides</i>				4(14)	5(13)							
<i>Populus balsamifera</i>				+(7)	1(13)							
<i>Betula papyrifera</i>												
B2:												
<i>Picea glauca</i>	4(75)	+(14)	2(25)	4(71)	3(100)	4(59)	1(50)	7(57)	10(90)	2(20)	2(20)	1(50)
<i>Picea mariana</i>	2(25)		19(100)	+(7)			13(100)	13(100)		22(100)	21(100)	5(100)
<i>Populus tremuloides</i>	3(50)	18(86)	5(88)	15(100)	11(38)	15(92)	9(100)	7(67)	4(40)	2(20)	2(30)	10(100)
<i>Populus balsamifera</i>	4(50)	2(57)	1(38)	1(29)	2(50)	4(54)	5(50)	2(57)			1(10)	
<i>Betula papyrifera</i>			2(38)		+(13)	1(15)	2(100)	1(33)	12(100)	2(40)	2(60)	
C:												
<i>Salix glauca</i>			8(25)			5(54)	27(75)		21(80)	11(60)		13(50)
<i>Salix novae-anglica</i>											2(10)	
<i>Salix bebbiana</i>	11(25)	4(14)	8(50)	4(14)		5(39)	5(39)	8(50)		8(50)	5(60)	19(50)
<i>Alnus crispa</i>	19(50)		15(53)	+(7)			27(75)		8(40)	13(40)	18(60)	
<i>Alnus tenuifolia</i>											1(10)	
<i>Salix alaxensis</i>			+(13)			1(8)			1(20)			
<i>Salix spp.</i>	48(75)	15(71)		10(57)	33(88)			53(100)			5(30)	
<i>Salix scouleriana</i>			9(50)	+(7)		4(23)			4(40)			
<i>Salix arbusculoides</i>			+(13)			2(15)			6(50)		2(10)	1(50)
DH:												
<i>Rosa acicularis</i>	19(75)	10(100)	12(100)	8(79)	18(75)	10(85)	6(100)	6(67)	5(80)	5(40)	5(50)	13(100)
<i>Shepherdia canadensis</i>	2(25)	15(71)	10(75)	22(93)	22(75)	19(85)	1(25)	1(33)	11(40)		1(10)	
<i>Vaccinium uliginosum</i>				1(7)				2(33)				11(100)
<i>Ledum palustre</i>	11(25)		3(25)				1(25)		4(40)		11(60)	
<i>Viburnum edule</i>									1(20)			
<i>Potentilla fruticosa</i>				1(7)		2(15)	1(50)	10(67)				
DW:												
<i>Equisetum spp.</i>	15(75)	2(29)	3(75)	2(43)	5(38)	2(31)	3(75)	5(33)	13(100)	10(60)	3(50)	4(50)
<i>Arctostaphylos uva-ursi</i>	3(25)	2(29)	15(88)	18(93)	2(13)	6(54)	7(25)	2(33)		6(80)	8(40)	21(50)
<i>Arctostaphylos rubra</i>			4(50)	2(14)	2(13)	2(39)	5(50)	21(67)	4(60)		11(500)	
<i>Calamagrostis canadensis</i>			4(13)	9(14)	3(25)	2(23)			12(40)	1(20)	2(10)	
<i>Epilobium angustifolium</i>	3(25)	13(36)	2(50)	4(71)	6(88)	3(69)	2(100)	6(67)	11(100)	3(80)	3(50)	11(100)
<i>Linnaea borealis</i>		2(14)	4(63)	1(7)	2(25)	2(39)	5(50)	2(33)				
<i>Pyrola spp.</i>	19(75)		+(13)	2(14)	1(25)	1(23)	1(25)	3(57)	1(20)	1(20)	2(40)	
<i>Mertensia spp.</i>	1(25)		2(38)	2(64)	2(50)	6(52)	1(25)	2(33)	5(100)	1(50)	1(30)	
<i>Geocaldon lividum</i>		+(14)	1(13)			1(7)			1(20)	1(20)		9(50)
<i>Galium spp.</i>	1(25)	4(43)		2(64)	4(75)	3(54)	1(25)		1(20)	1(20)		
<i>Vaccinium vitis-idaea</i>	1(25)		2(38)	1(7)		2(15)	3(50)	2(33)	4(60)		32(60)	24(100)
<i>Impatiens nigrum</i>			+(13)				1(50)	2(33)	2(20)		6(50)	5(100)
<i>Lupinus spp.</i>								19(100)				
<i>Carex spp.</i>												5(100)
DR:												
<i>Orepanocladus spp.</i>			4(38)		4(38)	2(15)	5(50)		1(20)	1(40)	2(10)	
<i>Cladonia spp.</i>	6(25)		8(88)	+(7)		1(23)	5(50)	1(33)	2(40)	10(60)	15(90)	23(50)
<i>Cetraria spp.</i>	3(25)		2(63)			1(31)	2(50)	1(33)	1(40)	4(60)	3(60)	1(50)
<i>Polytrichum spp.</i>			1(25)			+(15)			2(40)		3(20)	53(100)
<i>Rhytidadelphus spp.</i>			2(38)						2(20)			
<i>Pleurozium spp.</i>							1(25)					50(13)
<i>Peltigera spp.</i>	6(25)		10(88)	1(21)	1(25)	4(46)	10(75)	24(57)	7(40)	13(80)	8(80)	
<i>Cladonia rangiferina</i>			+(13)			+(7)	1(25)		1(20)	5(60)		
<i>Hylocomium splendens</i>	23(50)			2(7)			4(25)		3(20)		4(50)	
Litter		8(14)	4(25)			31(62)	33(75)		11(20)	4(20)		
Moss		2(57)		2(21)	6(38)		5(50)					
<i>Aulacomnium sp.</i>			1(13)				1(25)			1(20)	5(40)	
<i>Dicranum spp.</i>					2(13)	+(7)	1(25)		4(40)		+(10)	
<i>Sphagnum spp.</i>											2(20)	

1/Constancy is shown in parentheses; • = less than 1 percent cover. BP = balsam poplar; A = aspen; Y = young community; 1 to 9 = closed community; 10 to 19 = open community.

2/A1 = dominant and codominant trees; A2 = intermediate trees; B2 = tree seedlings; C = shrubs between 2 and 10 m in height; DH = shrubs and woody plants between 15 cm and 2 m in height; DW = small, woody plants less than 15 cm tall and all herbaceous plants; DR = bryophytes, lichens, and ground cover.

Table 7—Environmental summary of the mature plant associations in Porcupine Plateau and Yukon Flats

Item	BP1	BP2	A1	ABP1	AWS1	AWS2	WSB1	WS1	WS2	WS3	WS4	WS5	WS6	WS7
Physiographic section: <u>1/</u>	YF	YF	YF	YF	YF	YF	YF	YF	YF	YF	YF	YF	YF	YF
Elevation	139	177	180	137	160	186	357	213	201	182	152	146	215	194
Slope	0	0	1	0	0	3	18	2	1	2	0	1	1	0
Aspect	0	0	0	0	0	0	45	0	0	0	0	0	0	0
Soil order and suborder <u>2/</u>	EF	IR	IQ	EF		EF		IR	EF	EF	IR	EF	EF	
Soil association	2	1		2		2		1	2	2	1	2	2	
Depth to permafrost (cm)	144	130	109	74	87	89	32	78	87	69	125	67	59	80
Landscape <u>3/</u>	FP	FL	FL			FL		ST	FP	FL	FP	FL		ST
Rooting depth (cm)	50	23	58	23	32	29	25	35	32	27	20	23	31	45
Soil temperature:														
5 cm	17	9	14	13	10	13		17	12	10	12	11	7	10
10 cm	14	8	9	10	7	10		11	4	7	9	8	4	7
20 cm	10	7	8	8	5	8		8	6	5	7	6	2	5
Soil drainage class <u>4/</u>	4	4	5	4	4	4	4	5	5	4	4	4	4	4
Thickness of organic matter (cm)	5	5	5	7	6	5	5	5	5	5	1	7	10	11
pH of humus			6.2			4.8		5.9	7.3	5.7		7.3		
C/N of humus	25		22		24	25		26	22	28		22		
pH of mineral soil	8.0	7.0	6.9	6.0	5.4	6.8		6.9	6.9	7.1	6.5	7.2	6.5	7.0
Age (yr)	65	50	62	45	62	56	55	74	118	81	102	87	89	110
Growth class and site index: <u>5/</u>														
White spruce		6-65	6-21	8-36	6-62	7-53	7-61	7-56	6-64	7-50	6-71	6-59	7-57	7-61
Black spruce														
Birch					6-47	7-41		6-50						
Aspen														
Balsam poplar	6-74	d-34	8-39	8-28			6-44							
Stems/ha (2.5+ cm)	1,479	4,219	4,137	6,175	4,206	4,408	4,086	4,333	1,073	4,501	1,018	2,249	3,012	2,182
Basal area (m ² /ha)	21.1	9.7	13.0	9.9	18.2	14.1	8.4	22.9	21.5	19.9	33.2	18.5	17.4	19.3
D.b.h. (cm)	14.3	5.4	7.1	4.6	8.4	7.1	13.4	9.4	17.1	7.8	17.8	10.2	8.4	11.0
Biomass (kg/m ²)	8.1	3.1	4.2	2.6	6.0	4.4	3.6	8.2	9.4	6.1	15.8	6.8	6.1	6.9
CAI per year (g/m ²)	290	113	133	86	258	258	276	803	1026	418	2206	720	514	651
Stratification cover (percent):														
A layer	102	71	97	91	97	77	60	100	92	94	72	76	96	86
B layer	100	6	60	93	65	34	115	44	79	33	107	78	71	68
C layer	51	34	40	65	45	59	54	45	33	54	75	81	53	122
D layer	15	2	6	38	32	46	21	79	41	48	4	65	67	62
Ground cover:														
Humus	74		76		46	46		21	18	63	41	30		
Mineral soil														

A blank means value could not be determined.

1/ YF = Yukon Flats; FP = Porcupine Plateau.

2/ EF2 = Typic Cryofluents-Histic Pergelic Cryaquepts, loamy, nearly level association; IR1 = Typic Cryochrepts, loamy, nearly level to rolling associations; IR2 = Typic Cryochrepts-Typic Cryorthents, loamy, nearly level to rolling association; IQ = Aquept; IQ2 = Histic Pergelic Cryaquepts, loamy nearly level to rolling association; IQ6 = same as IQ2 with Pergelic Cryofibrists, nearly level association; IQ9 = Histic Pergelic Cryaquepts-Typic Cryochrepts, loamy, nearly level to rolling association.

3/ FP = floodplain; FL = flatwoods; ST = stream terraces; LP = level and undulating uplands; RP = rolling and hilly plains, plateaus and uplands; SM = swamps and marshes.

4/ 2 = poorly drained; 3 = somewhat poorly drained; 4 = moderately well drained; 5 = well drained.

5/ The 1st value represents the growth class, the 2d the site index (for example, BP2--6-65 = a growth class of 6 and a white spruce or balsam poplar site index of 65). Growth classes (per year): 9 = 0 to 0.7 m³/ha; 8 = 0.71 to 0.98 m³/ha; 7 = 0.99 to 1.33 m³/ha; 6 = 1.34 to 3.43 m³/ha.

Table 7— continued

BS1	BS2	WSBS1	WSBS2	WSBS3	WSBS4	A10	WSIO	WS11	BS10	BS11	BS12	BS13	WSB10	WSB11	BS20	BS21
PP 414 1 170	YF 308 9 214	PP 421 2 144	YF 321 9 88	YF 214 2 0	PP 397 5 113	YF 187 1 0	YF 214 4 0	YF 220 0 0	YF 307 1 0	PP 433 6 222	PP 381 3 102	PP 417 4 219	PP 500 11 98	PP 361 8 236	PP 211 0 0	YF 445 6 63
IQ 9 28	IR 2 62	IQ 9 24	IQ 2 56	IQ 6 61	IQ 6 18	EF 2 74			IQ 9 30	IQ 9 56	IQ 2 27	IQ 9 42	IQ 9 58	IQ 9 46	IQ 9 20	
LP	RP 34	RP 25	RP 18	LP 25				LP 23		RP 27	LP 24	RP 30	RP 40	RP 28	SM	RP 17
17 12 1	7 3 2		3 2 1	7 4 3	11 6 1	10 9 7	19 15 11	12 8 3	7 4 2	12 7 3	7 4 3	13 8 2	19 14 7	6 3 2		
3 8	4 10 4.7 5.8	3 6	4 9	5 9	2 11	5 3	4 9	4 8 5.4 27 6.5	3 8	3 9 6.9 27 6.5	4 8	2 5 6.9 28 6.7	3 8 5.6 7.0	2 16 32 6.3	3 33 6.0	3 5 6.4
104	84	107	106	89	106	45	111	74	100	109	68	72	147	63	50	86
9-26	7-52 8-35	8-37 9-30	8-43	8-45 9-38	9-26	7-61	7-51	8-52	7-48 8-36 7-35	9-30 8-41 9-23	8-56 8-31 9-33	8-38 9-27 9-20	9-34	7-58 8-40		8-29
2,635 6.7 5.8 1.7 27	4,876 21.7 8.0 6.3 208	2,789 7.2 6.0 2.0 70	4,207 12.5 6.3 4.0 285	4,520 15.2 6.2 4.1 131	2,748 6.9 5.7 1.8 44	4,476 5.0 4.9 2.0 67	1,960 12.1 10.9 4.5 468	3,442 12.6 7.0 3.8 257	3,900 9.6 5.6 2.6 49	1,766 5.0 6.1 1.4 74	1,807 5.0 6.2 1.4 26	1,197 3.2 5.4 0.9 34	1,688 4.4 5.6 1.2 58	2,464 4.2 5.1 1.2 30	223 0.3 2.1 0.1 1	2,135 6.8 6.4 1.8 34
55 89 69 57	69 67 75 96	55 132 172 146	72 44 78 58	78 35 100 78	85 89 105 72	53 58 73 5	53 86 106 47	51 90 138 68	59 65 69 76	43 69 88 48	37 95 141 36	27 106 67 52	31 87 72 67	35 74 80 72	9 138 76 94	16 77 79 105
18	24		8	18				42			18					

Table 8—Environmental summary of the young plant associations in Porcupine Plateau and Yukon Flats

Item	BPYI	ABPYI	ABYI	AWSYI	AWSY2	ABSYI	ABSY2	WSBYI	BSBYI	BSBY2	WSY2	WSY5
Physiographic section 1/												
Elevation (m)	YF 217	YF 139	PP 256	YF 150	YF 157	PP 347	PP 222	YF 225	PP 397	PP 352	YF 258	YF 178
Slope	2	0	1	0	0	13	8	1	15	7	3	0
Aspect		0	0	0	0	250	155	0	298	197	0	0
Soil order and suborder 2/		EF	IR	IR	IR	IQ	IQ	IQ	IQ	IQ	IQ	IR
Soil association		2	2	1	1	9	9	9	9	9	25	1
Depth to permafrost (cm)	73	105	100	98	110	90	83	94	58	60	55	33
Landform 3/	FP	FP		FL	FP	FP		FL	RP	FP	RP	FL
Rooting depth (cm)	25	25	31	31	34	37		23	30	30	22	29
Soil temperature:												
5 cm	12	14	15	11	15		12	11	16	12	10	13
10 cm	8	11	12	9	11		10	9	11	7	7	8
20 cm	5	9	10	7	9		7	8	7	4	5	7
Soil drainage class 4/	2	4	5	4	4	5	4	4	5	4	4	4
Thickness of organic-matter (cm)	6	3	0	4	3	4	4	6	3	9	8	6
pH of humus					6.5						7.4	6.3
C/N of humus			23		21			21			15	26
pH of mineral soil	7.1	7.1	6.0	7.1	7.1	6.0	6.3	6.0	6.0	6.6	6.4	6.9
Age (yr)	22	10	23	28	18	23	22	13	25	29	22	22
Growth class and site index : 5/												
White spruce	7-68	6-62	9-42	6-71	6-63	6-75		7-65	7-54	7-55	6-52	7-59
Black spruce			9-31		3-35	6-69	9-	3-34	5-37	9-34		
Birch			7-41					6-	9-28	7-46		
Aspen		7-28	5-41	6-44	7-44	6-58	7-50					
Balsam poplar	8-38	6-34										9-
Stems/ha (2.5+ cm)	510	11	1,334	4,282	2,582	5,854	445	567	1,379	1,187	731	228
Bdsl area (m²/ha)	1.2	.01	2.5	9.0	4.3	10.2	.4	1.0	2.3	1.5	2.1	1.7
D.b.h. (cm)	9.8	.5	3.3	4.3	4.4	5.3	3.0	2.7	5.2	4.5	7.4	4.9
Biomass (kg/m²)	.5	0	.6	2.5	1.3	2.7	.1	.3	.1	.5	.5	.5
CAI per year (g/m²)	13	0	23	99	39	92	3	27	22	28	39	30
Stratum cover (percent):												
A layer	25	0	20	74	37	71	3	18	41	25	16	16
B layer	98	56	83	87	56	74	93	83	55	94	95	75
C layer	42	69	80	56	73	66	96	106	97	119	34	79
D layer	30	20	39	14	19	32	39	45	39	46	52	47
Ground 1dyer:												
Humus		53	19		52	45		53	18		63	29
Mineral soil					19			8				

A blank means the value could not be determined.

1/ YF = Yukon Flats; PP = Porcupine Plateau.

2/ EF2 = Typic Cryoflyents-Histic Pergelic Cryaquepts, loamy, nearly level association; IR1 = Typic Cryochrepts, loamy, nearly level to rolling association; IR2 = Typic Cryochrepts-Typic Cryortments, loamy, nearly level to rolling association; IQ = Aquept; IQ2 = Histic Pergelic Cryaquepts, loamy, nearly level to rolling association; IQ6 = same as IQ2 with Pergelic Cryofibrists, nearly level association; IQ9 = Histic Pergelic Cryaquepts, loamy, nearly level to rolling association.

3/ FP = flood plain; FL = flatwoods; ST = stream terraces; LP = level and undulating uplands; RP = rolling and hilly plains. plateaus and uplands; SM = swamps and marnes.

4/ 2 = poorly drained; 3 = somewhat poorly drained; 4 = moderately well drained; 5 = well drained.

5/ The 1st value represents the growth class, and the 2d value the site index (for example, BP2-5-65 = a growth class of 6 and a white spruce or balsam poplar site index of 65). Growth classes (per year): 9 = 0 to 0.7 m³/ha; 8 = 0.71 to 0.38 m³/ha; 7 = 0.99 to 1.33 m³/ha; 6 = 1.34 to 3.43 m³/ha.

Table 8—Environmental summary of the young plant associations in Porcupine Plateau and Yukon Flats, continued

Item	BSY2	WSBSY2	WBSY4	AY10	ABSY10	WSY11	BSY11	BSY13	BSY14	WSBSY10	WSBSY12
Physiographic section <u>1/</u>	PP	YF	PP	YF	PP	PP	P?	PP	PP	P?	PP
Elevation (m)	340	223	313	221	713	268	360	372	308	275	217
Slope	6	2	3	1	25	2	2	5	8	5	8
Aspect	175	0	0	0	75	0	0	0	208	160	0
Soil order and suborder <u>2/</u>	IQ	IQ	IQ	R		IQ	IQ	IQ	IQ	IO	IQ
Soil association	6	2		1		9	9	9	9	9	
Depth to permafrost (cm)	48	106	66	92		79	46	35	63	77	106
Landform <u>3/</u>	RP	FL	LP				LP	LP	R?	RP	R?
Rooting depth (cm)	23	30	30	27		26		13	55	33	32
Soil temperature:											
5 cm	13	8	10	14		11	12	a	7	9	15
10 cm	9	6	7	10		9	8	5	4	7	12
20 cm	6	5	3	8		6	5		3	6	10
Soil drainage class <u>4/</u>	4	4	3	4	4	3	3	3	4	3	5
Thickness of organic matter (cm)	6	6	5	4	20	5	7	9	10	9	3
pH of humus						5.3					
C/N of humus	28	53	26	17		32		25	23		20
pH of mineral soil	5	7.3	6.5	7.0		6.1	5.7	6.7	7.3	5.2	7.0
Age (yr)	22	27	33	29	25	15	26	23	32	15	13
Growth class and site index: <u>5/</u>											
White spruce	8-44	8-50	6-51	6-54	9-52	8-46	9-23	9-35		8-44	6-69
Black spruce	9-30	9-	8-				9-	9-16	9-27	3-41	9-34
Aspen				6-39	9-			9-23			
Balsam poplar	7-40			6-30				9-33	R-51		7-37
Stems/ha (2.5+ cm)	646	781	3,157	3,182	1,334	241	145	494	27?	130	370
Basal area (m ² /ha)	1.2	1.3	4.2	5.6	1.6	.3	.2	.8	.5	.1	.5
D.O.N. (cm)	3.9	3.8	4.1	4.8	4.1	2.5	3.7	2.3	3.7	.8	2.1
Biomass (kg/m ²)	.3	.5	1.3	1.5	.4	.1	.1	.2	.1	.1	.?
CAL per year (g/m ²)	9	30	39	51	10	4	1	6	5	1	4
Stratumn cover (percent):											
A layer	13	18	66	44	22	11	2	8	3	2	3
B layer	113	108	111	70	109	81	119	76	78	58	131
C layer	72	106	53	77	170	104	72	73	147	95	69
D layer	55	54	86	18	104	48	54	41	33	62	22
Ground layer:											
Humus			63						30	29	64
Mineral soil											15

A blank means the value could not be determined.

1/ YF = Yukon Flats; PP = Porcupine Plateau.

2/ EF2 = Typic Cryoflyents-Histic Pergelic Cryaquepts, loamy, nearly level association; IR1 = Typic Cryochrepts, loamy, nearly level to rolling association; IR2 = Typic Cryochrepts-Typic Cryorthents, loamy, nearly level to rolling association; IQ = Aquept; IQ2 = Histic Pergelic Cryaquepts, loamy, nearly level to rolling association; IQ6 = same as IQ2 with Pergelic Cryofibrists, nearly level association; IQ9 = Histic Pergelic Cryaquepts, loamy, nearly level to rolling association.

3/ FP = flood plain; FL = flatwoods; ST = stream terraces; LP = level and undulating uplands; RP = rolling and hilly plains, plateaus and uplands; SM = swamps and marnes.

4/ 2 = poorly drained; 3 = somewhat poorly drained; 4 = moderately well drained; 5 = well drained.

5/ The 1st value represents the growth class, and the 2d value the site index (for example, 8P2-5-65 = a growth class of 6 and a white spruce or balsam poplar site index of 65). Growth classes (per year): 9 = 0 to 0.7 m³/ha; 8 = 0.71 to 0.98 m³/ha; 7 = 0.99 to 1.33 m³/ha; 6 = 1.34 to 3.43 m³/ha.

***Picea mariana/Ledum palustre/Vaccinium vitis-idaea/Cladonia* spp. (BSY1).**—This association has an overstory cover of 19 percent. The major tree reproduction is black spruce. White spruce is a common associate. The tall shrub layer is only moderately developed and is composed of several species of willow. Major species in the low shrub layer are Labrador-tea and bog blueberry with average cover values of 15 and 23 percent. Rose (*Rosa acicularis* Lindl.) is a common associate. The major species in the herbaceous layer is mountain cranberry, with average cover of 12 percent. The moss and lichen layer is dominated by species of *Peltigera* and *Cladonia*.

This community is found almost exclusively in the Porcupine Plateau section of the unit at an average elevation of 376 m. It is predominantly an upland community, for the most part on level and undulating uplands and rolling and hilly plains. It occurs mainly on Histic Pergelic Cryaquepts and Typic Cryochrepts. Soil drainage ranged from one very poorly drained site to somewhat excessively drained sites. Average thickness of the humus layer is 6 cm. The mineral soil is acid—mean pH 6.0. Average stand age is 22 years.

The average number of stems greater than 2.5 cm in d.b.h. is 646/ha. Average d.b.h. is 3.9 cm, and Reineke's (1933) SDI is 33. Stand biomass and CAI average 0.3 kg/m² and 9 g/m² per year. The CAI per square centimeter of basal area averages 7.1 g/yr.

The stands in this young community will mature into either a BS1 or a BS2 community type. The primary determining factor will be soil drainage. Poorly drained to somewhat poorly drained plots will become BS1, whereas moderately well-drained to excessively well-drained plots should become BS2 community types.

***Picea mariana/Rosa acicularis/Equisetum/Cladonia rangiferina* (BS2).**—Overstory cover for this community averages 73 percent and ranges from 37 to 91 percent. The major overstory species is black spruce. Common associates include paper birch and white spruce. The most abundant tree regeneration is black spruce. The tall shrub layer frequently contains American green alder (*Alnus crispa* (Ait.) Pursh.) and bebb willow (*Salix bebbiana* Sarg.), with an average cover of 24 and 32 percent, respectively. The most consistently occurring low shrub is rose with an average cover of 12 percent. All other species occur in less than 20 percent of the stands. The major genus found in the herbaceous layer is *Equisetum*, with a cover value of 16 percent. Mountain-cranberry, geocaulon (*Geocaulon lividum* (Richards.) Fern.), and twinflower (*Linnaea borealis* L.) are frequent associates, with a cover of about 8 percent. The moss and lichen layer is dominated by *Hylocomium splendens* which has an average cover of 50 percent. Associated species include *Cladonia rangiferina* (L.) Web. and *Peltigera* spp., with an average cover of 9 and 8 percent, respectively.

This community occurs throughout the southern half of both the Yukon Flats and Porcupine Plateau sections, predominantly on rolling and hilly plains. Some examples of this community type have been reported in the mountains and in swamps and marshes. The latter was found with a greatly reduced canopy coverage. Elevation averages 308 m and ranges from 183 to 262 m. The community occurs mainly on moderately well-drained to well-drained Typic Cryochrepts with an average depth to permafrost of 65 cm. Average rooting depth is 34 cm, and the organic layer is 10 cm thick. The mineral soil is acid, with an average pH of 5.4. The average age of the overstory is 88 years.

The number of stems greater than 2.5 cm in d.b.h. averages 5,272/ha. Average d.b.h. is 8.2 cm, and Reineke's (1933) SDI is 881. Overstory biomass and CAI average 6.8 kg/m² and 222 g/m² per year. The CAI per square centimeter of basal area averages 9.4 g/yr.

This community is similar to the *Picea mariana*/*Rosa acicularis*/*Peltigera* community described by La Roi (1967) and Foote (see footnote 1, p. 3). It should probably be considered a northern phase of that community type. This community also differs from the BS1 type in that it is generally found in locations with better drainage—either on sloping terrain or in warmer soils with good drainage. As a result, the CAI is about 10 times greater than in the BS1 community type.

Closed White Spruce-Black Spruce Forests

***Picea glauca*-*Picea mariana*/*Salix* spp./*Arctostaphylos* spp. (WSBSI).**—The overstory cover of this community averages 61 percent and ranges from 37 to 88 percent. The dominant overstory species are white spruce and black spruce. The dominant tree reproduction is black spruce, but white spruce is common. Paper birch is rare. The tall shrub layer consists of willow (*Salix* L.) and alder (*Alnus* Mill.). Willow is dominant, with an average cover of 23 percent. The low shrub layer is moderately developed and contains, among other species, Labrador-tea, dwarf arctic birch (*Betula nana* L.), and *Vaccinium* spp. with average cover of 21, 22, and 27 percent, respectively. The herbaceous layer is well developed and is dominated by both red-fruit bearberry (*Arctostaphylos rubra* (Rehd. & Wilson) Fern.) and bearberry (*A. uva-ursi* (L.) Spreng.), with average cover of 35 and 25 percent. A common associate is crowberry—cover value, 41 percent. The moss and lichen layer is dominated by *Aulacomnium* sp. and *Cetraria* spp., with a cover value of 24 and 15 percent, respectively. Common associates are Cyperaceae, *Parmelia* spp., and *Cladonia* spp.

This community is found at higher elevations in the Porcupine Plateau section, predominantly on somewhat poorly drained to very poorly drained Histis Pergelic Cryaquepts on either hilly and rolling plains or in swamps and marshes. Elevation averages 421 m and ranges from 282 to 533 m. Depth to permafrost averages 24 cm, and the organic layer is 6 cm thick. The mineral soil is nearly neutral; average pH, 6.8. The average stand age is 114 years.

The average number of stems greater than 2.5 cm in d.b.h. is 3,110/ha. Average d.b.h. is 6.1 cm, and Reineke's (1933) SDI is 323. Stand biomass averages 2.2 kg/m²; the CAI, 78 g/m² per year. The CAI per square centimeter of basal area averages 9.7 g/yr.

This community was not described by Viereck and Dyrness (1980). It represents a high-elevation, poorly drained community where black spruce is close to its altitudinal and latitudinal limits.

***Picea glauca*-*Picea mariana*/*Salix* spp./*Vaccinium vitis-idaea*/*Hylocomium splendens* (WSBS2).**—The overstory cover of this community averages 72 percent. The predominant overstory species are white spruce and black spruce. Tree reproduction is dominated by black spruce, although white spruce is common in the reproductive layer. The tall shrub layer is dominated by bebb willow; the low shrub layer, by rose and bog blueberry with an average cover value of 4 and 10 percent, respectively. Major species in the herbaceous layer are crowberry, mountain cranberry, and red-fruit bearberry with cover values of 18, 18, and 12 percent. Common associates are twinflower and winter-green (*Pyrola* L.). The moss and lichen layer is dominated by *Hylocomium splendens* with an average cover of 32 percent. Common associates are *Parmelia* spp., *Cetraria* spp., and *Dicranum* spp.

This community is scattered throughout the inventory unit but close to the boundary between the Yukon Flats and Porcupine Plateau. It is found in both sections on somewhat poorly drained to moderately well-drained Histic Pergelic Cryaquepts. Elevation averages 321 m and ranges from 175 to 487 m. Depth to permafrost averages 56 cm. The organic layer is 9 cm thick, and the mineral soil is slightly acid, with an average pH of 6.8. Stand age averages 106 years.

The number of stems greater than 2.5 cm in d.b.h. averages 4,207/ha. The averaged d.b.h. is 6.3 cm, and the Reineke (1933) SDI is 461. Stand biomass averages 4.0 kg/m²; CAI, 285 g/m² per year. The CAI per square centimeter of basal area averages 22.7 g/m².

This community was not described by Viereck and Dyrness (1980). The community is found at lower elevations and on better drained sites than the WSBS1 community, which results in a greater abundance of white spruce and about three times greater CAI.

***Picea glauca*-*Picea mariana*/*Salix* spp./*Vaccinium vitis-idaea*/*Hylocomium splendens* (WSBSY2).**—The overstory cover is 18 percent, predominantly white spruce and black spruce. The major tree reproduction is white and black spruce. The tall shrub layer is dominated by little tree willow (*Salix arbusculoides* Anderss.) and grayleaf willow (*S. glauca* L.). The low shrub layer is dominated by buffaloberry (*Shepherdia canadensis* (L.) Nutt.) and rose, with average cover values of 50 and 15 percent. The major species found in the herbaceous layer are mountain cranberry, red-fruit bearberry, and bearberry with average cover values of 20, 21, and 29 percent, respectively. The moss and lichen layer is dominated by *Peltigera* spp. and *Cladonia* spp. with average cover values of 21 and 23 percent.

This community appears to be concentrated in the center of the area with scattered occurrences in other parts of Yukon Flats. Because of the proximity of several of the plots it is likely that one large fire about 1945 was responsible for the distribution of this community type. Elevation averages 223 m. The community occurs on moderately well-drained Histic Pergelic Cryaquepts. Depth to permafrost averages 106 cm and rooting depth 30 cm. The average thickness of the humus layer is 6 cm, and the mineral soil is basic with an average pH of 7.3. Stand age averages 27 years.

The number of stems greater than 2.5 cm in d.b.h. averages 781/ha; d.b.h., 3.8 cm. Reineke's (1933) SDI is 38. Stand biomass averages 0.5 kg/m² and CAI 30 g/m² per year. The CAI per square centimeter of basal area averages 19.5 g/yr.

This community may develop into a WSBS2. One major difference in the young community is in the moss and lichen layer where constancy and cover of *Hylocomium splendens* are very low.

***Picea glauca*-*Picea mariana*/*Salix* spp./*Vaccinium vitis-idaea*/Lichen (WSBS3).—**

Total overstory cover for this community type averages 86 percent. The dominant overstory species is black spruce, but white spruce is a common associate. The major tree reproduction is black spruce, but again white spruce is a common associate. Willow species are dominant in the tall shrub layer. The low shrub layer is predominantly composed of buffaloberry and rose, with average cover values of 13 and 43 percent. The herbaceous layer is dominated by mountain cranberry, red-fruit bearberry, and crowberry; average cover values are 21, 18, and 15 percent, respectively. Geocaulon and twinflower are common associates. The moss and lichen layer is dominated by *Cladonia rangiferina*, *Ptilidium ciliare* (Web.) Hampe, and *Hylocomium splendens* with average cover values of 13, 13, and 25 percent.

This community occurs at an average elevation of 214 m at the eastern edge of the Yukon Flats portion of the unit. One stand was reported in the Porcupine Plateau but close to the Black River, at an average elevation of 397 m. This community occurs on well-drained Histic Pergelic Cryaquepts with an average depth to permafrost of 61 cm. Thickness of the organic layer averages 9 cm, and the mineral soil is neutral with an average pH of 7.0. The average stand age is 89 years.

The average number of stems greater than 2.5 cm in d.b.h. is 4,520/ha. The d.b.h. averages 6.2 cm, and Reineke's (1933) SDI is 482. Stand biomass and CAI average 4.1 kg/m² and 13 g/m² per year. The CAI per square centimeter of basal area averages 8.6 g/yr.

This community was not described by Viereck and Dyrness (1980). It appears to be similar to WSBS2, except for a lack of bog blueberry and a much greater dominance of black spruce in WSBS3.

Picea mariana*-*Picea glauca*/*Salix* spp./*Ledum palustre*/*Empetrum nigrum

(WSBS4).—Overstory cover for this community type averages 85 percent and is composed entirely of white spruce and black spruce. The majority of the tree reproduction is black spruce, but white spruce is a common associate. The tall shrub layer is dominated by several species of willow. The major species in the low shrub layer are Labrador-tea and bog blueberry, with average cover values of 22 and 42 percent. The herbaceous layer is dominated by mountain cranberry, *Equisetum*, and crowberry with average cover values of 21, 17, and 38 percent. The major species in the moss and lichen layer include *Cladonia rangiferina* and *Aulacomnium* sp., with average cover values of 19 and 28 percent.

This community occurs at relatively high elevations north of the Porcupine River within the Porcupine Plateau, at an average elevation of **397** m. It occurs on poorly drained Histic Pergelic Cryaquepts with an average depth to permafrost of 18 cm. Thickness of the humus layer averages 11 cm, and the mineral soil is slightly acid with an average pH of 6.8. The average stand age is 106 years.

The number of stems greater than 2.5 cm in d.b.h. averages 2,748/ha. D.b.h. averages 5.7 cm, and Reineke's (1933) SDI is 256. Stand biomass and CAI average 1.8 kg/m² and 44 g/m² per year. The CAI of basal area averages 7.9 g/cm² per year.

This community was not described by Viereck and Dyrness (1980).

***Picea mariana*-*Picea glauca*/Salix spp./*Potentilla fruticosa*/Rubus arcticus-Arctostaphylos spp. (WSBSY5).**—Overstory cover for this community averages 66 percent. The major overstory species are black spruce and white spruce. Aspen and balsam poplar are rare associates. Tree reproduction is dominated by black spruce. The major species in the tall shrub layer are bebb willow, American green alder, and grayleaf willow. The low shrub layer is dominated by rose and bush cinquefoil (*Potentilla fruticosa* L.) with an average cover value of 2 percent each. The major species in the herbaceous layer are dewberry (*Rubus arcticus* L.), bearberry, and red-fruit bearberry with average cover values of 2, 3, and 10 percent. The moss and lichen layer is dominated by *Peltigera* spp. and *Cladonia* spp.

This community occurs throughout the inventory unit at an average elevation of 313 m. It occurs on poorly drained to well-drained Histic Pergelic Cryaquepts, from swamps and marshes to rolling and hilly uplands. Depth to permafrost averages 66 cm. The thickness of the humus layer averages 5 cm, and the mineral soil is slightly acid with a pH of 6.5. The average stand age is 33 years.

The average number of stems is 3,157/ha. D.b.h. averages 4.1 cm, and Reineke's (1933) SDI is 173. Stand biomass and CAI average 1.3 kg/m² and 39 g/m² per year. The CAI per square centimeter of basal area is 9.0 g/yr.

Because this community is not related to any of the other closed white spruce-black spruce communities, it is not possible to predict the mature community type. It may represent a community that was not sampled in the mature stage.

Closed White Spruce Forests

***Picea glauca*/Rosa acicularis-Shepherdia canadensis/Linnaea borealis (WS1).**—Total overstory cover averages 100 percent for this association. The dominant overstory species is white spruce. Aspen and paper birch are rarely found in the overstory. The majority of tree reproduction is white spruce. The tall shrub layer is dominated by various species of willow; the two most abundant are scouler willow (*Salix scouleriana* Barratt) and littletree willow. The low shrub layer is dominated by rose and buffaloberry, with an average cover of 4 and 10 percent. Several other shrub species can occur, but their constancy is generally less than 25 percent. The two major species in the herbaceous layer are twinflower and bluebells (*Mertensia paniculata* (Ait.) G. Don) with an average cover of 2 percent. Other commonly associated species are geocaulon and red-fruit bearberry. A total of 39 herbaceous species were reported for this community. The moss and lichen layer is dominated by *Parmelia* sp., *Hylocomium splendens*, and *Cladonia* spp. with an average cover of 2, 27, and 18 percent, respectively. The presence of *Parmelia* and *Usnea* sp. is associated with twig and branch litter fall.

This community occurs in the Yukon Flats section of the inventory unit, predominantly in upland areas away from the major rivers, although it can occur along stream terraces of the smaller streams. It is generally found on Typic Cryochrepts or Histic Pergelic Cryaquepts. Depth to permafrost averages 78 cm (range, 33 to 125 cm). The average rooting depth is 33 cm, and the organic layer is 5 cm thick. The mineral soil is neutral, with an average pH of 7.0. The average stand age is 74 years.

The number of stems greater than 2.5 cm ind.b.h. averages 4,333/ha. Diameter averages 9.4 cm, and Reineke's (1933) SDI is 902. Average biomass and CAI are 8.2 kg/m² and 803 g/m² per year. The CAI per square centimeter of basal area is 35.1 g/yr.

This community appears to be a northern analog of the *Picea glauca*/*Linnaea borealis*/*Equisetum sylvaticum* community described by Foote (see footnote 1, p. 3). The presence of willow in this northern community differentiates it from its southern analog.

***Picea glauca*/Alnus spp./Arctostaphylos uva-ursi (WS2).**—Overstory cover of this community averages 92 percent. The overstory is comprised of white spruce with an occasional paper birch or balsam poplar. Tree reproduction is white spruce, but paper birch is a frequent associate. The tall shrub layer is dominated by willow species. American green alder is a very common associate, which may help explain the absence of buffaloberry in the low shrub layer. The low shrub layer, with an average cover of 42 percent, is dominated by rose. The herbaceous layer is weakly developed; *Equisetum* spp. are most abundant, with an average cover of 20 percent. Associated with *Equisetum* spp. are bearberry and *Mertensia* spp. The major moss species is *Hylocomium splendens*.

This community occurs at slightly higher elevations (average 201 m) than other white spruce communities. It can occur in both the Yukon Flats and Porcupine Plateau sections on landforms varying from flood plains of the major rivers to level and undulating uplands. The most commonly occurring soil associations are Typic Cryofluvents and Histic Pergelic Cryaquepts, nearly level to rolling and loamy. Depth to permafrost averages 86 cm and rooting depth 32 cm. The mineral soil is slightly acid, with an average pH of 6.9. Average stand age is 118 years.

The number of stems greater than 2.5 cm averages 1,073/ha; d.b.h., 17.1 cm. Reineke's (1933) SDI is 583. Stand biomass averages 9.4 kg/m²; CAI, 1,026 g/m² per year. The CAI per square centimeter of basal area averages 46.6 g/yr; the range is from 35.1 to 63.6.

This community was not described by Viereck and Dyrness (1980).

***Picea glauca*/Mertensia sp./Graminae (WSY2).**—This community has an overstory cover of 16 percent and is composed predominantly of white spruce. The principal reproducing tree species is white spruce, although aspen and birch can be found; balsam poplar and black spruce are rare. Even though willow is the primary tall shrub, alder is not uncommon and because of this, the community will probably mature into a WS2 type. At present, the primary low shrub is buffaloberry with an average cover of 18 percent. The primary species in the herbaceous layer are bluebells and equisetum with average cover values of 4 and 2 percent.

This type is scattered throughout the entire unit at an average elevation of 258 m. It is mainly found on Typic Cryofluvents or Histic Pergelic Cryaquepts with an average depth to permafrost of 66 cm. The average rooting depth is 22 cm, and the humus layer is quite thick with an average depth of 8 cm. The mineral soil is acid with an average pH of 6.4, and stand age averages 22 years.

The number of stems averages 731/ha; d.b.h., 7.4 cm. Reineke's (1933) SDI is calculated to be 104. Stand biomass averages 0.6 kg/m²; CAI, 39 g/m² per year. The CAI per square centimeter of basal area averages 18.3 g/yr.

***Picea glauca*/Shepherdia canadensis/Arctostaphylos spp./Peltigera spp. (WS3).—**

The overstory is dominated by white spruce with an average cover of 79 percent. Infrequently, balsam poplar, black spruce, and aspen are associates. The total overstory cover averages 94 percent. The tall shrub layer is dominated by willow with an average cover of 8 percent. Buffaloberry is the most common low shrub with an average cover of 12 percent. The most common herb is red-fruit bearberry with an average cover of 7 percent. Common associates are twinflower, *Mertensia* sp., and bearberry. The moss and lichen layer is relatively diverse; *Peltigera* spp. is most frequent, with an average cover of 6 percent.

This community occurs at relatively low elevations (182 m) in the Yukon Flats section, generally on or near flood plains on Typic Cryofluvents or Typic Cryochrepts. Depth to permafrost averages 69 cm; rooting depth, 27 cm. Mineral soil is neutral, with an average pH of 7.1. The average stand age is 81 years.

Number of stems averages 4,501/ha and d.b.h., 7.8 cm. Reineke's (1933) SDI is 694. The biomass of standing trees averages 6.1 kg/m²; CAI, 418 g/m² per year. The CAI per square centimeter of basal area averages 21.6 g/yr.

This community was not described by Viereck and Dyrness (1980)

***Picea glauca*/Rosa acicularis/Equisetum spp. (WS4).—**Total overstory cover averages 93 percent and is almost completely dominated by white spruce. Balsam poplar is an associate but has a cover value of only 3 percent. Regeneration and a tall shrub layer were absent from this community. The low shrub layer is dominated by rose with an average cover of 75 percent. The herbaceous layer is dominated by *Equisetum* spp. with an average cover of 75 percent.

This community occupies flood plains of the major streams and rivers in the Yukon Flats section of the unit. Stands occur where there is frequent flooding and accumulation of silt. This accounts for the poor development of moss and lichens. The prevalent soil suborder is Typic Cryochrepts, and depth to permafrost averages 124 cm. Rooting depth appears to be shallow—only 25 cm. Average thickness of the organic layer is only 1 cm, and the mineral soil is slightly acid with an average pH of 6.5. The average stand age is 120 years.

The number of stems larger than 2.5 cm averages 1,129/ha; d.b.h., 23.7 cm. Reineke's (1933) SDI is 1036. Stand biomass averages 23.4 kg/m²; CAI, 3293 g/m² per year. The average CAI per square centimeter of basal area is 67.4 g/yr.

This community was not described by Viereck and Dyrness (1980). Its stability depends on the frequency of flooding and silt deposition. If the disturbance is not a regular occurrence, then this community represents a seral stage to one of the other white spruce flood plain communities.

Picea glauca/Rosa acicularis/Equisetum spp. (WS4).—Total overstory cover averages 93 percent and is almost completely dominated by white spruce. Balsam poplar is an associate but has a cover value of only 3 percent. Regeneration and a tall shrub layer were absent from this community. The low shrub layer is dominated by rose with an average cover of 75 percent. The herbaceous layer is dominated by *Equisetum* spp. with an average cover of 75 percent,

This community occupies flood plains of the major streams and rivers in the Yukon Flats section of the unit. Stands occur where there is frequent flooding and accumulation of silt. This accounts for the poor development of moss and lichens. The prevalent soil suborder is Typic Cryochrepts, and depth to permafrost averages 124 cm. Rooting depth appears to be shallow—only 25 cm. Average thickness of the organic layer is only 1 cm, and the mineral soil is slightly acid with an average pH of 6.5. The average stand age is 120 years.

The number of stems larger than 2.5 cm averages 1,129/ha; d.b.h., 23.7 cm. Reineke's (1933) SDI is 1036. Stand biomass averages 23.4 kg/m²; CAI, 3293 g/m² per year. The average CAI per square centimeter of basal area is 67.4 g/yr.

This community was not described by Viereck and Dyrness (1980). Its stability depends on the frequency of flooding and silt deposition. If the disturbance is not a regular occurrence, then this community represents a seral stage to one of the other white spruce flood plain communities.

Picea glauca/Shepherdia canadensis/Equisetum sp.-Arctostaphylos spp. (WS5).—Total overstory cover of this community averages 81 percent and ranges from 47 to 129 percent. The dominant overstory species is white spruce; balsam poplar and aspen are infrequent associates. The tall shrub layer is dominated by willow which has an average cover of 34 percent. The most abundant low shrub, buffaloberry, has a cover value of 19 percent and is often associated with rose. The herbaceous layer is fairly well developed with many species. The most abundant are *Equisetum* sp., bearberry, and red-fruit bearberry with an average cover value of 18, 18, and 14 percent, respectively. The moss and lichen layer appears to be well developed. Mosses average 50 percent of the cover and can be as much as 100 percent. Further study is needed to determine if this group of plots belongs to previously described communities.

This community occupies sites at low elevation (147 m) in the southwest portion of the unit. It occurs mainly on flood plains or sites associated with smaller stream drainages, on poorly drained to well-drained Typic Cryofluvents and Typic Cryochrepts. Depth to permafrost averages 67 cm, but rooting depth only 23 cm. Mineral soil pH averages 7.2. The average stand age is 85 years.

The number of stems greater than 2.5 cm in d.b.h. averages 2,605/ha. The average diameter is 10.1 cm, and Reineke's (1933) SDI is 608. Stand biomass averages 7.2 kg/m²; CAI, 765 g/m² per year. The CAI per square centimeter of basal area averages 39.0 g/yr.

The community described here was not reported by Viereck and Dyrness (1980).

***Picea glauca/Shepherdia canadensis-Rosa acicularis/Arctostaphylos* spp.-**

***Equisetum* (WSY5).**—This community has an overstory cover of 16 percent, composed primarily of white spruce. Aspen, balsam poplar, and black spruce are common to rare associates. This young community is almost identical to WS5 in vegetative composition and is named for the same species. There are only minor differences in the vegetative descriptions for the two sites, so the reader is referred to the description of WS5.

The young version of this community occurs throughout the Yukon Flats section at an average elevation of 175 m. It is also found at lower elevations in the Porcupine Plateau section. Like the mature community, these stands occur mainly on Typic Cryochrepts and Typic Cryofluvents with an average depth to permafrost of 93 cm. The rooting depth averages 28 cm, and the humus layer is about 6 cm thick. The mineral soil is nearly neutral, with an average pH of 6.9. Stand age averages 22 years.

The average number of stems greater than 2.5 cm is 728/ha, and d.b.h. averages 4.9 cm. Stand biomass averages 0.5 kg/m²; CAI, 30 g/m² per year. The CAI per square centimeter of basal area averages 15.2 g/yr. An average of 5,711 seedlings/ha were recorded.

***Picea glauca/Alnus crispa/Rosa acicularis/Arctostaphylos rubra* (WS6).**—Overstory cover for this community averages 99 percent and is composed mainly of white spruce with birch and black spruce as occasional associates. The predominant tall shrub is American green alder with an average cover of 14 percent. Willow is a common associate. The low shrub layer is dominated by rose with an average cover value of 4 percent. The herbaceous layer is dominated by red-fruit bearberry and mountain cranberry with average cover values of 9 and 26 percent. The moss and lichen layer is poorly developed and appears to have no dominant species.

This community occurs on hilly and rolling uplands throughout the Yukon Flats section. It occurs on Typic Cryofluvents or Histic Pergelic Cryaquepts. Elevation averages 215 m. The average depth to permafrost is 59 cm. The humus layer averages 10 cm, and the mineral soil is somewhat acid with an average pH of 6.3. The average stand age is 90 years.

The average number of stems is 3,395/ha. Diameter at breast height averages 9.1 cm. Reineke's (1933) SDI is 671. Stand biomass averages 7.3 kg/m²; CAI, 751 g/m² per year. The CAI per square centimeter of basal area averages 36.3 g/yr.

This community was not described by Viereck and Dyrness (1980). The community is similar to WS2 and probably represents an upland version, with the reduced active layer reflected in the vegetative composition and overstory productivity.

Picea glauca/Rosa acicularis-Shepherdia canadensis/Arctostaphylos rubra-Linnaea borealis (WS7).—The overstory cover of this community averages 86 percent and is predominantly composed of white spruce. Aspen and balsam poplar are rare associates. The tall shrub layer is composed of several species of willow. The low shrub layer is dominated by rose and buffaloberry with average cover values of 21 and 26 percent. The dominant species in the low shrub layer are red-fruit bearberry and twinflower with average cover values of 23 and 20 percent. Common associates include *Equisetum* spp., bluebells, and wintergreen. The major species in the moss and lichen layer are *Parmelia* spp., *Hylocomium splendens*, and *Peltigera* sp. with average cover values of 9, 39, and 12 percent.

This community is found throughout the Yukon Flats section, predominantly on moderately well-drained stream terraces at an average elevation of 194 m. It occurs on Typical Cryofluvents of Typical Cryochrepts with an average depth to permafrost of 80 cm. The average thickness of the humus layer is 11 cm, and the mineral soil is neutral with an average pH of 7.0. Stand age averages 110 years.

The number of stems with an average diameter at breast height of 11 cm is 2,182/ha. Reineke's (1933) SDI is 584. Biomass averages 6.9 kg/m², and the average CAI is 651 g/m² per year. The CAI per square centimeter of basal area averages 34.4 g/yr and ranges from 24.9 to 43.9.

This community appears to be similar to the *Picea glauca/Linnaea borealis-Equisetum sylvaticum* community described by Foote (see footnote 1, p. 3).

Open Black Spruce Forests

***Picea mariana/Arctostaphylos rubra-Empetrum nigrum/Cladonia* spp. (BS10).**—Overstory cover for this community averages 59 percent and ranges from 8 to 134 percent. The major overstory species is black spruce with a rare paper birch, aspen, or white spruce. Tree production is almost exclusively black spruce. The tall shrub layer is poorly developed and may contain an occasional willow, alder, or birch. The low shrub layer is moderately developed, predominantly with rose. Rose has an average cover of 6 percent. The herbaceous layer is dominated by red-fruit bearberry and crowberry with an average cover of 16 percent each. The moss and lichen layer is dominated by *Cladonia* spp. and *Hylocomium splendens*, with average cover values of 18 and 22 percent.

This community is found throughout the inventory unit, on well-drained to poorly drained Histic Pergelic Cryaquepts on level uplands and rolling to hilly plains, and in swamps and marshes. Elevation averages 307 m and ranges from 204 to 594 m. The average rooting depth is 22 cm, and depth to permafrost averages 40 cm. The organic layer is 8 cm thick. The mineral soil is slightly acid with an average pH of 6.6. Average stand age is 100 years.

The average number of stems greater than 2.5 cm in d.b.h. is 3,900/ha. Diameter at breast height averages 5.6 cm, and Reineke's (1933) SDI is 353. Stand biomass and CAI average 2.6 kg/m² and 49 g/m² per year. The CAI per square centimeter of basal area averages 5.7 g/yr.

This community was not defined by Viereck and Dyrness (1980). It may represent three or four communities that could not be adequately separated with the current data. This community is similar to both the *Picea mariana/Vaccinium/feathermoss* community described by Drury (1956), Lutz (1956), and Viereck (1975) and the *Picea mariana/Rosa acicularis/Peltigera* community described by La Roi (1967) and Foote (see footnote 1, p. 3).

Picea mariana/Betula nana-Potentilla fruticosa/Carex spp. (BS11).—Overstory cover for this community averages 43 percent and ranges from 2 to 88 percent. The dominant overstory species is black spruce. White spruce is an occasional associate. The dominant tree reproduction is black spruce; some white spruce and paper birch are present. The tall shrub layer is relatively undeveloped with no consistent or dominant species. The low shrub layer is fairly well developed and contains a mixture of species including dwarf arctic birch, bog blueberry, and bush cinquefoil, with average cover values of 16, 10, and 11 percent. The herbaceous layer is dominated by *Carex* spp., red-fruit bearberry, *Equisetum* sp., and *Petasites* (Mill.) sp., with average cover values of 28, 13, 5, and 5 percent. The moss and lichen layer contains a wide variety of species. The two most common are *Aulacomnium* sp. and *Hylocomium splendens*, with average cover values of 17 and 20 percent.

The number of stems greater than 2.5 cm in d.b.h. averages 1,766/ha; diameter at breast height, 6.0 cm. Reineke's (1933) SDI is 179. Stand biomass and CAI average 1.4 kg/m² and 74 g/m² per year. The CAI per square centimeter of basal area is 10.1 g/yr.

This community occurs throughout the Porcupine Plateau section and at higher elevations in the Yukon Flats section. The average elevation is 433 m; the range, from 268 to 640 m. The community is predominantly found on poorly drained to somewhat poorly drained Histic Pergelic Cryaquepts. It has also been reported on very poorly drained and excessively drained sites. Depth to permafrost averages 30 cm, and the organic layer is 9 cm thick. The average mineral soil pH is 6.7, but neutral to alkaline soils can be found. The average age of the overstory is 109 years.

This community was not described by Viereck and Dyrness (1980).

Picea mariana/Betula nana/Carex spp. (BSY11).—The overstory cover for this community is 2 percent. The major tree reproduction is black spruce; white spruce is a common associate. The tall shrub layer can include several species, but none are dominant or consistent. The low shrub layer is dominated by dwarf arctic birch with an average cover value of 50 percent. The moss and lichen layer is dominated by *Aulacomnium* sp., *Peltigera aphthosa* (L.) Willd., and *Cladonia* spp. This community should develop into a BS11.

This community occurs throughout the Porcupine Plateau at an average elevation of 360 m, mainly on somewhat poorly drained Histic Pergelic Cryaquepts with an average depth to permafrost of 46 cm. Thickness of the humus layer averages 7 cm, and the mineral soil pH is 5.7. The average stand age is 26 years.

The number of stems larger than 2.5 cm in d.b.h. averages 145/ha. Average d.b.h. is 3.7 cm, and Reineke's (1933) SDI is 7. Stand biomass and CAI average 0.1 kg/m² and 1 g/m² per year. The CAI per square centimeter of basal area averages 7.0 g/yr.

***Picea mariana*/*Alnus crispa*/*Betula nana*/*Vaccinium* spp./*Cladonia* spp. (BS12).**—Overstory cover of this community averages **37** percent. Black spruce is the dominant overstory species, and paper birch and white spruce are occasional associates. The tall shrub layer is dominated by American green alder with an average cover of **39** percent. The low shrub layer is dominated by rose and dwarf arctic birch with average cover values of **17** and **12** percent. The herbaceous layer is dominated by mountain cranberry and *Equisetum* spp. with average covers of **23** and **12** percent. The moss and lichen layer is predominantly composed of *Cladonia* sp. with an average cover of **13** percent. *Peltigera* spp. and *Cetraria* spp. are common associates.

This community occurs at relatively high elevations on level to undulating uplands in the western portion of the Porcupine Plateau section. Elevation averages **331** m. The community occurs mainly on moderately well-drained to well-drained Histic Pergelic Cryaquepts. The average depth to permafrost is **56** cm. The organic matter is **8** cm deep, and the average mineral soil pH is **6.3**. Average stand age is **68** years.

The number of stems with an average d.b.h. of **6.2** cm averages 1,807/ha. Reineke's (1933) SDI is **193**. Stand biomass and CAI average **1.4** kg/m² and **26** g/m² per year. The CAI per square centimeter of basal area averages **5.9** g/yr.

This community was not described by Viereck and Dyrness (1980).

***Picea mariana*/*vaccinium uliginosum*/*Empetrum nigrum*/Lichen (BS13).**—Overstory cover averages **27** percent and ranges from **2** to **77** percent. The major overstory species is black spruce. Tree reproduction was found on all plots and consisted predominantly of black spruce with some white spruce. The tall shrub layer is moderately well developed and dominated by willow with alder as an associate. The low shrub layer is mainly composed of Labrador-tea and bog blueberry with cover values of **19** and **24** percent. The herbaceous layer is dominated by *Carex* spp., crowberry, mountain cranberry, and red-fruit bearberry with average covers of **24**, **20**, **18**, and **14** percent. The moss and lichen layer is dominated by species of both *Cladonia* and *Peltigera* with the moss *Hylocomium splendens*.

This community is found predominantly north of the Porcupine River in the Porcupine Plateau section. It occurs mainly on somewhat poorly drained to poorly drained Histic Pergelic Cryaquepts. Elevation averages **417** m. The average depth to permafrost is **27** cm, and the organic layer is **6** cm thick. The mineral soil is slightly acid, with an average pH of **6.7**. Average overstory age is **72** years.

The average number of stems greater than **2.5** cm in d.b.h. is 1,197/ha. Diameter at breast height averages 5.4 cm, and Reineke's (1933) SDI is **102**. Stand biomass and CAI average **0.9** kg/m² and **34** g/m² per year. The CAI per square centimeter of basal area averages **9.1** g/yr.

This community was not described by Viereck and Dyrness (1980). It may represent both an open phase and a woodland phase with the same species composition.

Picea mariana/Vaccinium uliginosum/Arctostaphylos rubra/Dicranum sp.

(BSY13).—Overstory cover for this community type is 8 percent, primarily black spruce. The major tree reproduction is black spruce; white spruce is a common associate. The tall shrub layer is poorly developed but may contain willow, alder, or birch. The low shrub layer is dominated by bog blueberry with an average cover value of 23 percent. The major species in the herbaceous layer are red-fruit bearberry or crowberry, with average cover values of 14 and 13 percent. The moss and lichen layer is dominated by *Dicranum* sp. and *Cladonia* spp., with average cover values of 19 and 6 percent. This community should develop into a BS13 type at maturity.

This community was found north of the Black River in the Porcupine Plateau section. It occurs at an average elevation of 372 m. The predominant soils are somewhat poorly drained Histic Pergelic Cryaquepts. The average thickness of the humus layer is 8 cm, and the mineral soil is slightly acid with an average pH of 6.7. The average stand age is 23 years.

The average number of stems greater than 2.5 cm ind.b.h. is 494/ha. The d.b.h. averages 2.8 cm. Stand biomass and CAI average 0.2 kg/m² and 6 g/m² per year. The CAI per square centimeter of basal area averages 4.3 g/yr.

Picea mariana/Salix/Potentilla fruticosa/Arctostaphylos rubra/Peltigera spp.

(BSY14).—Overstory cover for this association is 3 percent. The major tree reproduction is black spruce. Paper birch is a common associate. The tall shrub layer is dominated by several species of willow. The low shrub layer is dominated by bush cinquefoil and rose, with average cover values of 20 and 19 percent. The dominant species in the herbaceous layer are red-fruit bearberry and fireweed, with average cover values of 18 percent each. The moss and lichen layer is dominated by species of *Peltigera*.

This community was reported south of the Porcupine River in the Porcupine Plateau section of the unit. Elevation averages 308 m. The community is found on moderately well-drained Histic Pergelic Cryaquepts. The average depth to permafrost is 63 cm. The organic layer averages 10 cm in thickness; the mineral soil is basic, with an average pH of 7.3. Average stand age is 22 years.

The average number of stems greater than 2.5 cm ind.b.h. is 272/ha, and the average d.b.h. is 3.7 cm. Reineke's (1933) SDI is 20. Stand biomass and CAI average 0.1 kg/m² and 5 g/m² per year. The CAI per square centimeter of basal area is 7.2 g/yr.

**Open White Spruce-
Black Spruce Forests**

***Picea glauca*-*Picea mariana*/*Vaccinium uliginosum*/*Arctostaphylos rubra*/*Dicranum* sp. (WSBS10).**—Overstory cover averages 31 percent and is dominated by white spruce and black spruce. Tree reproduction is predominantly white spruce with some black spruce and paper birch. The tall shrub layer is poorly developed and might contain willow, birch, or alder. The low shrub layer is dominated by bog blueberry and bush cinquefoil with average cover of 28 and 11 percent. The herbaceous layer is dominated by red-fruit bearberry, mountain cranberry, and crowberry with cover values of 17, 18, and 18 percent. The moss and lichen layer is dominated by *Hylocomium splendens* and *Dicranum* sp. with cover values of 21 and 23 percent.

This community is found in the Porcupine Plateau section on rolling and hilly uplands at an average elevation of 500 m. It occurs mainly on somewhat poorly drained to somewhat excessively drained Hist Histic Pergelic Cryaquepts. Depth to permafrost averages 42 cm. The organic layer is 8 cm thick. The mineral soil is neutral with an average pH of 7.0. Average stand age is 147 years.

The average number of stems greater than 2.5 cm in d.b.h. is 1,688/ha. Diameter at breast height averages 5.6 cm. Reineke's (1933) SDI is 153. Stand biomass and CAI average 1.2 kg/m² and 58 g/m² per year. The CAI per square centimeter of basal area averages 12.3g/yr.

This community was not described by Viereck and Dyrness (1980).

***Picea mariana*-*Picea glauca*/*Betula nana*/*Arctostaphylos rubra*-*Vaccinium uliginosum* (WSBSY10).**—The current overstory cover for this community is 2 percent. The major tree reproduction is black spruce; white spruce is a common associate. The tall shrub layer is only moderately developed and shows no dominant species. The low shrub layer is dominated by dwarf arctic birch with an average cover value of 24 percent. Bush cinquefoil is a common associate. The herbaceous layer is dominated by red-fruit bearberry and bog blueberry with average cover values of 15 and 32 percent. The dominant species in the moss and lichen layer are grasses, sedges, and *Hylocomium splendens*. This community should eventually mature into a WSBS10 type.

This community was found south of the Porcupine River in both sections of the unit. The average stand elevation is 275 m. The community occurs mainly on Hist Histic Pergelic Cryaquepts with an average depth to permafrost of 77 cm. The humus layer averages 9 cm in thickness. The mineral soil is acid, with a pH of 6.2. The average stand age is 15 years.

***Picea mariana*-*Picea glauca*/*Ledum palustre*/*Petasites* spp./*Dicranum* sp.**

(WSBSI1).—Overstory cover of this community averages 35 percent. The overstory is composed entirely of black spruce and white spruce. Tree reproduction is composed of black and white spruce with an occasional birch. The tall shrub layer contains grayleaf willow, littletree willow, and American green alder. The low shrub layer is dominated by Labrador-tea with a cover of 21 percent. Commonly associated species are resin birch (*Betula glandulosa* Michx.) and rose. The herbaceous layer is dominated by mountain cranberry, sweet coltsfoot (*Petasites frigidus* (L.) Franch.), and red-fruit bearberry with average cover values of 15, 4, and 26 percent. Common associates are crowberry and winter-green. The moss and lichen layer is composed of a mixture of species; the dominant ones are *Dicranum* sp. (22 percent cover) and *Hylocomium splendens* (23 percent cover).

This community is found predominantly in the Porcupine Plateau. The average elevation is 361 m. It is found on somewhat poorly drained to very poorly drained Pergelic Cryaquepts and Pergelic Cryochrepts with an average slope of 9 percent. Depth to permafrost averages 58 cm, and the organic layer is 16 cm deep. The mineral soil pH is 6.3. Average stand age is 63 years.

The average number of stems greater than 2.5 cm in d.b.h. is 2,464/ha. The average d.b.h. is 5.1 cm, and Reineke's (1933) SDI is 192. Stand biomass and CAI average 1.2 kg/m² and 30 g/m² per year. The CAI per square centimeter of basal area is 7.0 g/yr.

This community was briefly described by Viereck (1979) as the black spruce-white spruce/resin birch/feathermoss community. It may also represent a northern or higher elevation phase of the WSBS10 community.

***Picea mariana*-*Picea glauca*/*Shepherdia canadensis*/*Epilobium* spp./*Peltigera* spp.**
(WSBSY12).—

The current overstory cover for this community type is 3 percent. The tree reproduction is composed of white and black spruce and trembling aspen. Balsam poplar and white birch are common associates. The tall shrub layer is composed of several species of willow; the most common is Scouler willow. The low shrub layer is dominated by buffaloberry and rose with average cover values of 18 and 6 percent. The herbaceous layer is dominated by *Epilobium* spp. with an average cover value of 7 percent. The moss and lichen layer is dominated by *Peltigera* spp. and litter with average cover values of 19 and 70 percent.

This community occurs in the south-central portion of the unit on rolling and hilly uplands predominantly in the Porcupine Plateau at an average elevation of 217 m. It occurs mainly on well-drained Histic Pergelic Cryaquepts with a depth to permafrost of 106 cm. Average rooting depth is 32 cm. The humus layer is 3 cm thick, and the average mineral soil pH is 7.0. The average stand age is 13 years.

The average number of stems greater than 2.5 cm in d.b.h. is 370/ha, and the average d.b.h. is 3.4 cm. Reineke's (1933) SDI is 15. Stand biomass and CAI average 0.2 kg/m² and 4 g/m² per year. The CAI per square centimeter of basal area averages 6.2 g/yr.

Open White Spruce Forests

***Picea glauca*/*Salix bebbiana*/*Rosa acicularis*/*Equisetum* sp.-*Epilobium* sp./Lichen (WS10).**—Total overstory cover averages 54 percent. The overstory is dominated by white spruce; aspen and birch are present only rarely. The majority of the tree reproduction is white spruce. The tall shrub layer is dominated by several species of willow. The most prominent is bebb willow with an average cover of 22 percent. The low shrub layer is dominated by rose with an average cover of 12 percent. The herbaceous layer is well developed with an average cover of 106 percent. Major species in the herbaceous layer are twinflower, *Equisetum* sp., and fireweed, with average covers of 11, 17, and 12 percent. Commonly associated species are mountain cranberry, red-fruit bearberry, and geocaulon. The moss and lichen layer is dominated by lichen. The two dominant genera are *Parmelia* and *Peltigera* with average covers of 4 and 10 percent. Other commonly associated species are *Cetraria* spp., *Cladonia* spp., and *Hylocomium splendens*.

This community is found predominantly north of the Black River in the Yukon Flats section, mainly on somewhat poorly drained to well-drained Histic Pergelic Cryaquepts and occasionally on Typic Cryochrepts and Typic Cryofluvents. Depth to permafrost averages 92 cm, and rooting depth is about 28 cm. Mineral soil pH is basic, averaging 7.8. Stand age averages 111 years and ranges from 45 to 250 years.

The number of stems greater than 2.5 cm in d.b.h. averages 1,960/ha and ranges from 537 to 4,668. Average d.b.h. is 10.9 cm, and the average value for Reineke's (1933) SDI is 517. Biomass and CAI average 4.5 kg/m² and 468 g/m² per year. The average CAI per square centimeter of basal area is 38.7 g/yr.

This community has not been described in current classifications of Alaska vegetation. The community does have a closed forest associate (WS1). The primary differences between the WS10 and the WS1 communities are: (1) WS1 has a closed canopy, and (2) the average cover of rose is much higher in WS10 because of the open canopy. There are also differences in the herbaceous layer that are undoubtedly a result of the difference in canopy closure.

***Picea glauca*/*Salix*/*Shepherdia canadensis*/*Vaccinium vitis-idaea* (WS11).**—Overstory cover for this community averages 51 percent; it is predominantly composed of white spruce with aspen and black spruce as rare components. The tall shrub layer is composed of various species of willow. The low shrub layer is predominantly buffaloberry and rose, each with an average cover value of 19 percent. The herbaceous layer is dominated by mountain cranberry and red-fruit bearberry with average cover values of 25 and 22 percent. Common associates include *Equisetum*, wintergreen, and twinflower. The moss and lichen layer is dominated by *Peltigera* spp. and *Cetraria* spp., with average cover values of 20 and 8 percent. Common associates include *Hylocomium splendens* and *Cladonia* spp.

This community occurs throughout the Yukon Flats section and on stream terraces in the Porcupine Plateau at an average elevation of 220 m. It occurs mainly on moderately well-drained Typic Cryochrepts and Histic Pergelic Cryaquepts with an average depth to permafrost of 73 cm. The average rooting depth is 29 cm. The humus layer averages 7 cm in thickness, and the mineral soil is somewhat acid, with an average pH of 6.5. The average stand age is 74 years.

The average number of trees greater than 2.5 cm in d.b.h. is 3,442/ha, with an average d.b.h. of 7.0 cm. Reineke's (1933) SDI is 446. Stand biomass averages 3.8 kg/m², and CAI averages 257 g/m² per year. The average CAI per square centimeter of basal area is 20.3 g/yr.

This community was not described by Viereck and Dyrness (1980).

***Picea glauca*/*Salix*/*Ledum palustre*/*Vaccinium vitis-idaea* (WSY11).**—This community has an overstory cover of 11 percent, comprised primarily of white spruce. The major tree reproduction is white spruce with birch and aspen as associates. This community is expected to mature into a WS11 type. The major tall shrubs are bebb willow, little tree willow, and American green alder. The primary low shrub is Labrador-tea with an average cover of 10 percent. The primary species in the herbaceous layer are mountain cranberry and bluejoint (*Calamagrostis canadensis* (Michx.) Beauv.) with average cover values of 18 and 29 percent.

This type occurs throughout the unit at an average elevation of 268 m, on very poorly drained to well-drained Histic Pergelic Cryaquepts with an average depth to permafrost of 79 cm. The humus layer averages 5 cm in thickness, and the average mineral soil pH is 6.1. Stand age averages 15 years.

The average number of stems with an average d.b.h. of 2.5 cm is 241/ha. Reineke's (1933) SDI is 6. Overstory biomass averages 0.1 kg/m², and the CAI averages 4 g/m² per year. The CAI per square centimeter of basal area averages 11.6 g/yr.

Woodland Black Spruce Forests

***Picea mariana*/*Betula nana*/*Eriophorum* spp./*Sphagnum* spp. (BS20).**—The total overstory cover for this community is 9 percent. It is dominated by black spruce. Tree reproduction is a mixture of black spruce and scattered paper birch. The tall shrub layer, if present, is composed of alder or willow. The low shrub layer is composed of dwarf arctic birch and Labrador-tea with average cover values of 40 and 13 percent. The herbaceous layer is composed mostly of mountain cranberry, *Carex* spp., and *Eriophorum* spp. with average cover values of 11, 4, and 4 percent. The moss and lichen layer is dominated by *Sphagnum* spp. with an average cover of 44 percent.

This community can occur in either the Yukon Flats or the Porcupine Plateau section of the unit. It occurs in swamps and marshes and represents a classic tussock community. Depth to permafrost averages 46 cm and the organic depth 33 cm. Average stand age is 50 years. The community occurs on Histic Pergelic Cryaquepts.

The average number of stems greater than 2.5 cm is 445/ha, and average d.b.h. is 4.2 cm. Reineke's (1933) SDI is 25. Stand biomass and CAI average 0.2 kg/m² and 3 g/m² per year. The CAI per square centimeter of basal area averages 5.0 g/yr.

This community is similar to the *Picea mariana*/*Eriophorum* sp. woodland of Dyrness and Grigal (1979), but the community described here contains a much larger cover of arctic dwarf birch and probably represents a northern phase of the described community.

***Picea mariana*/Salix/Hylocomium splendens-Cladonia rangiferina (BS21).**—The total overstory cover for the community is 16 percent and is composed of black spruce with some paper birch or white spruce. Tree reproduction is predominantly black spruce, but white spruce can be found. The tall shrub layer is dominated by willow species with alder as a common associate. The low shrub layer does not appear to be well developed but could contain Labrador-tea dwarf arctic birch, or rose. The herbaceous layer is dominated by crowberry and bearberry, both with average cover values of 24 percent. The major species in the moss and lichen layer are *Hylocomium splendens* and *Cladonia rangiferina* with average cover values of 46 and 33 percent.

This community type occurs throughout the Porcupine Plateau section, predominantly on rolling and hilly plains. The average elevation is 445 m. The community occurs on somewhat poorly drained Histic Pergelic Cryaquepts with an average depth to permafrost of 20 cm. The humus layer is 5 cm thick, and mineral soil pH averages 6.4. Average stand age is 86 years.

The average number of stems greater than 2.5 cm is 2,135/ha. Average d.b.h. is 6.4, and Reineke's (1933) SDI is 240. Stand biomass and CAI average 1.8 kg/m² and 34 g/m² per year. The CAI per square centimeter of basal area averages 5.8 g/yr.

This community was described as the *Picea mariana*/Sphagnum-Cladonia community of Viereck (1975, 1979).

Closed Aspen Forests

***Populus tremuloides*/Salix spp./Drepanocladus sp. (A1).**—Total overstory cover averages 97 percent for this community type. White spruce appears as reproduction in all plots. The tall shrub layer is dominated by several species of willow. The low shrub layer is predominantly rose and buffaloberry with average cover values of 14 and 21 percent. The herbaceous layer shows no distinct dominant species. The most common species in the moss layer is *Drepanocladus* sp.

These hardwood forests are found throughout the inventory unit, mainly on well-drained Histic Pergelic Cryaquepts. Permafrost is relatively deep, averaging 109 cm. Average rooting depth is 58 cm. Humus thickness averages 4 cm. Mineral soil pH is slightly acid, averaging 6.9 and ranging from 6.1 to 8.0. The average age of these stands is 62 years, definitely considered mature for hardwood stands in the inventory unit (Yarie 1981).

The number of trees greater than 2.5 cm in d.b.h. averages 4,137/ha and ranges from 1,741 to 8,818. Reineke's (1933) SDI averages 549. The total overstory biomass averages 4.2 kg/m² and ranges from 0.6 to 8.1 kg/m². The CAI averages 133 g/m² per year; again, there was a wide range in values, from 17 to 269 g/m² per year. The CAI per square centimeter of basal area averages 10.2 g/yr.

This community appears to be similar to the *Populus tremuloides*/Salix spp./Arctostaphylos uva-ursi community described by Viereck (1975).

Closed Balsam Poplar Forests

***Populus balsamifera*/Alnus-Salix/Rosa acicularis/Equisetum (BP1).**—Total overstory cover for this community averages 102 percent and is totally dominated by balsam poplar. The majority of the tree regeneration is balsam poplar. White spruce is a rare component of this community. The tall shrub layer is dominated by thin leaf alder and felt leaf willow. The low shrub layer always contains rose, with an average cover value of 21 percent. Commonly associated species include red-osier dogwood (*Cornus stolonifera* Michx.) and highbush cranberry (*Viburnum edule* (Michx.) Rat.). The herbaceous layer is dominated by *Equisetum* sp. with an average cover of 28 percent. The moss and lichen layer is poorly developed because of large quantities of litter fall from the overstory.

This community is restricted to the flood plain and stream terraces of the major rivers within the Yukon Flats section of the unit. This community probably occurs in the entire unit, but outside the Yukon Flats it is limited because of a lack of suitable flood plain habitat. The stands are always found on moderately well-drained to well-drained Typic Cryofluvents. When present, permafrost is deep, averaging over 150 cm. Thickness of the humus layer averages 5 cm, and the mineral soil is alkaline with a pH of 8.0. The average age of these stands is 65 years.

Stand density averages 1,479 stems/ha and ranges from 821 to 2,214. Reineke's (1933) SDI averages 603 and ranges from 355 to 697. Overstory biomass averages 8.1 kg/m² and ranges from 5.3 to 11.3 kg/m². CAI averages 290 g/m² and ranges from 188 to 398 g/m². The CAI per square centimeter of basal area averages 13.7 g/m² per year.

This community appears to be similar to the tree-line community (*Populus balsamifera*/Salix-Alnus/herb) described by Viereck (1979). The dominant herb, bluejoint, has been replaced by *Equisetum*. Bluejoint will occur in about half the stands representing this community.

***Populus balsamifera*/Rosa acicularis/Equisetum sp.-Pyrola spp. (BPY1).**—This community will represent a closed community at maturity. The overstory cover averages 19 percent and is dominated by balsam poplar. Tree reproduction includes white spruce and black spruce, balsam poplar, and aspen. *Pyrola* and *Equisetum*, both typical of the mature balsam poplar stands, are present in the herbaceous layer. No consistently dominant species were found in the moss and lichen layer, indicating that this single young community may become two or three different mature communities.

This young community can be found throughout the inventory unit. The average depth to permafrost is 78 cm, and the average mineral soil pH is 7.1. Both reflect the relatively young average age of 22 years.

The average number of trees greater than 2.5 cm in d.b.h. is 510/ha; 8,472 seedlings per hectare are also present. Biomass and CAI average 0.5 kg/ha and 18 g/m² per year. The CAI per square centimeter of basal area averages 15 g/yr.

Closed Aspen-Balsam
Poplar Forests

***Populus balsamifera*/*Arctostaphylos uva-ursi*/*Peltigera* spp. (BP2).**—The overstory cover of this community averages 71 percent; balsam poplar is the primary species. The tall shrub layer is dominated by willow. The low shrub layer includes rose, buffaloberry, and various willow species. The herbaceous layer is dominated by bearberry and fireweed, with average cover values of 15 and 2 percent. The moss and lichen layer is poorly developed, with an average cover of only 3.5 percent.

This community occurs in the Yukon Flats section. It appears to be an upland balsam poplar type that occurs at an average elevation of 178 m. It is found mainly on moderately well-drained Typic Cryochrepts, with an average depth to permafrost of 130 cm. Rooting depth averages 28 cm. The average stand age is 50 years.

The number of stems greater than 2.5 cm averages 4,219/ha. Average d.b.h. is 5.4 cm. Reineke's (1933) SDI averages 361. Overstory biomass averages 3.1 kg/ha, and CAI averages 113 g/m² per year. The CAI per square centimeter of basal area is 10.3 g/yr.

This community was not described by Viereck and Dyrness (1980).

***Populus tremuloides*-*Populus balsamifera*/*Rosa acicularis* (ABP1).**—Total overstory cover for this community averages 91 percent. The overstory is dominated by aspen and balsam poplar. Aspen is regenerating in 100 percent of the stands, and balsam poplar in 67 percent. The tall shrub layer is dominated by willow, with an average cover of 42 percent. The most frequent low shrub is rose, with an average cover of 10 percent. A very common associate and often dominant when it does occur is buffaloberry. It has an average cover of 33 percent. The herbaceous layer has no consistently dominant species. The most frequently occurring species in 67 percent of the stands is bluebells. The moss and lichen layer is typical of hardwood communities and contains no consistently dominant species.

The average number of stems is 6,175/ha, with an average d.b.h. of 4.6 cm. Reineke's (1933) SDI is 408. Biomass averages 2.6 kg/m² and ranges from 0.9 to 4.3 kg/m²; CAI averages 86 g/m² per year. The CAI per square centimeter of basal area averages 10.9 g/yr and ranges from 7.5 to 16.2.

This community is found in the Yukon Flats section on several soil associations but predominantly on Typic Cryofluvents. Depth to permafrost ranges from 56 to 106 cm and averages 74 cm. The average thickness of the humus layer is 7 cm, and the mineral soil is acid with an average pH of 6.0. Average stand age is 45 years.

This community was not described by Viereck and Dyrness (1980).

Closed Aspen-Birch Forests

***Populus tremuloides*-*Populus balsamifera*/*Rosa acicularis* (ABPY1).**—This community has an average overstory cover of less than 1 percent because of the young age of the stands. The species of tree reproduction would put this community into Viereck and Dyrness's (1980) aspen-balsam poplar group (level 4). The tall shrub layer is made up of several species of willow, and the low shrub layer is dominated by rose (10 percent average cover). Buffaloberry is a very common associate. The predominant herbaceous species is fireweed, with average cover of 20 percent. The moss and lichen layer is dominated by Graminae.

This group was found exclusively within the Yukon Flats section of the unit, in the vicinity of Fort Yukon and slightly to the east of the village. Elevation averages 139 m. The community mainly occurs on very poorly drained to moderately well-drained Typic Cryofluvents and Typic Cryochrepts, with an average depth to permafrost of 105 cm. Thickness of the humus layer averages 3 cm, and the mineral soil is neutral—average pH, 7.1 (range 6.5 to 8.0). Average stand age is 9 years.

Because of the young average stand age, only one stand had overstory large enough to appear as biomass. Seedlings averaged 9,135/ha.

This community will mature into the ABP1 community with the possible exception of stands 47 and 634. These later stands may become A I communities.

***Populus tremuloides*-*Betula papyrifera*/*Rosa acicularis*/*Arctostaphylos uva-ursi*/lichen (ABY1).**—Overstory cover is 20 percent and is predominantly composed of aspen and white birch. Tree reproduction is predominantly black spruce, aspen, and white birch. The major species in the tall shrub layer are American green alder and several species of willow. The low shrub layer is dominated by rose and buffaloberry, with average cover values of 12 and 10 percent. The herbaceous layer is dominated by bearberry and *Equisetum* spp., with average cover values of 15 and 4 percent. Commonly associated species are fireweed, twinflower, and red-fruit bearberry. The moss and lichen layer is dominated by species of *Cladonia*, *Peltigera*, and *Cetraria*, with average cover values of 8, 10, and 2 percent.

This community is located in the south-central portion of the unit at an average elevation of 256 m. It occurs predominantly on well-drained Typic Cryochrepts or Typic Cryorthents with an average depth to permafrost of 100 cm. The average rooting depth is 31 cm. Thickness of the humus layer is 6 cm, and the mineral soil is acid with an average pH of 6.0. The average stand age is 23 years.

The average number of stems greater than 2.5 cm in d.b.h. is 1,334/ha, and average d.b.h. is 3.3 cm. Reineke's (1933) SDI is 28. Stand biomass and CAI average 0.6 kg/m² and 23 g/m² per year. The average CAI per square centimeter of basal area is 11.2 g/m² per year.

This community appears to be similar to the ABSY1 community.

Open Aspen Forests

***Populus tremuloides*/Salix spp./Arctostaphylos uva-ursi/Graminae (A10).**—Total overstory cover averages 53 percent and ranges from 21 to 64 percent. The predominant overstory species is aspen, although white spruce can occur. White spruce is rare in the tree seedling layer. The tall shrub layer is dominated by willow, with an average cover of 25 percent. The low shrub layer is dominated by rose and buffaloberry, with average cover values of 5 and 10 percent. The herbaceous layer is dominated by bearberry, with average cover of 48 percent. Common associates include bedstraw (*Galium boreale* L.) and bluebells. The moss and lichen layer is dominated by various grasses, but they average only 4 percent cover.

These hardwood forests are found throughout the Yukon Flats section of the unit at an average elevation of 187 m. The stands are found predominantly on Typic Cryofluvents which are well drained. Rooting depth averages 23 cm, and the average depth to permafrost is 74 cm. The average thickness of the organic layer is 3.0 cm, and the mineral soil is acid with an average pH of 6.1. Average stand age is 45 years.

Stem density is slightly higher on the average than in community A1—4,475 stems/ha. But the average diameter is slightly less, 4.9 cm. Reineke's (1933) SDI is 327. Overstory biomass averages 2 kg/m²; and CAI, 67 g/m² per year. The CAI per square centimeter of basal area averages 10.1 g/yr and ranges from 7.1 to 18.1.

This community appears to be similar to the *Populus tremuloides*/Salix spp./Arctostaphylos uva-ursi community described by Viereck (1975).

***Populus tremuloides*/Salix spp./Arctostaphylos uva-ursi—Epilobium spp. (AY10).**—The overstory cover of this community is 44 percent, composed predominantly of aspen. Tree reproduction is mainly aspen, but white spruce is a common associate. For this reason it is difficult to determine into which mature community type these stands will proceed. They could develop into any one of three: A1, A10, or AWS2. The tall shrub layer is composed of several willow species. Buffaloberry and rose are the primary components of the low shrub layer, with average cover values of 22 and 8 percent. The herbaceous layer is dominated by bearberry and fireweed, with average cover values of 18 and 4 percent. Common associates include bluebells and bedstraw. The most prominent group in the moss and lichen layer is Graminae.

This community occurs predominantly in the Yukon Flats section, at an average elevation of 138 m. It is also widely scattered throughout the Porcupine Plateau at an average elevation of 526 m. It occurs mainly on moderately well-drained to well-drained Typic Cryochrepts and Typic Cryofluvents, with an average depth to permafrost of 92 cm. The average rooting depth is 27 cm, and the humus depth averages 4 cm. The mineral soil pH is 7.0. The average stand age is 29 years.

There are about 3,182 overstory trees per hectare with an average d.b.h. of 4.8 cm. Reineke's (1933) SDI averages 225. Overstory biomass and CAI average 1.5 kg/m² and 51 g/m² per year. The CAI per square centimeter of basal area averages 90 g/yr. The average number of seedlings is 8,336/ha.

Closed Aspen-White Spruce Forests

***Populus tremuloides*-*Picea glauca*/*Salix*/*Epilobium* (AWS1).**—Overstory cover for this community averages 97 percent and is dominated by aspen and white spruce. Tree reproduction is also dominated by both species. The tall shrub layer is made up of several willow species. The low shrub layer is predominantly rose and buffaloberry, with average cover values of 6 and 29 percent. The two main distinguishing species for this community, fireweed and *Pyrola* sp., occur in the herbaceous layer, each with 4 percent cover. The understory is dominated by lichens. The major genera are *Peltigera*, *Cladonia*, and *Cetraria*.

This community occurs predominantly in the Yukon Flats section, but it was also reported in the western section of the Porcupine Plateau south of the Porcupine River. This community occurs on moderately well-drained Histic Pergelic Cryaquepts and Typic Cryochrepts, with an average depth to permafrost of 87 cm. The average rooting depth is 32 cm. The humus layer is 6 cm thick, and the mineral soil is somewhat acid with an average pH of 6.3. The average stand age is 62 years.

The number of stems greater than 2.5 cm in d.b.h. averages 4,206/ha and ranges from 1,401 to 7,039. Reineke's (1933) SDI averages 731 for this community type. Average community biomass is 6.0 kg/ha. Average CAI is 258 g/m² per year. The CAI per square centimeter of basal area averages 14.2 g/yr.

This community appears to be similar to the *Populus tremuloides*-*Picea glauca*/*Arctostaphylos uva-ursi* community described by Lutz (1956), Buckley and Libby (1959), and Viereck (1975). It could be considered a northern phase in which the importance of bearberry will increase with community age.

***Populus tremuloides*-*Picea glauca*/*Salix*/*Epilobium* (AWSY1).**—The present overstory cover for this community is 74 percent, predominantly aspen and white spruce. The tree regeneration also appears to be about equally composed of aspen and white spruce. The tall shrub layer is exclusively willow. The low shrub layer is composed about equally of buffaloberry and rose. The major herbaceous species are fireweed and bluebells. Unlike the mature community type, wintergreen is present in only about 25 percent of the stands. This community type will undoubtedly develop into the AWS1 community type.

This community occurs exclusively in the Yukon Flats at an average elevation of 150 m. It predominantly occurs on moderately well-drained to well-drained Typic Cryochrepts and Typic Cryofluvents with an average depth to permafrost of 98 cm. Rooting depth averages 31 cm, and the humus layer averages 4 cm in thickness. The mineral soil is basic, with an average pH of 7.1. The average stand age is 28 years.

The average number of stems is 4,282/ha, and average d.b.h. is 4.3 cm. Reineke's (1933) SDI is 254. Overstory biomass averages 2.5 kg/m² and CAI 99 g/m² per year. The CAI per square centimeter of basal area averages 9.3 g/yr.

***Populus tremuloides*-*Picea glauca*/*Salix*/*Arctostaphylos uva-ursi* (AWS2).**—Overstory cover averages 77 percent and is composed predominantly of aspen and white spruce. White spruce is the main regenerating overstory species, but aspen is a common associate. The tall shrub layer is dominated by willow. The low shrub layer is composed mainly of rose and buffaloberry, with average cover values of 5 and 12 percent. The main herbaceous species are bearberry, fireweed, and bluebells, with average cover values of 5, 2, and 2 percent. The moss and lichen layer is composed mainly of lichen; *Peltigera* and *Cladonia* are the predominant genera.

This community type is located almost exclusively in the Yukon Flats section of the unit at an average elevation of 181 m. It occurs predominantly on moderately well-drained to well-drained Typic Cryofluvents and Histic Pergelic Cryaquepts with an average depth to permafrost of 89 cm. Average rooting depth is 29 cm. Thickness of the humus layer averages 5 cm, and the mineral soil is slightly acid, with an average pH of 6.8. Average stand age is 56 years.

The number of overstory stems averages 4,086/ha; d.b.h. averages 7.1 cm. Biomass averages 4.4 kg/m² and ranges from 0.6 to 6.4 kg/m². Average CAI is 258 g/m² per year. The CAI per square centimeter of basal area averages 18.3 g/m² per year. This community is slightly more productive than the AWSI community.

This community appears to be similar to the *Populus tremuloides*-*Picea glauca*/*Arctostaphylos uva-ursi* community described by Lutz (1956), Buckley and Libby (1959) and Viereck (1975). This community and community AWSI should possibly be considered as one group in a very dynamic succession proceeding to a number of white spruce community types.

***Populus tremuloides*-*Picea glauca*/*Salix*/*Arctostaphylos uva-ursi* (AWSY2).**—This community has an overstory cover of 37 percent, composed mainly of aspen and white spruce. The remainder of the vegetation structure is similar to AWS2. At present, fireweed and bluebells are slightly more common than bearberry, but this is a result of the young average stand age.

This community occurs exclusively in the Yukon Flats at an average elevation of 160 m. It is found predominantly on moderately well-drained to well-drained Typic Cryochrepts and Typic Cryofluvents with an average depth to permafrost of 114 cm. The humus layer is about 3 cm thick; the mineral soil is basic, with an average pH of 7.1. The average stand age is 18 years.

The average number of stems per hectare is 2,582, and average d.b.h. is 4.4 cm. The average number of seedlings is 8,935/ha. Total overstory biomass averages 1.3 kg/m²; CAI, 39 g/m² per year. The CAI per square centimeter of basal area averages 6.2 g/yr.

This community type is considered to be a temporary stage that will progress to AWS2.

Closed Aspen-Black
Spruce Forests

Populus tremuloides-*Picea mariana*/*Salix/Rosa acicularis/Equisetum* sp. **(ABSY1).**—The overstory cover of this community averages 71 percent. The overstory is mainly composed of aspen, black spruce, and birch. The tall shrub layer is dominated by grayleaf willow and American green alder. The low shrub layer is mainly composed of rose, with an average cover of 6 percent. The dominant herbaceous species are *Epilobium* spp. and *Equisetum*, with average cover values of 2 and 3 percent. Common associates include twinflower, red-fruit bearberry, mountain cranberry, and bog blueberry. The major genus found in the moss and lichen layer is *Peltigera*.

This community occurs mainly in the Porcupine Plateau section of the unit, on rolling and hilly uplands at an average elevation of 347 m. It is found mainly on well-drained to somewhat excessively drained Histic Pergelic Cryaquepts with an average depth to permafrost of 90 cm. The average rooting depth is 37 cm, and the humus thickness averages 4 cm. Average stand age is 23 years.

The number of stems greater than 2.5 cm in d.b.h. averages 5,864/ha; average d.b.h. is 5.3 cm. Overstory biomass and CAI average 2.7 kg/m² and 92 g/m² per year. The CAI per square centimeter of basal area averages 9.7 g/yr.

To project how these stands will develop is difficult, but at present it appears that they will eventually become BS2 community types.

Populus tremuloides-*Picea mariana*/*Salix/Lupinus* spp. **(ABSY2).**—The overstory cover for this community type is 3 percent, composed mainly of aspen. The major species of tree reproduction are black spruce, white spruce, and aspen. The tall shrub layer is dominated by willow. The low shrub layer is dominated by bush cinquefoil and rose, with average cover values of 10 and 6 percent. The major species in the herbaceous layer is lupin with an average cover value of 19 percent. Commonly associated species are red-fruit bearberry, fireweed, and wintergreen. The major genus in the moss and lichen layer is *Peltigera*.

This community was scattered through the unit, predominantly on level and undulating uplands at an average elevation of 222 m. It was found on moderately well-drained Histic Pergelic Cryaquepts with an average slope of 8 percent. Depth to permafrost averages 83 cm, and the humus layer is 5 cm thick. The mineral soil is acid with a pH of 6.3, and the average stand age is 22 years.

The number of stems greater than 2.5 cm in d.b.h. averages 445/ha. Average d.b.h. is 3.0 cm. Reineke's (1933) SDI is 15. Stand biomass and CAI average 0.1 kg/m² and 3 g/m² per year. The CAI per square centimeter of basal area averages 6.6 g/yr.

This community should develop into a white spruce-black spruce forest type if the spruce can withstand the heavy competition from the willow cover.

Closed White Spruce-Birch Forests

***Picea glauca*-*Betula papyifera*/*Alnus-Salix*/*Galium boreale* (WSB1).**—The overstory cover of this community averages 59 percent, with equal amounts of white spruce and white birch in the overstory. The tall shrub layer is dominated by American green alder and various species of willow. The low shrub layer contains rose in various quantities (that is, cover ranges from 1.5 to 41.5 percent). The herbaceous layer is dominated by a relatively sparse cover of bedstraw (1 percent) and *Equisetum* spp. (average 9 percent). Several other herbaceous species were reported. The moss and lichen layer consistently contains a small cover of *Drepanocladus* sp. and *Cladonia* spp.

This community is found in the Yukon Flats section of the unit. It generally occurs on moderately well-drained Typic or Pergelic Cryochrepts. Depth to permafrost is shallow, averaging 32 cm. The organic layer is about 5.5 cm thick. The average age of these stands is 55 years.

Density of stems over 2.5 cm in d.b.h. averages 648/ha and ranges from 463 to 832. Average overstory biomass is 3.6 kg/m². Overstory CAI ranges from 172 to 380 g/m² per year; average, 210 g/m² per year. Reineke's (1933) SDI is 276. Average CAI per square centimeter of basal area is 31.9 g/yr, reflecting the presence of white spruce.

This community was not described by Viereck and Dyrness (1980).

***Picea glauca*-*Betula papyifera*/*Salix*/*Epilobium* spp. (WSBY1).**—Overstory cover for this community is 18 percent. The major species of tree reproduction are paper birch and white spruce. The tall shrub layer is dominated by grayleaf willow, with an average cover value of 21 percent. Rose, with an average cover value of 6 percent, is the dominant species in the low shrub layer. The dominant species in the herbaceous layer are fireweed, bluebells, and *Equisetum*, with average cover values of 11, 5, and 18 percent.

This community occurs throughout the unit at an average elevation of 226 m, mainly on moderately well-drained Histic Pergelic Cryaquepts or Typic Cryochrepts with an average depth to permafrost of 94 cm. The humus layer averages 6 cm in depth, and the mineral soil is acid with an average pH of 6.3. The average stand age is 13 years.

The number of stems greater than 2.5 cm averages 567/ha, and d.b.h. averages 2.7 cm. Reineke's (1933) SDI is 16. Biomass averages 10 kg/m²; the CAI, 27 g/m² per year. The CAI per square centimeter of basal area averages 17 g/yr.

Closed Black Spruce- Birch Forests

Picea mariana*-*Betula papyrifera*/*Arctostaphylos uva-ursi*/Lichen (BSBY1).**—Overstory cover for this community averages **41** percent and is primarily composed of black spruce and white birch. The major tree reproduction is black spruce. The major species in the tall shrub layer are grayleaf willow and bebb willow. The low shrub layer is poorly developed and shows no consistent or dominant species. The herbaceous layer is dominated by bearberry and ***Epilobium spp., with average cover values of **6** and **3** percent. The moss and lichen layer is dominated by *Peltigera* spp. and *Cladonia* spp., with average cover values of **13** and 15 percent.

This community occurs throughout the southern portion of the unit in the Porcupine Plateau section. Average elevation is **397** m. The community occurs on somewhat poorly drained to somewhat excessively drained Histic Pergelic Cryaquepts. Average depth to permafrost is 58 cm. The average humus thickness is **3** cm, and the mineral soil is acid—average pH, **6.0**. Average stand age is 25 years.

The number of stems greater than 2.5 cm in d.b.h. averages 1,379/ha. Average d.b.h. is 5.2 cm, and Reineke's (1933) SDI is 11. Stand biomass and CAI average **0.7** kg/m² and 22 g/m² per year. The CAI per square centimeter of basal area averages **10.7** g/m² per year.

***Picea mariana*-*Betula papyrifera*/*Ledum palustre*/*Vaccinium vitis-idaea* (BSBY2).**—Overstory cover for this community type is 25 percent and is composed predominantly of black spruce and birch. Tree reproduction is dominated by black spruce with birch as a common associate. The major species in the tall shrub layer are American green alder and bebb willow. The low shrub layer is dominated by Labrador-tea and rose, with average cover values of 11 and 5 percent. The major species in the herbaceous layer is mountain cranberry, with an average cover value of **32** percent. The moss and lichen layer is dominated by *Cladonia* spp. and *Peltigera* spp., with average cover values of **15** and 8 percent.

This community predominantly occurs south of the Porcupine River in the Porcupine Plateau section of the unit on rolling and hilly uplands. Average elevation is 352 m. The community occurs on moderately well-drained Histic Pergelic Cryaquepts with an average depth to permafrost of 60 cm. The humus layer thickness averages **9** cm, and the mineral soil is slightly acid with an average pH of **6.6**. The average stand age is 28 years.

The average number of stems greater than 2.5 cm in d.b.h. is 1,187/ha. Average d.b.h. is **4.5** cm, and Reineke's (1933) SDI is **76**. Stand biomass and CAI average 0.5 kg/m² and 28 g/m² per year. The CAI per square centimeter of basal area averages **13.6** g/yr.

Open Aspen-Black Spruce Forests

***Populus tremuloides*-*Picea mariana*/*Vaccinium uliginosum*/*Polytrichum* sp. (ABSY10).**—Overstory cover for this community is 22 percent. It is thought that these stands will never represent a closed forest type. The main overstory species is aspen. Tree regeneration includes both aspen and black spruce. The dominant low shrub species are rose and bog blueberry, with average cover values of 13 and 11 percent. The herbaceous layer is composed of several species, the most prominent being bunchberry (*Cornus canadensis* L.), with an average cover value of 29 percent. Constant associates include mountain cranberry, crowberry, fireweed, and lousewort (*Pedicularis* L.). The prominent genus in the moss and lichen layer is *Polytrichum*.

This community occurs exclusively in the Porcupine Plateau at an average elevation of 719 m. The major soils are Pergelic Cryorthents and Histic Pergelic Cryaquepts. The average stand age is 25 years.

The number of stems averages 1,334/ha; d.b.h. averages 4.1 cm. Reineke's (1933) SDI averages 73. Biomass averages 0.4 kg/m²; CAI, 9.5 g/m² per year. The CAI per square centimeter of basal area is 6.2 g/yr.

These stands will probably develop into community BS12 or WSBS11.

Discussion— Vegetation Classification

About 85 percent of the study area is forested. A conservative estimate of the total number of forest communities in the area is 50, if 80 percent of the communities are assumed to have been described in this paper. The portions of the area that received little attention because of random sampling of the unit were the "salt flats" in the vicinity of the village of Chalkyitsik, the mountains along the Canadian border, and all tundra or other nonforest areas.

The sampling design used for the forest survey allows the estimate of a number of statistics not usually available in standard vegetation classification work. A relatively good estimate of area occupied by each community is given in table 9. The area occupied by each community is a relatively small portion of the unit. Communities *Picea mariana*/*Ledum palustre*/*Vaccinium vitis-idaea*/*Cladonia* spp. (BS1 and BSY1), and the closed white spruce communities WS5 and WSY5 occupy the largest portion of the unit (5.9 percent). The smallest portion is occupied by BP2 (0.3 percent). Black spruce communities occupy the largest percentage of the unit—23.4 percent. White spruce and mixed conifer communities follow (19.9 and 15.4 percent).

Because of the relative uniformity of the distribution of communities across the unit, in some cases it is difficult to make any broad generalizations about community environments. In general, hardwood or mixed hardwood-conifer sites tend to be warmer and better drained than conifer sites, with the exception of flood plain white spruce sites. Few of the communities are site specific. The communities WS4 and BP1 are limited to flood plains of the major rivers. Although WS2 is also a flood plain community, it appears to be restricted to smaller drainages. Balsam poplar community BP2 appears to be restricted to upland sites.

Table 9—Estimates of the area occupied by each community in the study area in the Porcupine River drainage

Code	Area	Percent of total area
	ha	
Mature communities:		
BS1	110 699	3.07
BS2	56 123	1.56
WSBS1	110 365	3.06
WSBS2	75 935	2.11
WSBS3	50 538	1.40
WSBS4	56 901	1.58
WS1	91 272	2.53
WS2	31 005	.86
WS3	39 853	1.11
WS4	12 644	.35
WS5	87 948	2.44
WS6	33 795	1.10
WS7	48 130	1.34
BS10	154 621	4.29
BS11	99 482	2.76
BS12	50 955	1.41
BS13	86 957	2.41
WSBS10	33 963	.94
WSBS11	84 067	2.33
WS10	60 776	1.69
WS11	69 356	1.92
BS20	19 357	.54
BS21	49 086	1.36
BP1	13 451	.37
BP2	10 478	.29
A1	22 529	.63
ABP1	13 696	.38
WSB1	8 321	.23
AW1	33 663	.93
AW2	60 097	.67
A10	20 834	.58
Total	1 689 200	46.87

Table 9—Estimates of the area occupied by each community in the study area in the Porcupine River drainage, continued

Code	Area	Percent of total area
	ha	
Young communities:		
BSY 1	119 661	3.32
WSBSY2	32 026	.89
WSBSY5	35 360	.98
WSY2	70 371	1.95
WSY5	123 181	3.42
BSY11	71 320	1.98
BSY13	66 189	1.84
BSY14	26 329	.73
WSBSY10	45 261	1.26
WSBSY12	32 019	.89
WSY11	43 734	1.21
BPY1	27 554	.76
AY10	102 316	2.84
ABPY1	45 310	1.26
AWSY1	42 137	1.17
AWSY2	64 951	1.80
ABSY10	14 339	.40
BSBY1	33 437	.93
BSBY2	54 945	1.52
ABY1	41 828	1.16
WSBY1	44 054	1.22
ABSY1	29 689	.82
ABSY2	45 332	1.26
Total	1 211 342	33.61
Unclassified conifer communities	128 499	3.57
Unclassified deciduous communities	25 622	.71
Total unclassified area	154 121	4.28
Grand total	3 054 663	84.76

The two closed black spruce communities can be separated by physiographic provenance, drainage, and soil order. The community BS1 is predominantly found in the Porcupine Plateau on poorly drained sites. Black spruce community BS2 is located in the Yukon Flats section but predominantly on moderately well-drained sites. One community that might be considered typical of poorly drained or somewhat poorly drained sites in Yukon Flats is BS10. Communities WS10 and WSBS2, also typical of the Yukon Flats section, may also be found on somewhat poorly drained sites. These latter two communities would probably be found on sites with better drainage than the BS10 sites. An extension of this drainage continuum would then lead to WS11 or WSBS3 sites; both communities are typical of the Yukon Flats section.

Two additional gradients are represented within the described communities. The first is a moisture gradient that goes from poorly drained to well-drained sites and corresponds to the community series WSBS4, WSBS1, WSBS2, and WSBS3. This series also follows an approximate gradient in elevation: WSBS4 and WSBS1 are at higher elevations than is WSBS3 (table 7). A moisture gradient is also apparent in the open black spruce communities in the Porcupine Plateau. The gradient goes from poorly drained sites occupied by BS13 communities to somewhat poorly drained and moderately well-drained sites occupied by BS11 and BS12 communities. Both open mixed-spruce communities are found at higher elevations in the Porcupine Plateau.

Delineation of typical sites for the closed white spruce communities was more difficult. A gradient, if one exists, appears to be related to height above or distance from major or minor streams and rivers. Community WS4 is a typical flood plain site type; WS2 is related but is found predominantly along smaller waterways. Communities WS1 and WS7 are both typical of stream terraces, which places them slightly higher above the river than flood plain sites. Communities WS3 and WS5 are removed from any river influence, and community WS6 is an upland community on rolling and hilly uplands.

Few of the communities showed distinct geographical limitations. Of the ones that did, WSBS1 was found only in the northwest quarter of the unit. Community WSBSY2 was clustered between Big Rat and Mink Lakes on the east and Chandalar Creek on the west (fig. 1). Mixed conifer community 4 (WSBS4) was found in a narrow band running from Coleen Mountain on the south past Rabbit Mountain to the northern border of the unit. Community WS5 was found exclusively in the southwest portion of the study area. Community BS13 was found along the northern boundary of the unit east of Vundik Lake (fig. 1).

It is impossible to describe typical sites for most of the hardwood communities because of their high dependence on disturbance. Most of these communities are probably transitional to some of the conifer communities if they can escape disturbance for a sufficient time.

One interesting feature of the vegetation in the study area is the prevalence of mixed white spruce-black spruce communities. In more southern portions of interior Alaska, these communities tend to occupy tree-line areas (Vioreck 1979) or ecotones between white spruce and black spruce sites. A total of seven associations are reported, occupying a range of environments. One explanation for the frequency of these types in the study unit is that the latitude of the unit is much closer to the northern limit of black spruce than of white spruce. In this area white spruce begins to occupy black spruce sites, although white spruce appears to perform as poorly as black spruce. In fact, its general appearance is similar to black spruce. White spruce undoubtedly has a competitive advantage over black spruce in northern areas. White spruce may also grow slightly faster on these sites, but no data were collected to verify this.

Tree Biomass and Productivity

A total of 54 trees were sampled (table 10) during two field seasons. Average tree data indicate that white spruce is the largest and most productive species in the unit (table 11). Although equivalent data for balsam poplar and aspen are lacking, balsam poplar may actually be more productive than white spruce (Van Cleve and others 1980), but white spruce will attain larger dimensions than balsam poplar.

The average size of sample trees was larger and the range of sizes wider than those collected by Johnson and Vogel (1966). Because of the differences in size, the proportions of foliage, branches, and stem are quite different. Johnson and Vogel (1966) report 27, 22, and 3 percent foliage for white spruce, black spruce, and birch; the proportion of foliage to total aboveground tree weight in this study was 9, 4, and 4 percent for the same species (table 11). The leaf:wood ratios were also much lower for the average tree sampled in this study compared with the Johnson and Vogel (1966) study. The data collected in this study suggest that leaf:wood ratios are very dependent on age, especially in vigorous trees. The average leaf:wood ratios reported in this study were 0.14, 0.05, and 0.05 for white spruce, black spruce, and birch (table 11). The value of 0.1 suggested by Johnson and Vogel (1966) may be too high a criterion to use as a survival limit for black spruce. A leaf:wood ratio closer to 0.01 may be more realistic; even at that value, black spruce may survive for several decades.

Because of the inventory methods, two sets of biomass and production equations (table 12) were necessary. Only diameter at breast height was available as an independent variable for trees from 2.54 to 12.69 cm in d.b.h. Both diameter and height were available for trees 12.70 cm in d.b.h. and greater. Only current annual production and total tree biomass were calculated. Both sets of equations are given for these components.

Estimated biomass and current annual production for the communities described are comparable to values reported for other interior Alaska forests (Barney and others 1978; Johnson and Vogel 1966; Troth and others 1976; Van Cleve and others 1980, 1981). A large range in values for biomass and production was found (tables 7 and 8), but this was expected because of the regional nature of the study.

The estimated aboveground tree biomass values ranged from 0.1 to 23.4 kg/m² for a woodland black spruce community (BS20) to a closed white spruce community (WS4). The reported mean annual increment (MAI) ranged from 4.0 to 195.0 g/m² per year for these same communities (table 13). The average aboveground tree MAI was almost 3.5 times higher in white spruce communities than black spruce communities; 24.3 g/m² per year compared with 86.7 g/m² per year. Hardwood and mixed communities had almost three times the MAI of black spruce communities (table 13). The hardwood communities will never attain the standing biomass values of the white spruce communities because they do not live as long, but their MAI is about 89 percent of the white spruce communities.

Table 10—Stand location and trees sampled for preparation of the biomass equations for Porcupine Plateau

Plot number	Site class	Latitude	Longitude	Elevation	Sample trees	
					Species	Number
				m		
10	--	66°37'	142°52'	183	White spruce	2
12	--	66°38'	142°50'	183	Birch	1
13	6	66°48'	144°55'	152	Balsam poplar	2
14	--	66°48'	144°56'	152	White spruce	1
15	6	66°29'	145°11'	130	White spruce	5
16	6	66°31'	145°11'	130	Balsam poplar	2
17	7	67°25'	141°37'	305	White spruce	6
19	--	67°25'	141°37'	335	White spruce	3
21	9	66°47'	141°15'	709	White spruce	2
21	9	66°47'	141°15'	709	Black spruce	1
23	9	66°46'	141°16'	686	White spruce	6
24	6	66°14'	142°08'	253	White spruce	6
27	6	66°05'	142°18'	221	White spruce	2
28	6	65°20'	143°50'	457	Birch	6
29	9	65°26'	144°03'	244	Black spruce	6

Table 1I—Average biomass data summary by species in Porcupine Plateau

Item	White spruce				Black spruce				Birch			
	x	Min.	Max.	S.E.	x	Min.	Max.	S.E.	$\bar{x}$	Min.	Max.	S.E.
D.b.h. (cm)	20.6	3.85	49.96	2.36	7.8	2.50	12.75	1.43	10.1	4.30	14.8	1.64
Height (m)	14.36	3.00	30.50	1.43	7.17	2.74	10.17	1.09	13.32	10.7	15.15	.72
Age (yr)	68.1	50.00	122.00	6.19	103.00	11.00	121.00	15.37	58.8	52.0	68.0	2.63
Component weight (kg):												
Foliage	21.25	.35	98.74	5.99	.62	.11	1.30	.16	1.56	.16	3.85	.55
Current growth	1.77	.06	9.22	0.51	.75	.02	.17	.02				
Branches	33.55	.32	207.77	8.34	.89	.10	2.39	.26	6.99	.42	20.25	2.79
Live crown	60.61	.73	321.30	13.85	3.16	.23	11.88	1.31	8.77	.57	24.10	3.30
Dead brdnches	10.02	.01	142.44	4.20	1.31	.09	4.40	.48	1.02	.09	3.48	.46
Cones	.75	0	10.13	.39	.04	0	.10	11.54				
Total Crown	70.63	.a7	340.05	15.03	4.47	.32	12.36	1.37	9.79	.66	25.76	3.61
Stemwood minus 5-yr wood increment	130.03	.48	597.86	32.57	10.12	.57	21.96	4.63	25.57	2.50	48.28	7.11
Bark	20.84	.32	102.98	4.66	2.07	.20	4.23	.57	4.46	.58	8.53	1.24
5-yr wood increment	8.45	.24	38.65	2.36	.41	.03	1.03	.15	3.43	.51	7.31	1.13
Total stem	156.78	1.12	738.11	37.92	12.51	.80	27.11	3.72	32.97	3.59	64.12	9.17
Total tree	227.71	2.15	1078.16	51.40	16.98	1.12	36.60	4.93	41.80	4.56	89.88	12.50

$\bar{x}$ = mean; S.E. = standdrd error.

Table 12—Biomass and production equations derived from data collected in the Porcupine River drainage study unit 1/

Species and component	Regression coefficients					r ²	Sy,x	N
	a	b	c	d	e			
White spruce:								
Total stem minus bark	-3256.5	863.97			8.210	0.99	2359	25
Bark	-31.929			20.836	.518	.98	756	25
Dead branches	12140.1	-3503.1		252.0	-6.096	.52	6272	23
Branchwood and bark	955.3				2.953	.78	6277	25
Foliage	-2651.7		568.74	35.46		.86	4735	23
Total tree	-1544.18			209.11	7.592	.96	13082	23
	15017.0	-4579.0		503.57		.96	15340	23
Last 5-yr stemwood increment	-2139.64			549.68	10.394	.75	1857	23
	160.66			17.593		.68	2220	23
Current growth	-484.277	123.06				.44	744	23
		39.342		2.079		.48	769	23
Total current annual production	-1887.8	499.15		-18.072	.511	.75	824	23
Black spruce:								
Total stem minus bark	-25.574			68.532	7.316	.99	161	6
Bark	-47.479			34.974	-.814	.99	287	6
Dead branches	-64.643			24.312		.91	312	6
Branchwood and bark	448.84	455.15	-517.42			.90	108	6
Total tree	1878.0	716.37	-1390.7	222.47		.99	184.8	6
	-25.506			202.36		.99	444.6	6
Last 5-year increment	33.825			6.048		.94	60.1	6
	16.943			6.232		.94	50.5	6
Current growth	3.906	5.162		.581		.99	5.3	6
	-5.0257	7.977		.405		.98	4.9	6
Total current annual production	23.39			2.157		.98	12.8	6
Birch:								
Total stem minus bark	-1343.8			248.39		.99	1072	5
Bark	7240.7		-701.35	48.69		.99	260	5
Dead branches	-195.18				.828	.84	455	5
Branchwood and bark	-1908.4			79.30		.87	2691	5
Foliage	781.61	-283.84		31.52		.99	289	5
		-87.90		21.38		.97	268	5
Total tree	-3813.0			390.9		.99	3798	5
		-1047.1		447.83		.99	3540	5
Last 5-yr stemwood increment	6580.8		-631.95	41.733		.99	204	5
				29.827		.99	327	5
Total current annual production	-297.08			22.395		.97	336	5

1/ The model is $y = a + bx_1 + cx_1^2 + dx_2 + ex_3$; where, y is component oven-dry weight (g), x is d.b.h. (cm), $\bar{x}_1$ is height (m), x_2 is (d.b.h.)², and x_3 is (x_2)(height).

Table 13—Mature community production and potential production in Porcupine River drainage, interior Alaska

Community	Estimated potential production per year						
	Current MAI per year		Metric SDI L/	Total tree		Wood	
				MAI	CAI	MAI	CAI
	g/m ²	ft ³ /acre		g/m ²	ft ³ /acre	g/m ²	ft ³ /acre
Black spruce communities:							
BS1	13.5	4	365	51	95	11	3
BS2	77.3	17	881	88	252	19	9
WSBS1	13.3	4	323	60	188	13	20
WSBS2	37.7	8	461	82	618	18	66
WSBS3	46.1	10	482	96	272	21	29
WSBS4	17.0	4	256	56	172	14	18
BS10	26.0	6	353	74	139	16	5
BS11	12.8	3	179	72	413	16	15
BS12	20.6	5	133	107	134	24	5
BS13	12.5	3	102	123	329	27	12
WSBS10	8.2	2	153	54	373	12	40
WSBS11	19.1	4	192	93	154	22	15
BS20	4.0	1	5	80	40	18	1
BS21	20.9	5	240	87	140	19	5
White spruce communities:							
WS1	110.2	24	901	12	891	27	156
WS2	73.7	17	583	137	1758	30	308
WS3	75.3	15	594	103	603	24	105
WS4	195.0	42	1036	188	2130	41	373
WS5	84.7	18	603	139	1258	30	220
WS6	81.1	18	671	121	1119	26	196
WS7	62.1	14	534	107	1115	23	195
WS10	40.5	9	519	78	902	17	158
WS11	51.4	11	492	105	522	23	91
Hardwood and mixed communities:							
AI	67.7	17	543	123	242	30	27
BP1	124.6	31	603	207	480	51	53
BP2	52.0	15	361	313	172	77	19
ABP1	57.8	14	408	142	212	35	23
AI0	44.4	11	327	136	204	33	23
AWS1	96.7	24	581	166	443	41	49
AWS2	126.8	31	441	28	585	71	65
WSB1	65.5	16	238	275	116	68	129

L/ Stand density index (Reineke 1933).

Application To Forest Management

The conceptual basis that links ecosystem classification to forest management has been reviewed by Klinka and others (1979) and is only briefly described in this paper. The key to successful forest management is the ability to reliably predict forest growth and the effect of prescribed silvicultural treatments on the forest ecosystem. An ecosystem is "that part of the forest uniform over a certain area in the composition, structure and properties of its components, and in the interrelationships among them; that is, uniform in the plants, animals, and microorganisms inhabiting it, in the parent material, in its hydrological, microclimatic (atmospheric), and soil environments and the interactions among them; and in the kind of matter and energy exchange between these components and other natural phenomena in nature." This is the definition given by Sukachev and Dylis (1964) as translated by Klinka and others (1979).

Because it is impossible to quantify all components, plants and soils are most often used to describe ecosystems. In my study, the classification is based only on the plants. Plants in this case are considered to integrate and reflect all other ecosystem properties. Ideally plant, soil, and climatic variables should have been quantified for each location, but time and money precluded detailed measurements of the latter two components. The smallest unit in the classification is one that is uniform in terms of plant cover (that is, the community).

Similar ecosystems are grouped or classified so that knowledge about each ecosystem can be organized and effectively communicated. Finally, with enough information about one ecosystem, the effects of silvicultural treatments over a large area containing similar ecosystems can be predicted. The power of prediction is the important feature of ecosystem classification that can link it to effective forest management.

As an example of the application of the classification presented earlier, it is now possible to take the basic community growth data and estimate which communities have a potential for producing wood or wood fiber in sufficient quantity to sustain a commercial market. **Also**, an estimate can be made of the total land area within the study area that might be suitable for commercial forestry operations.

The first step in estimating potential forest productivity is to decide if each community is fully occupied by trees. Could this community support more trees without reducing growth on any one stem? Estimates of relative stand density were made by use of a metric version of Reineke's (1933) stand density index. A fully stocked stand is one that has a SDI value of 1000. Therefore, a community like WS5 which has an average SDI of 608 (table 13) is considered to be 60 percent stocked and could support 40 percent more trees with no reduction in growth on any one tree.

An estimate of potential production can be made for all communities if they are fully stocked. The average total production (MAI) for the mature communities is 47.3 g/m^2 ($10.7 \text{ ft}^3/\text{acre}$) per year. The estimated potential production if all stands are fully stocked is 106.3 g/m^2 (**$23.9 \text{ ft}^3/\text{acre}$**) per year (table 13). This represents a 225-percent increase in aboveground total tree and wood production.

If this potential productive capacity is to be utilized, additional criteria must also be met. These are often dictated by the commercial market and by the tools people use to extract a resource from the natural environment. For example, each community under consideration for management must be able to produce wood fiber at a given rate. In interior Alaska, this rate has traditionally been thought of as 20 ft³/acre per year (Hegg and Sieverding 1979, Hutchison 1967). In terms of current MAI, this restriction eliminates all black spruce communities, all but two of the white spruce communities, and five of the eight hardwood and mixed communities (table 13). Only 9.6 percent of the study area is currently covered by commercial forests. If the communities that might have potential to produce 20 ft³/acre or more per year are considered, all hardwood and mixed communities are included; all but one white spruce community has potential and four of the black spruce communities can support commercial forests. This group of communities covers 42.9 percent of the study area (1 546 500 ha).

In the immediate future, the communities that should be considered first for commercial operation include the flood plain or stream terrace communities of BP1, WS4, and WS1 plus the two upland aspen-white spruce communities (AWS1 and AWS2).

Other applications of the classification to forest management can be developed. A guide to selection of tree species for regeneration and for prescribed burning could be developed. This guide could be similar to the one developed by Klinka (1977) for southwestern British Columbia. A guide to harvesting techniques or general site limitations for various harvesting techniques could be developed. Recommendations could also be made to help improve or at least maintain wildlife habitat and possible recreational opportunities. So, within the framework of an ecosystem classification, much of the knowledge needed to effectively manage forest lands can be easily organized and communicated to the manager and the public.

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English Equivalents

<u>Metric unit</u>	<u>English equivalent</u>
1 hectare	= 2.4710 acres
1 kilogram per square meter	= 0.2048 pound per square foot
1 centimeter	= 0.3937 inch
1 cubic meter per hectare	= 14.2913 cubic feet per acre
1 gram	= 0.035 ounce
1 gram per square meter	= 0.378 ounce per square foot

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Appendix

Vegetative Key to the Forest Communities of the Porcupine Plateau Section of the River Drainage, Interior Alaska

A vegetative key was developed based on the results of the TWINSPLAN (Hill 1979) analysis. It should be emphasized that this proposed key has not been field tested in the study area and that any attempt to use it outside the area may lead to incorrect conclusions. The initial breakdown was based on overstory age and general cover type (for example—white spruce, black spruce, and hardwood). The vegetative key itself would be located entirely within level I of the preliminary classification system for vegetation of Alaska (Viereck and Dyrness 1980). Levels II through IV are mixed within the structure of the key because the key was based entirely on a vegetative analysis. The final key designation is a level V plant community.

1. Over 75 percent of tree cover contributed by conifer species 2
1. Less than 75 percent of tree cover contributed by conifer species 5
2. Black spruce tree cover at least 25 percent of total, or in young stands at least 25 percent of the seedlings are black spruce 3
2. White spruce tree cover at least 75 percent of total or black spruce seedlings make up less than 25 percent of total 4
3. Average overstory age greater than 40 years Mature black spruce
3. Average overstory age less than 40 years Young black spruce
4. Average overstory age greater than 40 years Mature white spruce
4. Average overstory age less than 40 years Young white spruce
5. Average overstory age greater than 50 years Mature hardwoods
5. Average overstory age less than 40 years Young hardwoods

Mature Black Spruce

1. Rosa acicularis is present; at least two of the following are absent: Potentilla fruticosa, Betula nana, Vaccinium uliginosum, Carex spp., and Ledum palustre 2
1. Rosa acicularis is absent; at least two of the following are present: Potentilla fruticosa, Betula nana, Vaccinium uliginosum, Carex spp., and Ledum palustre 7
2. Arctostaphylos uva-ursi is present with a cover value greater than 5 percent or Cyperaceae is present with a cover value greater than 10 percent 3
2. If Arctostaphylos uva-ursi is present with cover greater than 5 percent, then Cyperaceae is absent 4
3. Arctostaphylos rubra is absent and overstory cover less than 25 percent BS21
3. Arctostaphylos rubra is present with a cover value of at least 10 percent WSBS1
4. Two of the following species are present: overstory Picea glauca, Linnaea borealis, and Cladonia rangiferina and at least 60 percent overstory cover 5
4. Less than 60 percent overstory cover and/or Linnaea borealis is absent 6
5. At least one of the following is present: Arctostaphylos rubra or Empetrum nigrum; and at least two of the following are absent: Alnus crispa greater than 10 percent, Graminae, Rosa acicularis, and Equisetum spp. WSBS2
5. At least two of the following are present: Alnus crispa at least 10 percent cover, Graminae, Rosa acicularis, and Equisetum spp.; and at least one of the following is absent: Arctostaphylos rubra or Empetrum nigrum BS1

6. At least two of the following are present: *Equisetum* spp., *Betula* nana, and *Alnus crispa* BS12
6. At least two of the following are absent: *Equisetum* spp., *Betula* nana, and *Alnus crispa* BS10
7. Overstory and seedling black spruce with at least 10 percent cover and at least two of the following are absent: *Betula* nana, *Carex* spp., and *Ledum palustre* 8
7. At least two of the following are present: *Betula* nana, *Carex* spp., and *Ledum palustre* 10
8. Overstory cover less than 60 percent and at least three of the following are present: *Vaccinium uliginosum* with cover greater than 5 percent; *Cetraria* spp., *Salix glauca*, *Cladonia rangiferina*, and *Peltigera* spp. WSBS10
8. Overstory cover greater than 60 percent and *Vaccinium uliginosum* with cover greater than 5 percent 9
9. Tall shrub layer contains *Salix* spp. with a cover value of 10 percent and at least 2 percent *Equisetum* spp. WSBS4
9. Tall shrub layer is poorly developed with less than 10 percent cover of *Salix* spp., and no white spruce BS2
10. *Potentilla fruticosa* is present with *Salix* spp., cover less than 5 percent in the low shrub layer 11
10. *Potentilla fruticosa* is absent; *Salix* spp. are present in the tall shrub layer and have a cover value greater than 5 percent in the low shrub layer WSBS3
11. *Carex* spp. present with at least 5 percent cover and *Cetraria* spp. with less than 5 percent cover BS11
11. *Carex* spp., if present, have a cover value of less than 5 percent and *Cetraria* spp. are present with greater than 5 percent cover WSBS11

Young Black Spruce

1. Two of the following four species are present: *Rosa acicularis*, *Shepherdia canadensis*, *Arctostaphylos uva-ursi*, and *Salix bebbiana*; *Betula nana* is absent 2
1. Two of the above four species are present, and *Betula nana* is present 8
2. White spruce seedlings are present, and *Shepherdia canadensis* is present with at least 5 percent cover 3
2. Overstory black spruce is present with a cover value of at least 2 percent 6
3. *Arctostaphylos rubra* and *Vaccinium vitis-idaea* are present with at least 2 percent cover, and white spruce overstory is present 4
3. At least two of the above three species are absent 5
4. *Arctostaphylos uva-ursi* is present with a cover value of less than 2 percent and *Potentilla fruticosa* is present BSY14
4. *Arctostaphylos uva-ursi* is present with a cover value greater than 2 percent WSBSY2
5. Moss and lichen layer cover with at least 33 percent tree litter WSBSY12
5. Less than 33 percent tree litter ABYI
6. At least 10 percent cover of *Vaccinium vitis-idaea* 7
6. Less than 10 percent cover of *Vaccinium vitis-idaea* BSBY2
7. Overstory paper birch is present BSBY1
7. Overstory paper birch is absent WSBSY2
8. *Carex* and *Ledum palustre* are absent; at least 5 percent cover of *Equisetum* or *Arctostaphylos uva-ursi* ABSY1
8. *Equisetum* or *Arctostaphylos uva-ursi*, if present, has less than 5 percent cover and two of the following are present: *Carex* spp., *Ledum palustre*, and *Vaccinium vitis-idaea* 9

- 9. At least 2 percent cover of *Betula nana* 10
- 9. If present, *Betula nana* has less than 2 percent cover 11
- 10. *Vaccinium uliginosum* is present, and *Carex* spp. are absent WSBSY10
- 10. *Carex* spp. are present, and *Vaccinium uliginosum* is absent BSY11
- 11. *Dicranum* sp. cover is greater than 2 percent, and *Rosa acicularis* cover is less than 2 percent BSY13
- 11. *Rosa acicularis* cover is greater than 2 percent, and *Dicranum* sp. cover is less than 2 percent BSY1

Mature White Spruce

- 1. *Cetraria* sp., *Parmelia* sp., and *Hylocomium splendens* are present, and less than 10 percent cover of willow is in the tall shrub layer 2
- 1. At least 10 percent willow cover in the tall shrub layer and no *Cetraria* sp., *Parmelia* sp., or *Hylocomium splendens* in the moss and lichen layer 6
- 2. An upland site with no *Cetraria* sp., *Parmelia* sp., or *Shepherdia canadensis* WS6
- 2. *Cetraria* sp., *Parmelia* sp., or *Shepherdia canadensis* is present in the understory 3
- 3. *Salix bebbiana* is absent as a tall shrub; *Arctostaphylos uva-ursi*, *Equisetum* spp., *Lupinus* spp., and *Vaccinium vitis-idaea* are present in the herbaceous layer 4
- 3. *Salix bebbiana* is present as a tall shrub 5
- 4. Overstory canopy cover is less than 60 percent, or cover of *Equisetum* sp. is greater than 10 percent WS11
- 4. Overstory canopy cover is greater than 60 percent, and *Linnaea borealis* cover is greater than 2.5 percent WS7

5. Overstory cover is greater than 60 percent, and cover of *Rosa acicularis* is less than 10 percent WS1
 5. Overstory cover is less than 60 percent, and cover of *Rosa acicularis* is greater than 10 percent WS10
 6. *Rosa acicularis* cover is greater than 25 percent, and the cover of *Alnus crispa* is greater than 1 percent 7
 6. *Alnus crispa* is absent, and *Shepherdia canadensis* and *Arctostaphylos rubra* are present 8
 7. *Salix* spp., *Arctostaphylos uva-ursi*, and seedling *Picea glauca* are absent WS4
 7. *Salix* spp., *Arctostaphylos uva-ursi*, and seedling *Picea glauca* are present WS2
 8. *Populus tremuloides* saplings are present, and *Salix* spp. are present in the low shrub layer WS3
 8. *Picea glauca* seedling cover is greater than 10 percent; *Equisetum* spp. are present with cover greater than 2.5 percent WS5
- Young White Spruce**
1. Birch seedling cover is greater than 5 percent, and white spruce overstory cover is less than 2 percent 2
 1. Birch seedling cover is less than 5 percent, and white spruce overstory cover is greater than 2 percent 3
 2. *Ledum palustre* may be present and *Mertensiana* spp. absent WSY1₁
 2. *Ledum palustre* is absent, and *Mertensiana* spp. are present WSBY1
 3. *Arctostaphylos uva-ursi* is present with or without *Potentilla fruticosa* WSY5
 3. *Arctostaphylos uva-ursi* and *Potentilla fruticosa* are absent WSY2

Mature Hardwood Types

1. *Equisetum* has a cover value of at least 2 percent under a balsam poplar overstory cover greater than 10 percent BP1
1. Overstory balsam poplar is less than 10 percent 2
2. At least 2 percent of overstory is white spruce with at least 2 percent *Peltigera* spp. and *Arctostaphylos rubra* 6
2. At least 50 percent cover of overstory aspen with less than 2 percent white spruce and at least 10 percent *Arctostaphylos uva-ursi* 3
3. At least 5 percent overstory cover of both balsam poplar and aspen with no *Arctostaphylos uva-ursi* in understory APB1
3. Less than 2 percent overstory cover of balsam poplar or greater than 2 percent cover of *Arctostaphylos uva-ursi* 4
4. More than 2 percent overstory is balsam poplar cover, and more than 2 percent cover is *Arctostaphylos uva-ursi* BP2
4. Less than 2 percent overstory cover of balsam poplar 5
5. *Arctostaphylos uva-ursi* is present with a cover value of at least 25 percent, and overstory aspen cover is less than 60 percent A10
5. Overstory aspen cover is greater than 60 percent, and *Arctostaphylos uva-ursi* cover is less than 25 percent A1
6. *Galium boreale* is present, and *Shepherdia canadensis* is absent in the understory WSB1
6. *Shepherdia canadensis* is present 7
7. *Epilobium* sp., *Pyrola* spp., and *Linnaea borealis* are the most dominant herbaceous species, and *Arctostaphylos uva-ursi* cover is less than 2 percent AWS1
7. *Arctostaphylos uva-ursi* has a cover value greater than 2 percent AWS2

Young Hardwood Types

1. Black spruce seedlings and *Alnus crispa* or *Empetrum nigrum* are present 2
1. Black spruce seedlings are absent 3
2. Birch seedlings are present ABSY1
2. Birch seedlings are absent ABSY2
3. Overstory balsam poplar cover is at least 2 percent, and *Pyrola* spp. are present BPY1
3. Aspen is present in the overstory, and at least 5 percent is aspen regeneration and 10 percent is cover of *Shepherdia canadensis* 4
4. At least 2 percent of cover is white spruce regeneration, and 33 percent in the tall shrub layer is willow; no *Arctostaphylos uva-ursi* is present AWSY1
4. *Arctostaphylos uva-ursi* and some Graminae are present 5
5. At least 2 percent cover is white spruce regeneration, 33 percent cover is willow in the tall shrub layer, and *Arctostaphylos uva-ursi* is present in the herbaceous layer AWSY2
5. Less than 2 percent cover is white spruce regeneration, and 33 percent is tall willow 6
6. Less than 2 percent is overstory balsam poplar with at least 10 percent overstory aspen AYIO
6. Equal mix of balsam poplar and aspen either in the overstory or as seedlings ABPY1

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The forest vegetation of 3 600 000 hectares in northeast interior Alaska was classified. A total of 365 plots located in a stratified random design were run through the ordination programs SIMORD and TWINSpan. A total of 40 forest communities were described vegetatively and, to a limited extent, environmentally. The area covered by each community was similar, ranging from **0.29** to **4.29** percent. A large number of mixed spruce communities were described and suggested to be the result of the study area's proximity to the northern limit of black spruce (*Picea mariana* (Mill.) B.S.P.). Average aboveground tree biomass and productivity were estimated for each community. Values for trees ranged from **0.2** kilogram per square meter aboveground biomass and 4.0 grams per square meter per year mean annual increment for a woodland black spruce community to **23.4** kilograms per square meter and **195** grams per square meter per year for a closed white spruce community. The potential productivity of the study area was estimated on the basis of 100-percent stocking of each community with trees. A total of **42.9** percent of the area was estimated to have potential to support commercial forests.

Keywords: Classification (forest communities), biomass, Alaska (Porcupine River drainage).

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