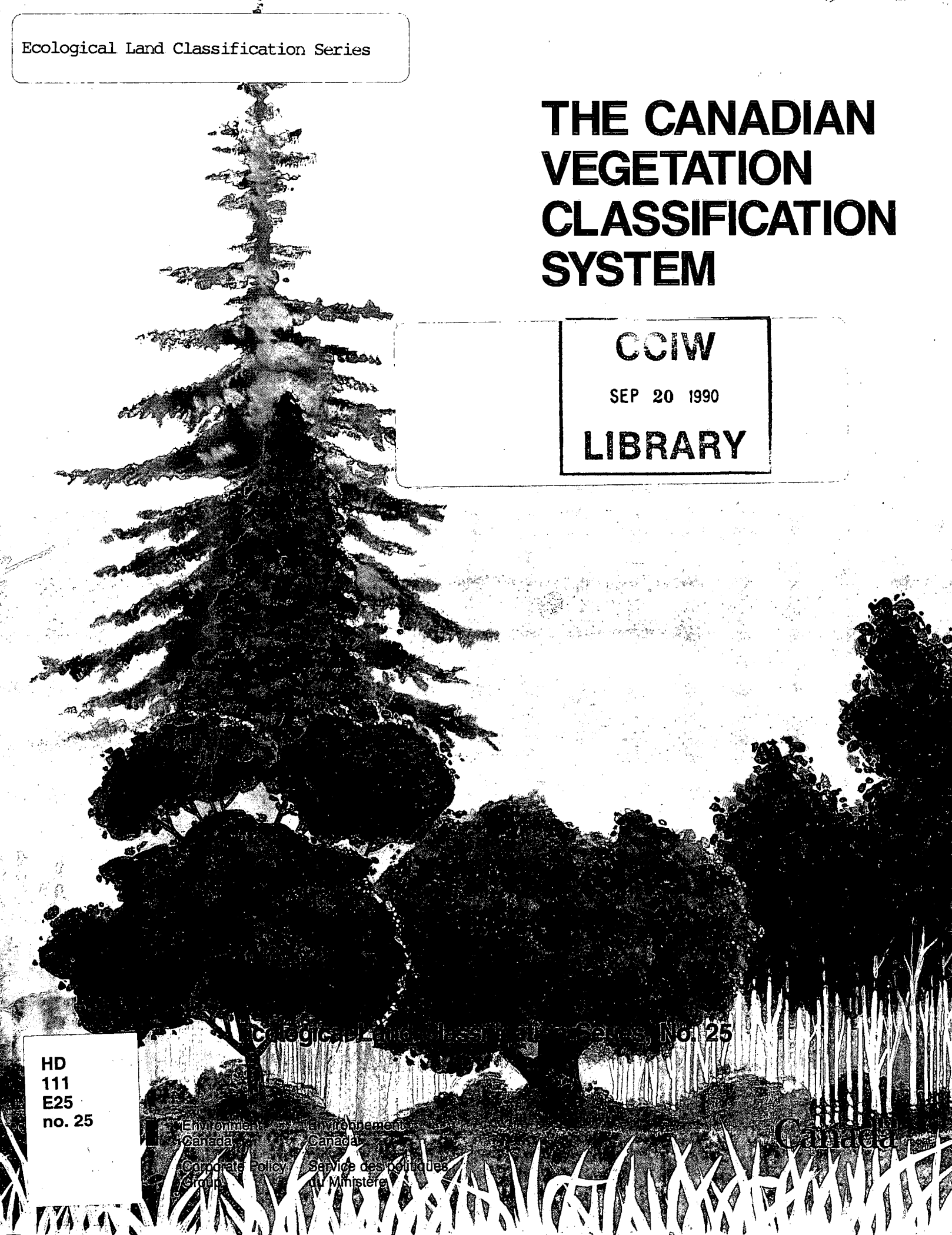
Ecological Land Classification Series

THE CANADIAN VEGETATION CLASSIFICATION SYSTEM



Ecological Land Classification Series, No. 25

Environment Canada
Corporate Policy Group
Environnement Canada
Service des politiques du Ministère
Canada

THE CANADIAN VEGETATION CLASSIFICATION SYSTEM

First Approximation
1990

National Vegetation Working Group

Canada Committee on Ecological Land Classification

Edited by
W. L Strong, E.T. Oswald, and D.J. Downing

Sustainable Development
Corporate Policy Group
Environment Canada

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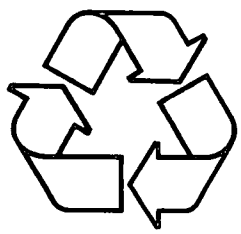

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PREFACE

A system is presented for classifying terrestrial vegetation in Canada. The system has seven levels defined by plant community physiognomy and species-dominance criteria; the composition of the upper four levels have been completed, whereas the remaining levels still require development. The ultimate unit of classification is the "community-type". To facilitate development of the remaining three levels of the classification system, a relevé registry system is proposed for use by individuals wishing to contribute to this national project. Completed relevé forms submitted would include information on plant community composition and structure, background, and site condition. Completion of a comprehensive national vegetation classification system is expected to require several years.

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INTRODUCTION

Rationale for a National Vegetation Classification System

Vegetation description and classification are common tasks of most ecologically based natural resource studies. As a result, thousands of relevés[1] (basic units of vegetation classification) are collected and classified each year in Canada. The concept of vegetation classification provides a convenient mechanism for reducing the complexity of natural vegetation to a small number of relatively homogeneous, easily understood groups. This has obvious advantages for natural resource managers and land use planners as well as vegetation scientists. Vegetation classification is an integral part of many natural resource studies, but no single approach or combination has yet been accepted as a standard for classifying the vegetation of Canada. There are three likely reasons for this:

- Most vegetation analyses are conducted as local or subregional studies. As a result, they seldom receive widespread distribution, which limits the direct comparison of plant communities from different geographical areas.

- Vegetation classifications are influenced by their intended use and the classifier's background, which often limits their usefulness to others.

- Until recently, no organization existed to promote the development of a nationally recognized standard for classifying vegetation in Canada.

If these obstacles can be overcome, a national vegetation classification system could contribute to the systematic analysis and a more effective and sustainable management of vegetation and other associated natural resources by providing a standard approach to classification.

The National Vegetation Working Group

To promote the development of a national vegetation classification system, the Canada Committee on Ecological Land Classification (CCELC) established the National Vegetation Working Group. At its inaugural meeting in April 1985, under the chairmanship of E.T. Oswald, the National Vegetation Working Group established two important long-term objectives:

- To develop a national vegetation classification system that would accommodate the wide diversity of terrestrial plant communities that occur in Canada; and

- To establish a registry system for accumulating plant community data to refine the classification.

The objectives of this report are:

- To describe the basic framework of a proposed vegetation classification system (first approximation); and

- To provide a mechanism for vegetation scientists and resource managers throughout Canada to participate in the development of this classification system.

VEGETATION CLASSIFICATION — PAST AND PRESENT

Vegetation is a complex mosaic of plants that tend to form natural aggregates in response to abiotic and biotic conditions. These recurring aggregates are often referred to as plant communities. The concept of plant communities and their classification is neither new nor was it conceived in Canada (see Whittaker 1978). The following summary briefly outlines several important approaches that have been developed for classifying vegetation during the past 180 years.

Physiognomy: This approach to classification relies upon the general architecture or growth-forms of vegetation (e.g., Short-Grass Prairie, Deciduous Forest). Fredrich Heinrich Alexander von Humboldt pioneered this system in the early 1800s and is credited with being the first to systematically describe and classify vegetation (Mueller-Dombois and Ellenberg 1974). This approach has been used widely for regional and national vegetation description.

An elaborate physiognomic system based on plant community structure was developed by Fosberg in the 1960s and subsequently adopted by the International Biological Program (Fosberg 1967; UNESCO system, Mueller-Dombois and Ellenberg 1974, p. 466-493). Because of its worldwide scope, the system did not include floristic criteria, as plant species distributions are geographically restricted. Instead, it describes vegetation according to structure and function (e.g., deciduous or evergreen, life-form, growth-form). A similar but more species-specific approach for vegetation analysis was used by Beard (1946) and other British researchers to describe the complexity of tropical rain forests of South America. A drawback of the former physiognomic system is that terms such as short grass, savannah, scrub, etc. may have different regional meanings.

[1]Technical terms are defined in the "Glossary of Technical Terms".

Life-form: This approach was developed by Raunkiaer (ca. 1910-20s) and involves the classification of plants and communities according to the location of meristematic tissues, or terminal buds (e.g., geophyte, chamaephyte). Raunkiaer's life-form system is seldom used for management-oriented vegetation classifications because it provides only indirect information on species composition and relative abundance.

Structural Dominance: This classification approach groups stands on the basis of recurring dominant species by stratum or layer (Trass and Malmer 1978). It is most commonly used in regions with relatively poor floristic diversity. The basic unit of classification is referred to as a "sociation". The sociation approach was primarily developed in Scandinavia by the Uppsala School of Phytosociology (Becking 1957), and in the Soviet Union (Aleksandrova 1978). This approach also includes the synusia concept (Barkman 1978).

Floristics: This classification system was originally developed in central and southern Europe by the Zurich-Montpellier School of Phytosociology (Becking 1957), and is also referred to as the Braun-Blanquet relevé method (Mueller-Dombois and Ellenberg 1974). The approach relies on characteristic and differential species for classification (Becking 1957), and works best with diverse flora. Factors such as internal plant community structure (i.e., strata) or dominants are not direct classification criteria, although grouped stands must have a similar physiognomy. The Braun-Blanquet method has developed most strongly in eastern Canada (e.g., Dansereau 1972; Grandtner and Vaucamps 1982; and others).

The basic unit of classification is the "association". Association classifications are usually prepared by the manual re-arrangement of relevés (Mueller-Dombois and Ellenberg 1974, p. 177-209), or sometimes through computer-based systems (e.g., Ceska and Roemer 1971).

Quantitative: This approach to vegetation classification was pioneered primarily by researchers in the United States and western Europe. It involves the mathematical analysis of plant species cover data through measures of similarity/dissimilarity. The quantitative approach increased in popularity after computers became both sufficiently powerful to accommodate such analyses and more readily available (post-1950s). Popular multivariate statistical techniques include cluster analysis (e.g., Wishart 1975) and Two-Way Indicator Species Analysis (TWINSPAN - Hill 1979). These techniques are largely objective methods, although they do involve subjectivity in the selection of coefficients of comparison, setting of cover class intervals, and the selection of classes. Pielou (1984) provides an excellent review of selected quantitative techniques.

Ecosystematic: This approach to classification incorporates both vegetation and site conditions. Examples of ecosystematic classifications are common in North America and include: the "site-type" of eastern Canada (Hills 1976); the "habitat-type", which is widely used in northwestern United States (Daubenmire 1968; Pfister et al. 1977; Alexander 1985); the "biogeocoenosis" of British Columbia (Krajina 1965); and ecological land classification (e.g., Subcommittee on Biophysical Land Classification 1969). The ecosystematic approach has gained popularity with natural resource managers in recent times, but more information is required before a national synthesis will be possible.

Many of the basic vegetation classification concepts used by Canadians have been imported and modified to accommodate local circumstances. It appears that most vegetation classifications emphasize both structural dominance ("sociation" approach) and floristics ("association" approach) criteria, with quantitative techniques gaining acceptance.

THE PROPOSED CANADIAN VEGETATION CLASSIFICATION SYSTEM

The proposed Canadian vegetation classification system uses a combination of physiognomic, structural dominance, and floristics criteria in a seven-level hierarchy. It is a terrestrially oriented system that combines elements of Fosberg's (1967) structural formation scheme at the upper four levels, and the structural dominance and floristics criteria at Levels V through VII.

Users of vegetation data have diverse needs. Therefore, the system describes vegetation without reference to environmental criteria or connotative physiognomic labels such as savannah, shrubland, or grassland. This approach will reduce problems associated with inconsistent and misleading terms. Two advantages of a system based on physiognomic characteristics at the broadest levels are that descriptive vegetation information can be provided to those who do not require species data and, secondly, it allows the grouping of similar plant communities from spatially separate geographical areas. This will facilitate the classification and description of vegetation for tasks such as remote sensing interpretations and reconnaissance-level surveys. At the most detailed levels of the proposed system, floristics criteria are incorporated, providing a common link to ecological land classification as well as other vegetation classification systems. The proposed system can therefore be used in ecologically oriented studies, as is the Canadian System of Soil Classification (Canada Soil Survey Committee 1987).

The proposed system has three main components: a hierarchy table, keys for classification, and a proposed plant relevé registry system. Table 1 summarizes the seven-level structure of the proposed classification system. Classificational criteria

Table 1: Levels of the Canadian Vegetation Classification System

The table is inserted as a loose foldout within the report.

for specific categories are defined for Levels I through IV. However, the potential permutations of species and our current national understanding of vegetation makes detailed presentation for Levels V through VII impractical. The keys (Table 2) provide users with a tool for classifying plant communities to Level IV. These keys can be used much like any taxonomic plant key, where lines of equal status (preceded by the same letter) provide decision points.

Users of this proposed system should consider the following guidelines:

1) The system should be used only for classifying terrestrial vegetation, or wetland vegetation associated with less than two meters of permanent standing or flowing water.

2) For a stand of vegetation to be classified within the proposed system (i.e., vegetated), there should be at least a two percent ground cover of living plants. Most plant communities have considerably more cover, but in harsh arctic environments (Bliss et al. 1973, p. 336) and on early successional sites (e.g., river sandbars) vegetation cover may be at or below this threshold. A similar criterion was used in the proposed Alaska vegetation classification (Viereck et al. 1986).

3) It is suggested that sample plots should be at least 0.1 hectare in size for tree-dominated stands and 0.01 hectare for stands dominated by shrubs, herbs, or nonvasculars. The plot should be located in the sampled stand in a manner that will avoid ecotonal influences.

4) Plant species composition and percent cover data should be collected, preferably by stratum (i.e., >25, >15-25, >3-15, >1-3, >0.2-1, and $\leq$0.2 metres), since they are an integral part of the proposed system. The total cover of species within a plot, when summed separately, can exceed 100% cover due to the overlapping of individual plants (Figure 1); however, ground or overall vegetation cover never exceeds 100%.

5) In situations where selected plant communities do not "fit" the classificational criteria, users should select the appropriate classification category based on their knowledge of the vegetation and the systems broad objectives. It would also be appreciated if such inconsistences could be brought to the attention of the National Vegetation Working Group so that they might be rectified.

6) The grouping of relevés at Level VII should be done on the basis of overall composition rather than the presence and relative abundance of a few individual species. Naming of grouped relevés is in part dictated by the names assigned at Level V (a dominant or codominant species) and VI (a dominant or codominant understory species). Relative species dominance, abundance, and stratal position are used for naming individual plant communities. Scientific species names are used in naming plant communities at Level VII.

The following summarizes the seven levels (I-VII) of the Canadian Vegetation Classification System:

Level I distinguishes broad physiognomic types. Allocation of individual types of vegetation to a specific category is based on both stand physiognomy and dominance criteria (Table 2). Preference is given to individual growth-forms for classification purposes as follows: trees > shrubs > herbs > nonvascular. For example, a stand with 30% cover of trees and a 70% cover of shrubs is classified as a "Tree" stand, despite the greater cover of shrubs, because trees represent the dominant growth-form in terms of overall stand structure.

Level II subdivides physiognomic types (Level I) on the basis of different growth-forms that commonly form plant communities. Two groups are recognized within the Tree and Shrub categories: evergreen and deciduous. Herbs are subdivided into Forbs and Graminoids (Figure 2), while Nonvasculars are subdivided into Lichens and Bryophytes. Physiognomic types within a single growth-form without a clear dominant (>75% composition) are considered to be codominants or "mixed" (e.g., Mixed Herb -- 60% forb and 40% graminoids).

Level III subdivides the growth-forms of Level II on the basis of total stand ground cover (Figure 1 and Table 2). Three categories are recognized: closed ($\geq$60%), open (25-60%), and sparse ($\leq$25%).

Level IV subdivides the physiognomic classes within Level III on the basis of height. Five classes are recognized for Trees and Shrubs, and four classes for Herbs (Table 1). No equivalent differentiation was made for Nonvasculars.

Level V subdivides Level IV on the basis of dominant (e.g., diamond willow, trembling aspen, white spruce-alpine fir, elk sedge, black spruce), and codominant species (e.g., white spruce-alpine fir). A dominant species is defined as having the greatest cover and/or biomass within a community, and is usually the tallest species (Figure 2). Codominants are two or more dominant species that occur in approximately equal abundance and have a similar physiognomy. This level generally corresponds with the "consociation" of the structural dominance approach approach or partly, with the "alliance" of Braun-Blanquet system. Common names for species are used at this Level.

Table 2: Key to the upper levels (I-IV) of the Canadian Vegetation Classification System

The following keys are provided as an aid to the classification of terrestrial vegetation to Level IV of the Canadian Vegetation Classification System. To use the key, start at line "A" and select the description that most appropriately describes the vegetation stand in question. After making a choice, proceed to the indicated letter. For example, if your stand is an upland site with <2m of permanently standing or flowing water, go to "B" and repeat the process until a category such as **deciduous tree** is reached. This classification represents Level II. To further refine the classification, proceed to the section indicated after the selected category (e.g., N for Deciduous Trees). Again repeat the process until a category is selected. By combining the names in these two steps (e.g., —— **deciduous tree** and **tall, closed** —— equals **tall, closed deciduous tree** stand), a classification to Level IV is obtained.

A. Upland or wetland vegetation associated with <2m of permanently standing or flowing water ..... B
  B. Ground surface with <2% cover of living plants ..... UNVEGETATED*
  B. Ground surface with ≥2% cover of living plants ..... (VEGETATED) — C
    C. Vegetation with ≥10% overstory cover of trees ..... D
      D. Deciduous trees compose ≥75% of tree canopy ..... (——DECIDUOUS TREE) — N
      D. Deciduous trees compose <75% of tree canopy ..... E
        E. Evergreen trees compose ≥75% of tree canopy ..... (-----EVERGREEN TREE) — N
        E. Evergreen trees compose <75% of tree canopy ..... (——MIXED TREE) — N
    C. Vegetation dominated by species other than trees, tree cover <10% ..... F
      F. Shrub stratum with a cover ≥10% if tallest stratum, or composes ≥50% of total vegetation if of a height similar to other species of the stand ..... G
        G. Deciduous shrubs compose ≥75% of total shrub cover ..... (——DECIDUOUS SHRUB) — S
        G. Deciduous shrubs compose <75% of total shrub cover ..... H
          H. Evergreen shrubs compose ≥75% of total shrub cover ..... (-----EVERGREEN SHRUB) — S
          H. Evergreen shrubs compose <75% of total shrub cover ..... (-----MIXED SHRUB) — S
      F. Shrub cover <10% and does not meet above criteria I
        I. Herb cover ≥2%; nonvascular:herb cover ratio ≤2 (i.e., 0–2) ..... J
          J. Forbs, including ferns and allies, compose ≥75% of herb cover ..... (——FORB) — S
          J. Forbs compose <75% of herb cover ..... K
            K. Graminoids compose ≥75% of herb cover ..... (——GRAMINOID) — S
            K. Graminoids compose <75% of herb cover ..... (-----MIXED HERB) — S
        I. Nonvascular species (bryophytes and/or lichens) with cover ≥2%; nonvascular species with >2 times the cover of herbs L
          L. Lichens compose ≥75% of nonvascular cover ..... (——LICHEN) — X
          L. Lichens compose <75% of nonvascular cover ..... M
            M. Bryophytes compose ≥75% of nonvascular plant cover ..... (——BRYOPHYTE) — X
            M. Bryophytes compose <75% of nonvascular plant cover ..... (-----MIXED NONVASCULAR) — X
A. Aquatic or marine vegetation associated with permanently standing or flowing water ≥2m in depth ..... WATER*

SECTION N (Tree-dominated stands)

N. Total tree canopy cover >60% ..... (-----CLOSED-----) — 0
  O. Tree height generally >25m ..... (VERY TALL, CLOSED-----)
  O. Tree height generally >15–25m ..... (TALL, CLOSED-----)
  O. Tree height generally >3–15m ..... (INTERMEDIATE, CLOSED-----)
  O. Tree height generally ≤3m due to age ..... (LOW, CLOSED-----)
  O. Tree height generally ≤3m due to environmental constraints ..... (DWARF, CLOSED)
N. Total canopy cover ≤60% ..... P
  P. Total tree canopy cover >25% ..... (-----OPEN-----) — Q
    Q. Tree height generally >25m ..... (VERY TALL, OPEN-----)
    Q. Tree height generally >15–25m ..... (TALL, OPEN-----)
    Q. Tree height generally >3–15m ..... (INTERMEDIATE, OPEN-----)
    Q. Tree height generally ≤3m due to age ..... (LOW, OPEN-----)
    Q. Tree height generally ≤3m due to environmental constraints ..... (DWARF, OPEN-----)
  P. Total tree canopy cover ≤25% ..... (-----SPARSE-----) — R
    R. Tree height generally >25m ..... (VERY TALL, SPARSE-----)
    R. Tree height generally >15–25m ..... (TALL, SPARSE-----)
    R. Tree height generally >3–15m ..... (INTERMEDIATE, SPARSE-----)
    R. Tree height generally ≤3m due to age ..... (LOW, SPARSE-----)
    R. Tree height generally ≤3m due to environmental constraints ..... (DWARF, SPARSE-----)

SECTION S (Shrub- or Herb-dominated stands)

S. Total ground cover >60% ..... (-----CLOSED-----) — T
  T. Uppermost stratum >5m in height (shrubs only) ..... (VERY TALL, CLOSED-----)
  T. Uppermost stratum >3–5m in height ..... (TALL, CLOSED-----)
  T. Uppermost stratum >1–3m in height ..... (INTERMEDIATE, CLOSED-----)
  T. Uppermost stratum >0.2–1m in height ..... (LOW, CLOSED-----)
  T. Uppermost stratum ≤0.2m in height ..... (VERY LOW, CLOSED-----)
S. Total ground cover ≤60% ..... U
  U. Total ground cover >25% ..... (-----OPEN-----) — V
    V. Uppermost stratum >5m in height (shrubs only) ..... (VERY TALL, OPEN-----)
    V. Uppermost stratum >3–5m in height ..... (TALL, OPEN-----)
    V. Uppermost stratum >1–3m in height ..... (INTERMEDIATE, OPEN-----)
    V. Uppermost stratum >0.2–1m in height ..... (LOW, OPEN-----)
    V. Uppermost stratum ≤0.2m in height ..... (VERY LOW, OPEN-----)
  U. Total ground cover ≤25% ..... (-----SPARSE-----) — W
    W. Uppermost stratum >5m in height (shrubs only) ..... (VERY TALL, SPARSE-----)
    W. Uppermost stratum >3–5m in height ..... (TALL, SPARSE-----)
    W. Uppermost stratum >1–3m in height ..... (INTERMEDIATE, SPARSE-----)
    W. Uppermost stratum >0.2–1m in height ..... (LOW, SPARSE-----)
    W. Uppermost stratum ≤0.2m in height ..... (VERY LOW, SPARSE-----)

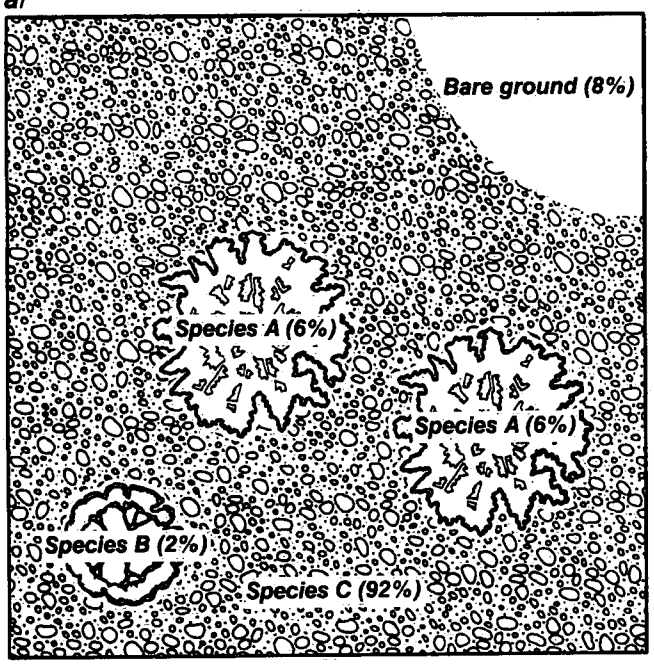
SECTION X (Nonvascular-dominated stands)

X. Total ground cover >60% ..... (CLOSED-----)
X. Total ground cover ≤60% ..... Y
  Y. Total ground cover >25–60% ..... (OPEN-----)
  Y. Total ground cover 2–25% ..... (SPARSE-----)

*Not addressed

Figure 1: Cover estimates. Plant species cover is based on the total percent of area occupied by an individual species within a plot. For example, the two trees in part a) each occupy 6% of the plot, which equals a total cover of 12%. However, if plants of the same species overlapped, their total cover would be less than the sum of individual plants (see Species C). Total plant cover, which is based on the summation of individual plant species cover, equals 106% (i.e., 6 + 6 + 2 + 92 = 106%) within the example, whereas total ground cover was only 92%, because 8% of the plot was unvegetated.

a/



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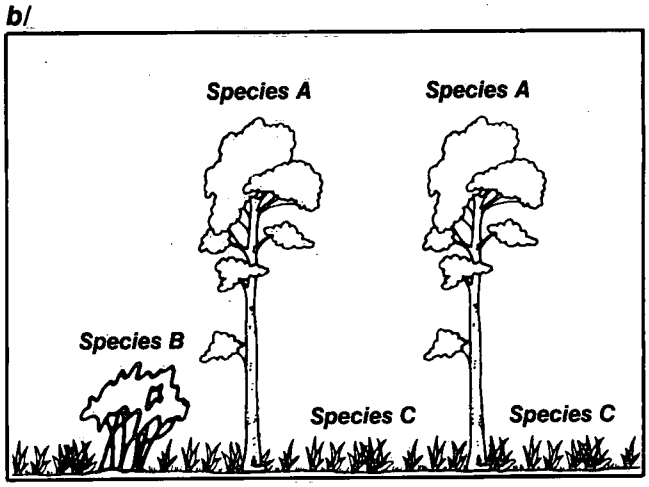

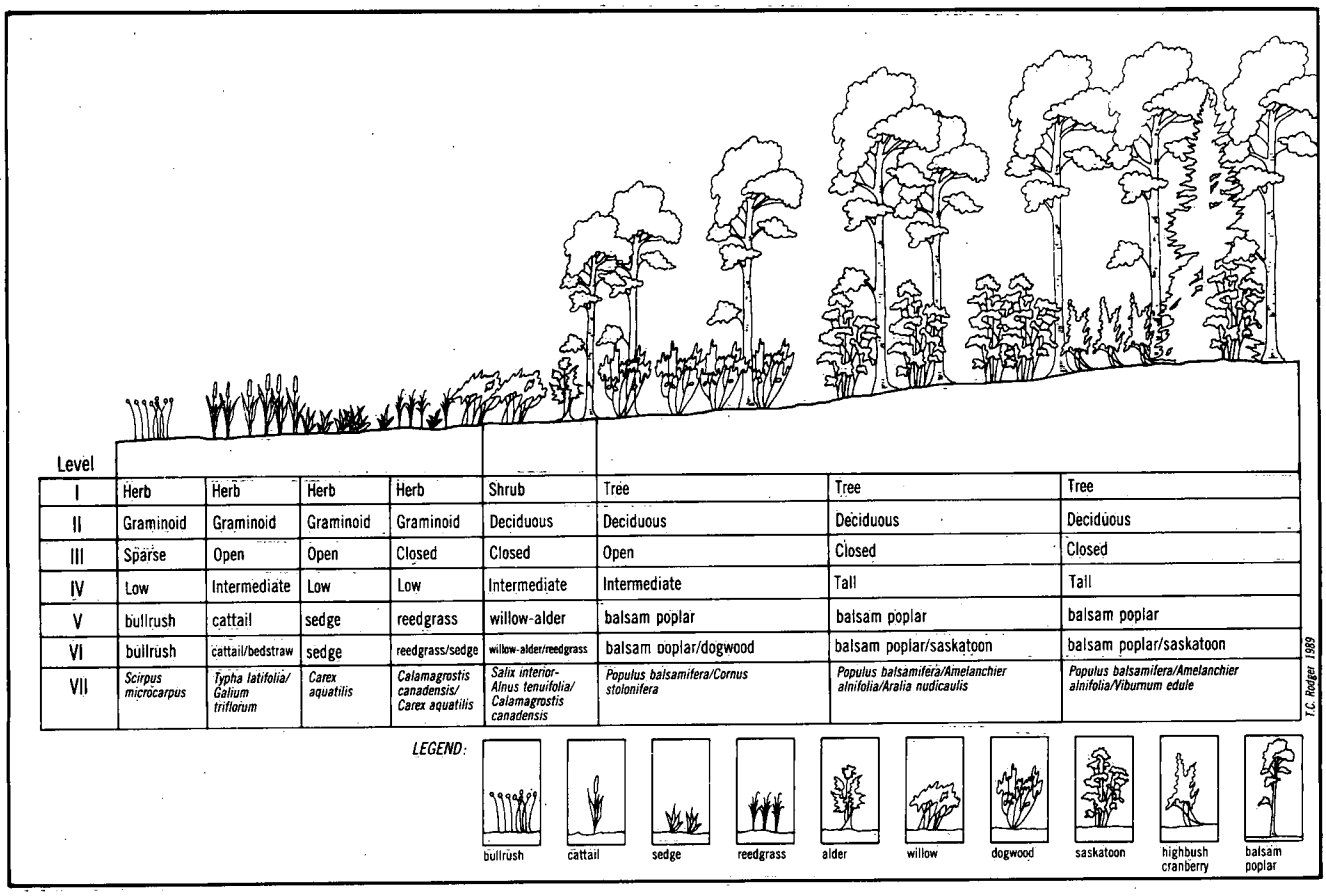

Figure 2: An idealized sequence of plant communities illustrating relationships between plant communities and various levels of the Canadian Vegetation Classification System (Source: Strong et al. 1985)

Level VI subdivides Level V on the basis of major understory vegetation, if present (e.g., White Spruce/Feathermoss, Willow/Reedgrass). Differentiation is based on dominant growth-forms or species as represented by percent cover. Classes within this level represent broadly defined plant communities and are referred to as "Types" and described using common plant names.

Level VII represents a subdivision of Level VI classes on the basis of one or more major understory species. This level is the most detailed level of the vegetation classification system, and generally corresponds to the association or subassociation and sociation of the Braun-Blanquet floristics and structural dominance approaches, respectively. Scientific plant names are used at this Level (e.g., Level V -- White Spruce; Level VI -- White Spruce/Feathermoss Type; Level VII -- Picea glauca/Salix bebbiana/Hylocomium splendens-Pleurozium schreberi Community-type).

Examples of plant communities which have been classified according to the proposed system are presented on the back cover along with descriptive captions.

The classification of relevés and the vegetation they represent at Level VII, normally involves two distinctive components: grouping and naming of grouped stands.

Grouping - The grouping of relevés should be based on their overall composition rather than the presence and relative abundance of a few individual species. This task can be accomplished by a variety of methods, including qualitative and quantitative techniques. However, if a national plant community registry is established for purposes of standardization, it will be necessary to recognize a single approach for classifying relevés.

Naming - The naming of grouped relevés is in part dictated by names assigned at Levels V (dominant overstory species) and VI (major understory). Relative species dominance, abundance, and stratal position are used for naming individual plant communities. Scientific species names are used for naming at Level VII, since common names are inconsistent, and sometimes ambiguous or lacking (preferred taxonomic manuals: Scoggan 1979 for vasculars; Ireland et al. 1987 for mosses; Egan 1987 for lichens; and Stotler and Crandall-Stotler 1977 for liverworts and hornworts). Slashes are used to separate strata while dashes denote codominant species.

~commended that the basic unit of classification be termed a "community-type", which is defined by Whittaker (1975, p. 128) as a group of vegetation stands that share common characteristics irrespective of classificational criteria (i.e., dominance, floristics, physiognomy, or combinations thereof). The term community-type is recommended for two reasons. Firstly, the proposed classification does not conform exclusively to any of the previously described approaches (See "Vegetation Classification -- Past and Present"), and it would therefore be inappropriate to use terms specifically developed for these approaches (e.g., association, sociation). Secondly, the term community-type as defined is more flexible than other commonly used terms, since it does not require classification on the basis of species presence-absence or the rigorous application of stratal criteria.

Taxonomic keys and species composition tables will eventually be developed to describe and facilitate the identification of community-types. Figure 2 illustrates graphically how the classification system would work.

RELEVÉ REGISTRY SYSTEM

To facilitate the development of a national vegetation classification, it will be necessary to establish and maintain a central relevé data bank or relevé registry system. The primary goals of such a system would be to: (i) accumulate and organize relevé data into a standardized format that will facilitate their analysis; and (ii) develop a national vegetation classification at Level VII. e final section of this report describes a system for summarizing and submitting relevé data to a national registry.

POTENTIAL ROLE OF THE CANADIAN VEGETATION CLASSIFICATION SYSTEM IN NATURAL RESOURCE MANAGEMENT

The objectives of this report are to present a proposed system suitable for classifying the diverse vegetation of Canada, and to provide a mechanism for vegetation scientists and resource managers to participate in the continued development of this national system. Pursuant to the first objective, four levels of a seven-level system and associated criteria were developed and presented. The development of a national approach to vegetation classification will contribute to a better understanding and therefore better management of resources, for which vegetation is an integral component. Potential uses of a national vegetation classification system include:

- ecological inventory and analysis;
- wildlife habitat inventory and management;
- park and recreation planning and management;
- watershed management;
- soil stabilization and management;
- land use planning;
- environmental pollution analysis and monitoring (e.g., acid rain and climatic change);
- forest site classification and management;
- range management;

- fire management;
- environmental impact assessment;
- applied research (e.g., forest site quality assessment); and
- pure research.

Present trends in resource management point towards the increased use of computer-based geographical information systems as a management tool. To accommodate vegetation data in such systems and to facilitate the transfer of information and technology to resource managers, a standardized approach to vegetation classification must be adopted. This does in part occur, but only on a study-by-study basis, which limits the comparison and direct use of management prescriptions between studies. Furthermore, much money is being spent on environmental and resource planning/management projects without adequate baseline information on vegetation, although it often represents a key component within such a study. The acceptance and refinement of the proposed system would result in a management tool equivalent to the Canadian System of Soil Classification (1987).

While the classification system provides a systematic framework for classifying vegetation, the development of a comprehensive classification at Level VII will depend upon the development of a national registry. Development of this registry will require both time and labour as well as the cooperation of vegetation scientists from across Canada.

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Table 1: Levels of the Canadian Vegetation Classification System

LEVEL						
I	II	III	IV	V	VI	VII
TREE (≥10% cover of trees)	DECIDUOUS (all broadleaf species, including the genus *Arbutus*)	CLOSED (>60% cover)	Very Tall (>25m)	DOMINANT with or without CODOMINANT SPECIES OF SAME STRATUM AS LEVEL I	DOMINANT with or without CODOMINANT OVERSTORY SPECIES PLUS MAJOR UNDERSTORY SPECIES OR GROWTH FORM	DOMINANT with or without CODOMINANT OVERSTORY SPECIES PLUS ONE OR MORE MAJOR UNDERSTORY SPECIES
			Tall (>15–25m)			
			Intermediate (>3–15m)			
			Low (≤3m due to age)			
			Dwarf (≤3m due to environment)			
		OPEN (>25–60% cover)	Very Tall (>25m)			
			Tall (>15–25m)			
			Intermediate (>3–15m)			
			Low (≤3m due to age)			
			Dwarf (≤3m due to environment)			
		SPARSE (10–25% cover)	Very Tall (>25m)			
			Tall (>15–25m)			
			Intermediate (>3–15m)			
			Low (≤3m due to age)			
			Dwarf (≤3m due to environment)			
	EVERGREEN (all conifers, including the genus *Larix*)	CLOSED (>60% cover)	Very Tall (>25m)			
			Tall (>15–25m)			
			Intermediate (>3–15m)			
			Low (≤3m due to age)			
			Dwarf (≤3m due to environment)			
		OPEN (>25–60% cover)	Very Tall (>25m)			
			Tall (>15–25m)			
			Intermediate (>3–15m)			
			Low (≤3m) due to age)			
			Dwarf (≤3m due to environment)			
		SPARSE (10–25% cover)	Very Tall (>25m)			
			Tall (>15–25m)			
			Intermediate (>3–15m)			
			Low (≤3m due to age)			
			Dwarf (≤3m due to environment)			
	MIXED	CLOSED (>60% cover)	Very Tall (>25m)			
			Tall (>15–25m)			
			Intermediate (>3–15m)			
			Low (≤3m due to age)			
			Dwarf (≤3m due to environment)			
		OPEN (>25–60% cover)	Very Tall (>25m)			
			Tall (>15–25m)			
			Intermediate (>3–15m)			
			Low (≤3m due to age)			
			Dwarf (≤3m due to environment)			
		SPARSE (10–25% cover)	Very Tall (>25m)			
			Tall (>15–25m)			
			Intermediate (>3–15m)			
			Low (≤3m due to age)			
			Dwarf (≤3m due to environment)			
SHRUB (≥10% cover if tallest stratum, or composes ≥50% of total vegetation if of a similar height as other species in stand)	DECIDUOUS	CLOSED (>60% cover)	Very Tall (>5m)			
			Tall (>3–5m)			
			Intermediate (>1–3m)			
			Low (>0.2–1m)			
			Very Low (≤0.2m)			
		OPEN (>25–60% cover)	Very Tall (>5m)			
			Tall (>3–5m)			
			Intermediate (>1–3m)			
			Low (>0.2–1m)			
			Very Low (≤0.2m)			
		SPARSE (2–25% cover)	Very Tall (>5m)			
			Tall (>3–5m)			
			Intermediate (>1–3m)			
			Low (>0.2–1m)			
			Very Low (≤0.2m)			
	EVERGREEN	CLOSED (>60% cover)	Very Tall (>5m)			
			Tall (>3–5m)			
			Intermediate (>1–3m)			
			Low (>0.2–1m)			
			Very Low (≤0.2m)			
		OPEN (>25–60% cover)	Very Tall (>5m)			
			Tall (>3–5m)			
			Intermediate (>1–3m)			
			Low (>0.2–1m)			
			Very Low (≤0.2m)			
		SPARSE (2–25% cover)	Very Tall (>5m)			
			Tall (>3–5m)			
			Intermediate (>1–3m)			
			Low (>0.2–1m)			
			Very Low (≤0.2m)			
	MIXED	CLOSED (>60% cover)	Very Tall (>5m)			
			Tall (>3–5m)			
			Intermediate (>1–3m)			
			Low (>0.2–1m)			
			Very Low (≤0.2m)			
		OPEN (>25–60% cover)	Very Tall (>5m)			
			Tall (>3–5m)			
			Intermediate (>1–3m)			
			Low (>0.2–1m)			
			Very Low (≤0.2m)			
		SPARSE (2–25% cover)	Very Tall (>5m)			
			Tall (>3–5m)			
			Intermediate (>1–3m)			
			Low (>0.2–1m)			
			Very Low (≤0.2m)			
HERB (includes ferns and their allies; ≥2% herb cover; nonvascular:herb cover ratio ≤2.0 — i.e., 0–2)	FORB (includes ferns and their allies)	CLOSED (>60% cover)	Tall (>3–5m)			
			Intermediate (>1–3m)			
			Low (>0.2–1m)			
			Very Low (≤0.2m)			
		OPEN (>25–60% cover)	Tall (>3–5m)			
			Intermediate (>1–3m)			
			Low (>0.2–1m)			
			Very Low (≤0.2m)			
		SPARSE (2–25% cover)	Tall (>3–5m)			
			Intermediate (>1–3m)			
			Low (>0.2–1m)			
			Very Low (≤0.2m)			
	GRAMINOID	CLOSED (>60% cover)	Tall (>3–5m)			
			Intermediate (>1–3m)			
			Low (>0.2–1m)			
			Very Low (≤0.2m)			
		OPEN (>25–60% cover)	Tall (>3–5m)			
			Intermediate (>1–3m)			
			Low (>0.2–1m)			
			Very Low (≤0.2m)			
		SPARSE (2–25% cover)	Tall (>3–5m)			
			Intermediate (>1–3m)			
			Low (>0.2–1m)			
			Very Low (≤0.2m)			
	MIXED	CLOSED (>60% cover)	Tall (>3–5m)			
			Intermediate (>1–3m)			
			Low (>0.2–1m)			
			Very Low (≤0.2m)			
		OPEN (>25–60% cover)	Tall (>3–5m)			
			Intermediate (>1–3m)			
			Low (>0.2–1m)			
			Very Low (≤0.2m)			
		SPARSE (2–25% cover)	Tall (>3–5m)			
			Intermediate (>1–3m)			
			Low (>0.2–1m)			
			Very Low (≤0.2m)			
NONVASCULAR (≥2% cover of nonvasculars, >2 times the cover of herbs)	LICHEN	CLOSED (>60% cover)				
		OPEN (>25–60% cover)				
		SPARSE (2–25% cover)				
	BRYOPHYTE	CLOSED (>60% cover)				
		OPEN (>25–60% cover)				
		SPARSE (2–25% cover)				
	MIXED	CLOSED (>60% cover)				
		OPEN (>25–60% cover)				
		SPARSE (2–25% cover)				

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GLOSSARY OF TECHNICAL TERMS

(Sources: Allaby 1983; Barbour et al. 1980; Daubenmire 1968; Lincoln et al. 1982; Mueller-Dombois and Ellenberg 1974; National Wetlands Working Group 1987; Spurr and Barnes 1973; and Whittaker 1975)

Abiotic - The non-living portion of an ecosystem.

Alliance - A group of associations within the Braun-Blanquet vegetation classification system.

Association - A stable plant community classified according to its characteristic and differential species.

Biotic - Living elements of an ecosystem.

Bryophyte - A group of nonvascular plants composed of mosses, liverworts, and hornworts.

Climax (community) - A plant community which represents the final, stable, self-maintaining and self-reproducing state of development.

Characteristic Species - Species whose distribution is concentrated in a particular type of plant community.

Codominants - Two or more species of approximately equal abundance (i.e., cover) and of similar physiognomy.

Community (plant) - A naturally occurring group of plants that occupy a common environment.

Community-type - An abstract unit of classification developed from the grouping of real stands of vegetation.

Consociation - A vegetation classification unit defined on the basis of one dominant species (a physiognomic dominant).

Cover (percent) - The percentage of ground included in a vertical projection of imaginary polygons drawn around the total natural spread of foliage of individual species. The combined total of all species within a plot may exceed 100%.

Deciduous - A plant which sheds its leaves annually, triggered by environmental factors such as temperature, lack of water, and day length.

Differential Species - A species of moderate constancy that facilitates the recognition of a single plant community-type within the vegetation under consideration.

Dominant - A species having the greatest biomass and/or cover, and usually the tallest in a plant community.

Dwarf - Being of an atypically small form.

Evergreen - A plant that does not generally shed its leaves annually.

Flora - The plant life of an area, the basic unit of which is the plant species

Floristics - Study of the composition of vegetation in terms of the species (flora) present in it.

Forb - Herbaceous plants other than graminoids and usually with reticulate or dendroid venation.

Graminoid - A herbaceous plant with long, narrow leaves with linear venation; including grasses, sedges, and related species.

Ground Cover - The percentage of ground occupied by living plants (the total ground cover not exceeding 100%).

Habitat Type - An area capable of supporting the same climax vegetation.

Herb - A vascular plant without a woody stem (including ferns and their allies for the classification system).

Lichen - A nonvascular plant composed of an alga and a fungus that live together in a symbiotic relationship.

Life-form - A plant classification system based on the location of meristematic tissues, or terminal buds.

Nonvascular - A plant lacking an internal vascular system.

Overstory - The uppermost layer of vegetation cover.

Physiognomy - The external appearance of vegetation (e.g., forest, grassland, etc.).

Relevé - A tabular list of plant species and their associated cover from a sampled stand of vegetation.

Shrub - A multi-stemmed woody perennial plant.

Sociation - A stable plant community with one or more dominant species at each strata. An abstract vegetation type based on plant community structure and species dominance by strata.

Stand - A relatively homogeneous portion of a plant community.

Stratum (pl. strata) - A structural subdivision of vegetation based on height criteria.

Structure - The arrangement in space of plant biomass.

Succession - The progression within a community whereby one plant species is replaced by another until a stable assemblage for a particular environment is attained.

Synusia - A group of plants of the same life-form occurring together in the same stratum.

Tree - A woody perennial plant usually with a single stem.

Understory - Plant species that grow beneath an overstory or canopy.

Vegetation - A collection of plant communities that occupy a given area.

Wetland - A body of permanently standing or flowing water < 2 metres in depth.

PROPOSED RELEVÉ REGISTRY FORM AND INSTRUCTIONS

INTRODUCTION

To facilitate the development of a comprehensive national terrestrial vegetation classification system, it is important that relevé data be incorporated into a central registry or data bank. This data will form the basis for developing Levels V through VII of the classification. The management of such large data sets will potentially necessitate the use of computers, and therefore, a standard terminology and recording format is required to maximize the compatibility of data. Table 3 presents a standardized relevé registry submission form, and Table 4 is an example of one which has been completed for illustrative purposes. Three broad types of data or information are requested for submission of a registry form:

1. **Vegetation Information**

   - Relevé Composition - stratum (St), species, and cover (%)
   - Sampling Date
   - Location of Relevé (latitude, longitude)
   - Taxonomic Authorities
   - Sampling Unit Shape and Plot Size

2. **Site Condition Information**

   - Elevation (m)
   - Slope Class
   - Aspect (slope orientation)
   - Surficial Material
   - Drainage Class
   - Moisture Status
   - Soil Texture
   - Soil Classification (Great Group, Subgroup)
   - Successional Stage
   - Stand Age
   - Evidence of Disturbance
   - Other Available Data/Information

3. **Background Information**

   - Identification Code of Relevé
   - Source of Data/Information
   - Contributor (name, position, address, phone number)
   - Date of Submission

Vegetation and Background Information must be provided for inclusion within the National Registry. If available, the inclusion of Site Condition Information will be useful for characterizing the environmental conditions associated with recognized community-types and the interpretation of their ecology.

A Relevé Registry Form suitable for photocopy is included for individuals wishing to submit data. Large plant community data sets could also be submitted on floppy disks, but the data should be organized in a systematic matter so that it could be readily transposed to a standardized form. Specifics with regards to data formating have not yet been developed.

Standardized plant species codes for use with the Registry Form have been compiled (Strong 1989) and are available from:

Secretariat
Canada Committee on Ecological Land Classification
Sustainable Development
Corporate Policy Group
Environment Canada
Ottawa, Ontario
K1A 0H3

Once the registry system has been sufficiently developed, it is anticipated that data will be made accessible to vegetation scientists and interested parties across Canada in two forms: 1) classified community-types and 2) raw data. Community-type summaries will include tabular arrays of species composition, constancy, and average percent cover by stratum. Environmental conditions associated with the community-type and the original source of the data will be provided. This data would be oriented towards individuals who are interested in comparing their data to a nationally recognized standard. Periodic publication of community-type summaries may also be possible. Ideally, direct access to accumulated raw relevé data would be available to all researchers and management agencies who wish to conduct their own vegetation analyses.

REGISTRY FORM INSTRUCTIONS AND CRITERIA

The following instructions have been compiled to standardize criteria and assist persons wishing to contribute vegetation data to the "Canadian Plant Community Registry" which is being developed by the National Vegetation Working Group of the Canada Committee on Ecological Land Classification. It is desirable that the submitted forms be completed in their entirety.

Submission Code - This box should be used only by regional coordinators as a method of organizing submitted information. This code should include two parts: 1. a one-letter Province/Territory code (See Province/Territory Codes); and 2. a five-digit numerical code based on sequential numbered forms (e.g., A-00001, A-00002, etc).

Level IV Code - This box should be used only by regional coordinators to initially classify a relevé (e.g., a plot) to Level IV.

Table 3: Relevé registry form

RELEVÉ REGISTRY FORM

[_-______] **Submission Code**

[__] **Level IV Code**

Relevé Composition

St*	Species	Cover	St*	Species	Cover
[__	- __________	- ____]	[__	- __________	- ____]
[__	- __________	- ____]	[__	- __________	- ____]
[__	- __________	- ____]	[__	- __________	- ____]
[__	- __________	- ____]	[__	- __________	- ____]
[__	- __________	- ____]	[__	- __________	- ____]
[__	- __________	- ____]	[__	- __________	- ____]
[__	- __________	- ____]	[__	- __________	- ____]
[__	- __________	- ____]	[__	- __________	- ____]
[__	- __________	- ____]	[__	- __________	- ____]
[__	- __________	- ____]	[__	- __________	- ____]
[__	- __________	- ____]	[__	- __________	- ____]
[__	- __________	- ____]	[__	- __________	- ____]
[__	- __________	- ____]	[__	- __________	- ____]
[__	- __________	- ____]	[__	- __________	- ____]
[__	- __________	- ____]	[__	- __________	- ____]
[__	- __________	- ____]	[__	- __________	- ____]
[__	- __________	- ____]	[__	- __________	- ____]
[__	- __________	- ____]	[__	- __________	- ____]
[__	- __________	- ____]	[__	- __________	- ____]
[__	- __________	- ____]	[__	- __________	- ____]
[__	- __________	- ____]	[__	- __________	- ____]
[__	- __________	- ____]	[__	- __________	- ____]
[__	- __________	- ____]	[__	- __________	- ____]
[__	- __________	- ____]	[__	- __________	- ____]
[__	- __________	- ____]	[__	- __________	- ____]
[__	- __________	- ____]	[__	- __________	- ____]
[__	- __________	- ____]	[__	- __________	- ____]
[__	- __________	- ____]	[__	- __________	- ____]
[__	- __________	- ____]	[__	- __________	- ____]
[__	- __________	- ____]	[__	- __________	- ____]
[__	- __________	- ____]	[__	- __________	- ____]
[__	- __________	- ____]	[__	- __________	- ____]
[__	- __________	- ____]	[__	- __________	- ____]
[__	- __________	- ____]	[__	- __________	- ____]
[__	- __________	- ____]	[__	- __________	- ____]
[__	- __________	- ____]	[__	- __________	- ____]
[__	- __________	- ____]	[__	- __________	- ____]
[__	- __________	- ____]	[__	- __________	- ____]
[__	- __________	- ____]	[__	- __________	- ____]
[__	- __________	- ____]	[__	- __________	- ____]
[__	- __________	- ____]	[__	- __________	- ____]
[__	- __________	- ____]	[__	- __________	- ____]
[__	- __________	- ____]	[__	- __________	- ____]

Sampling Date (day-month-year) [__-___-_____]

Location: Lat. [__°__′__″N]
Long. [___°__′__″W]

Province/Territory [_] **Level of Analysis** [_]

Taxonomic Authority: Vasculars [__] Bryophytes [__]

Lichens [__] Liverworts and Hornworts [__]

Sampling Unit Shape [__] **Plot Size** [__ x __ m]

Elevation(m) [_____] **Slope Class** [_] **Aspect** [_]

Surficial Mat. [__] **Drainage Class** [_] **Moisture Status** [_]

Soil Texture at: 0-20 cm [_] 50 cm [_] 100 cm [_]

Soil Great Group [__] **Soil Subgroup** [__]

Successional Stage [_] **Stand Age** (years) [___]

Evidence of Disturbance [__,__,__,__,__,__,__]

Other Available Data/Information [__,__,__,__,__,__]

Identification Code of Relevé [_________]

Source of Data ____________________

____

____

Contributor: Name ____________________

Position: ____________________

Address ____________________

____

Postal Code [___-___]

Phone Number [(___) ___-_____]

Date of Submission

(day-month-year) [__-___-_____]

*Stratum

☐ Please check if additional information is provided on reverse.

Table 4: Example of a completed relevé registry form

RELEVÉ REGISTRY FORM

[A-00001]
Submission Code

[_ _]
Level IV Code

Relevé Composition

St*	Species	Cover	St*	Species	Cover
2	PIC GLAC	45			
3	POP TREM	35			
5	ROS ACIC	01			
6	MER PANT	01			

Sampling Date (day-month-year) [23-11-1953]

Location: Lat. [55° 13' 05" N]
Long. [103° 27' 21" W]

Province/Territory [A] **Level of Analysis** [2]

Taxonomic Authority: Vasculars [01] Bryophytes [02]

Lichens [01] Liverworts and Hornworts [02]

Sampling Unit Shape [01] **Plot Size** [15 x 10 m]

Elevation(m) [1552] **Slope Class** [6] **Aspect** [5]

Surficial Mat. [06] **Drainage Class** [2] **Moisture Status** [3]

Soil Texture at: 0-20 cm [1] 50 cm [2] 100 cm [1]

Soil Great Group [01] **Soil Subgroup** [01]

Successional Stage [2] **Stand Age** (years) [145]

Evidence of Disturbance [01]

Other Available Data/Information [ ]

Identification Code of Relevé [PSP 1]

Source of Data FRANKLIN, B. 1969. Vegetation of the Columbia Glacier. M.Sc. thesis, University of Leduc, Leduc, Alberta

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Date of Submission (day-month-year) [01-07-1990]

*Stratum

☑ Please check if additional information is provided on reverse.

Relevé Composition - Include information on vegetation stratum, floral composition, and percent cover of species within a relevé, (samples composed of nested or subsampled units to be summarized as a single relevé):

Stratum (St) - Each species within a relevé should be assigned to one of the following classes based on their typical height, exclusive of seed heads.

1. >25m
2. >15-25 m
3. >3-15 m
4. >1-3 m
5. >0.2-1 m
6. 0-0.2 m

In some cases, an individual species may occur in more than one stratum. For example, white spruce may occur as a mature tree (Class 2), a subdominant (Class 3), and a seedling (Class 6) within a single relevé.

Species - If available, the standardized list of acronyms developed by the National Vegetation Working Group (Strong 1989) should be used to code species. However, if this listing is not available, sequential number or regional acronym for each species should be used to record species, and the codes and corresponding scientific names should be recorded on the reverse side of the REGISTRY FORM. Use the same code for a single species irrespective of its stratal position within the vegetation. Standardized codes will form the basis for computerization.

Cover - The percent cover of each species by stratum should be recorded directly after the species code. Cover is defined as the percentage of ground included in a vertical projection of imaginary polygons drawn around the total natural spread of foliage of individual species. A species within a single stratum should never have a cover in excess of 100%, although a species that occurs in more than one stratum may have values that total more than 100%. For species with cover values less than 1%, record as 0.5%.

Sampling Date - Record the day (if possible), month, and year, of sampling (e.g., 23-06-87).

LOCATION - Record the location of the sampling unit by latitude and longitude coordinates. These should be taken from standard National Topographic Series maps.

Province/Territory - Record Province or Territory where the sample was collected according to the following codes.

A - Alberta
B - British Columbia
F - Newfoundland
M - Manitoba
N - Northwest Territories
O - Ontario
S - Saskatchewan
P - Prince Edward Island
Q - Quebec
R - New Brunswick
V - Nova Scotia
Y - Yukon Territory

Level of Analysis - Record the level of sampling intensity involved in collecting the data:

1. A quickly sampled relevé, the intent being to obtain information on dominant over- and understory species within a community, and with no attempt being made to determine the complete floral composition.

2. Relevé was sampled for the purpose of determining general composition of the vegetation; an attempt was made to locate and evaluate all species within a relevé, except those of low frequency. Temporal variation not assessed.

3. An attempt was made to locate and identify "all" species within a relevé, and assess their cover as accurately as possible. Sites may be revisited to assess seasonal dynamics.

Taxonomic Authority - Identify the authority upon which the scientific names of species were based:

Vascular Species

1. Scoggan, H.J. 1979. **The Flora of Canada.** National Museum of Natural Sciences, National Museums of Canada, Publications in Botany, No. 7 (preferred authority).

2. Fernald. M.L. 1950. **Gray's manual of botany: a handbook of the flowering plants and ferns of the central notheastern United States and adjacent Canada. (8th Edition).** American Book Company, New York (1970: corrected printing, Van Nostrand, New York).

3. Gleason, H.A. 1963. **Illustrated flora of the northeastern United States and adjacent Canada.** Lancaster Press, Inc., Lancaster, Pennsylvania.

4. Hitchcock. C.L. and A. Cronquist. 1973. **Flora of Pacific Northwest.** University of Washington Press, Seattle, Washington.

5. Hultén, E. 1968. **Flora of Alaska and neighboring territories.** Stanford University Press, Stanford, California.

6. Looman, J. and K.F. Best. 1979. **Budd's flora of the Canadian prairie provinces.** Agriculture Canada, Research Branch. Publ. 1662.

7. Moss, E.H. 1983. **Flora of Alberta. (2nd edition).** University of Toronto Press, Toronto, Ontario.

8. Porsild, A.E. and W.J. Cody. 1980. **Vascular plants of continental Northwest Territories, Canada.** National Museum of Natural Sciences, National Museums of Canada, Ottawa, Canada.

9. Vitt, D.H., J.E. Marsh, and R.B. Bovey. 1988. **Mosses, lichens, and ferns of northwestern North America.** Lone Pine Publishing, Edmonton, Alberta.

99. Other (please specify on reverse side of registry form).

Mosses

1. Ireland, R.R., G.R. Brassard, W.C. Schofield, and D.H. Vitt. 1987. **Checklist of the mosses of Canada II.** Linbergia (Copenhagen) 13:1-62 (preferred authority).

2. Grout, A.J. 1939. **Moss flora of North America.**

3. Lawton, E. 1971. **Moss flora of the Pacific Northwest.** Hattori Botanical Laboratory, Nichinan, Miyazaki, Japan.

4. Nyholm, E. 1965. **Illustrated moss flora of Fennoscandia** Fasc. 2-5. GWK Gleeup/Lund, Sweden.

5. Vitt, D.H., J.E. Marsh, and R.B. Bovey. 1988. **Mosses, lichens, and ferns of Northwestern North America.** Lone Pine Publishing, Edmonton, Alberta.

99. Other (please specify on reverse side of registry form).

Lichens

1. Egan, R.S. 1987. **A fifth checklist of the lichen-forming lichenicolous and allied fungi of the continental United States and Canada.** Bryologist 90:77-173. (preferred authority).

99. Other (please specify on reverse side of registry form).

Liverworts and Hornworts

1. Stotler, R. and B. Crandall-Stotler. 1977. **A checklist of the liverworts and hornworts of North America.** Bryologist 80:405-428. (preferred authority).

2. Arnell, S. 1956. **Illustrated moss flora of Fennoscandia, I. Hepaticae.** GWK Gleerup Publishers, Lund, Sweden.

3. Vitt, D.H., J.E. Marsh, and R.B. Bovey. 1988. **Mosses, lichens, and ferns of Northwestern North America.** Lone Pine Publishing, Edmonton, Alberta.

99. Other (please specify on reverse side of registry form).

Sampling Unit Shape - Please provide additional specifications if necessary:

1. Rectangular plot
2. Square plot
3. Circular plot
4. Line transect with subplots (specify number of subplots and size)
5. Point sampling
6. Plotless method

99. Other (please specify on reverse side of registry form).

Plot Size - Please specify the dimensions of sampling unit in metres.

Elevation - Record the elevation of the sampled site in metres Above Sea Level (to convert feet to metres, multiply by 0.3048).

Slope Class - Record the slope class of sampling unit according to the following scale:

1. <2%
2. 2-5%
3. 6-10%
4. 11-15%
5. 16-30%
6. 31-45%
7. 46-60%
8. >60%

Aspect - Record aspect or slope orientation (true direction) according to the following scale:

1. North (337-22°)
2. Northeast (23-67°)
3. East (68-112°)
4. Southeast (113-156°)
5. South (157-202°)
6. Southwest (203-247°)
7. West (248-292°)
8. Northwest (293-336°)

Surficial Material - Record the numerical code that best defines the surficial material of the sampled site. (as defined by Canada Soil Survey Committee 1987, p. 142-143):

1. Anthropogenic
2. Colluvial
3. Eolian
4. Fluvial
5. Lacustrine
6. Morainal
7. Saprolite
8. Outwash
9. Glaciofluvial
10. Volcanic
11. Marine
12. Undifferentiated
13. Organic
14. Rock
15. Water
99. Other (please specify)

Drainage Class - Record the drainage category that best describes the site where vegetation sampling was conducted (Source: National Soil Survey Committee 1974):

1. Rapidly drained - Soil moisture content seldom exceeds field capacity in any horizon, except immediately after water additions. Soils are free of gleying throughout the profile. Rapidly drained soils are commonly coarse-textured or on steep slopes.

2. Well-drained - Soil moisture content does not normally exceed field capacity in any horizon (except possibly the C) for a significant part of the year. Soils are usually free of mottling in the upper 1 metre, but may be mottled below this depth. B horizons, if present, are reddish, brownish, or yellowish.

3. Moderately well-drained - Soil moisture in excess of field capacity remains for a small but significant period of the year. Soils are commonly mottled in the lower B horizon, if present, may be faintly mottled in fine-textured soils and in medium-textured soils that have a slowly permeable layer below the solum. In grassland soils, the B and C horizons may be only faintly mottled and the A horizon may be relatively thick and dark.

4. Imperfectly drained - Soil moisture is in excess of field capacity and remains in subsurface horizons for moderately long periods during the year. Soils are commonly mottled in the B and C horizons and the Ae horizon, if present, may be mottled. The matrix generally has a lower chroma than in the well-drained soils on similar parent materials.

5. Poorly drained - Soil moisture in excess of field capacity remains in all horizons for a large part of the year. The soils are usually very strongly gleyed. Except in high-chroma parent materials the B, if present, and upper C horizons usually have matrix colours of low chroma. Faint mottling may occur throughout.

6. Very poorly drained - Free water remains at or within 30 cm of the surface most of the year. The soils are usually very strongly gleyed. Subsurface horizons usually are very strongly gleyed, and usually are of low chroma with yellowish to bluish hues. Mottling may be present, but at depth in the profile. Very poorly drained soils usually have a mucky or peaty surface horizon.

Moisture Status - Record the moisture status that most closely characterizes the site:

1. Very xeric - Water is removed extremely rapidly in relation to supply; soil is moist for a negligible time after precipitation.
2. Xeric - Water is removed very rapidly in relation to supply; soil is moist for brief periods following precipitation.
3. Subxeric - Water is removed rapidly in relation to supply; soil is moist for short periods following precipitation.
4. Submesic - Water is removed readily in relation to supply; water is available for moderately short periods following precipitation.
5. Mesic - Water is removed somewhat slowly in relation to supply; soil may remain moist for a significant period; available soil moisture reflects climatic input.
6. Subhygric - water is removed slowly enough to keep the soil wet for significant parts of the growing season; some temporary seepage and mottling occurs below 20 cm.
7. Hygric - Water is removed slowly enough to keep the soil wet for most of the growing season; permanent seepage and mottling are present; soil may be weakly gleyed.
8. Subhydric - Water is removed slowly enough to keep the water table at or near the surface for most of the year; gleyed mineral or organic soils, are common permanent seepage is less than 30 cm below the surface.
9. Hydric - Water is removed so slowly that the water table is at or above the soil surface all year; gleyed mineral or organic soils are common.

Soil Texture - Record texture for depths of 0-20, 50, and 100 cm according to the following scale. For additional criteria, see Canada Soil Survey Committee (1987), p. 136. Measurements should begin at the top of the uppermost mineral horizon, or the substrate surface in an organic soil.

Mineral

1. Coarse - gravel, coarse sand, loamy sand, sand
2. Moderately Coarse - sandy loam
3. Medium - loam, silt, silty loam
4. Moderately Fine - clay loam, silty clay loam, sandy clay loam
5. Fine - clay, silty clay, sandy clay
6. Organic
7. Bedrock

Organic (von Post scale - Canada Soil Survey Committee 1987, p. 29)

1. Undecomposed - plant structure unaltered; yields only clear water colored light yellow brown.
2. Almost undecomposed - plant structure distinct; yields only clear water colored light yellow brown.
3. Very weakly decomposed - plant structure distinct; yields distinctly turbid brown water, no peat substance passes between fingers, residues not mushy.
4. Weakly decomposed - plant structure distinct; yields strongly turbid brown water, no peat substance escapes between fingers, residue rather mushy.

5. Moderately decomposed - plant structure clear but becoming distinct; yields much turbid brown water, some peat escapes between fingers, residue very mushy.

6. Strongly decomposed - plant structure somewhat indistinct but clearer in the squeezed residue than in the undisturbed peat; about a third of the peat escapes between the fingers, residue strongly mushy.

7. Strongly decomposed - plant structure indistinct but recognizable; about half the peat escapes between the fingers.

8. Very strongly decomposed - plant structure very indistinct; about two-thirds of the peat escapes between the fingers, residue almost entirely remnants such as root fibers and wood.

9. Almost completely decomposed - plant structure almost unrecognizable; nearly all the peat escapes between the fingers.

10. Completely decomposed - plant structure unrecognizable; all the peat escapes between the fingers.

Soil Great Group - Record soil Great Group according to definitions of Canada Soil Survey Committee (1987):

1. Melanic Brunisol
2. Sombric Brunisol
3. Eutric Brunisol
4. Dystric Brunisol
5. Brown Chernozem
6. Dark Brown Chernozem
7. Black Chernozem
8. Dark Gray Chernozem
9. Turbic Cryosol
10. Static Cryosol
11. Organic Cryosol
12. Humic Gleysol
13. Luvic Gleysol
14. Gleysol
15. Gray Brown Luvisol
16. Gray Luvisol
17. Fibrisol
18. Mesisol
19. Humisol
20. Folisol
21. Humic Podzol
22. Ferro-Humic Podzol
23. Humo-Ferric Podzol
24. Regosol
25. Humic Regosol
26. Solonetz
27. Solodized Solonetz
28. Solod

Soil Subgroup - Record soil Subgroup as defined by Canada Soil Survey Committee (1987):

1. Alkaline
2. Black
3. Brown
4. Brunisolic
5. Calcareous
6. Cumulo
7. Cumulic
8. Dark
9. Dark Brown
10. Duric
11. Eluviated
12. Fera
13. Fibric
14. Fragic
15. Glacic
16. Gleyed
17. Gleyed Black
18. Gleyed Brown
19. Gleyed Brunisolic
20. Gleyed Calcareous
21. Gleyed Cumulic
22. Gleyed Dark Brown
23. Gleyed Dark Gray
24. Gleyed Eluviated
25. Gleyed Fragic
26. Gleyed Ortstein
27. Gleyed Podzolic
28. Gleyed Rego
29. Gleyed Solonetzic
30. Gleyed Sombric
31. Gleysolic
32. Gray
33. Hemic
34. Histic
35. Humic
36. Hydric
37. Lignic
38. Limno
39. Luvisolic
40. Mesic
41. Orthic
42. Ortstein
43. Placic
44. Podzolic
45. Rego
46. Regosolic
47. Solonetzic
48. Sombric
49. Terric
50. Terric Fibric
51. Terric Mesic
52. Terric Humic
53. Typic
99. "Not Soil"

Successional Stage - Record numerical code that best describes the successional status of the sampled vegetation (based in part on Walmsley et al. 1980).

1. Pioneer - a community which has invaded disturbed or newly created sites, and represents the early stages of either primary or secondary succession.

2. Early Succession - a community which has not undergone a series of natural thinnings. Dominant plants are essentially growing as independent individuals rather than as members of a phytosociological community. It is

floristically similar to mid-successional stands but is juvenile in structure development.

3. Mid-Succession - a seral community which has undergone natural thinning as a result of species interaction and may show evidence of secondary succession (e.g., invasion of climax species) but is still dominated by seral species. May include stands with an over mature overstory.

4. Subclimax - a successionally maturing community dominated primarily by climax species but significant remnants of earlier seral stages may be present.

5. Climax - a climatic or edaphic community which is self-perpetuating and composed primarily of climax species. A successional stage with unevenly aged and multiple height classes.

Stand Age - Record age in years of the sampled vegetation (i.e., time since origin). This may only be possible for forest communities by counting the annual growth rings of trees.

Evidence of Disturbance - If known, record in order of occurrence:

1. logging
2. disease
3. insects
4. browsing
5. wind damage
6. snow/ice damage
7. fire
8. flooding
9. mining
10. pipeline
11. wellsite
12. agriculture
13. domestic grazing
14. toxic chemicals
15. urban development
99. other (please specify on reverse side of registry form)

Other Available Data Information -

1. mensuration data
2. age structure
3. soils description
4. soil-nutrient data
5. soil moisture data
6. wildlife habitat data
7. vegetation chemistry
8. microclimate data
9. stand history
99. other (please specify on reverse side of registry form)

Identification Code of Relevé - Identify the field sample name or number of relevé

Source of Data/Information - Identify the source of the data, if possible provide citation (i.e., author, date, title, and publisher/journal, volume, and pages).

Contributor - Indicate who is submitting the information, their title or position, address including postal code, phone, and the date submitted. This information will be used to develop acknowledgement lists and to clarify information.

Notes and Additional Information - Please add notes or explanations on the reverse side of the form.

Completed REGISTRY FORMS should be sent to the Chairman of the National Vegetation Working Group or to the provincial or regional coordinator. The names and addresses are available from: Secretariat, Canada Committee on Ecological Land Classification, Ecological Applications Research Division, Sustainable Development, Corporate Policy Group, Environment Canada, Ottawa, Canada K1A 0H3.

IF YOUR ADDRESS HAS CHANGED OR IF YOU WISH TO HAVE YOUR NAME ADDED TO OR DELETED FROM THE CCELC MAILING LIST, PLEASE COMPLETE THIS FORM AND SEND IT TO: SECRETARIAT, CANADA COMMITTEE ON ECOLOGICAL LAND CLASSIFICATION, SUSTAINABLE DEVELOPMENT, CORPORATE POLICY GROUP, ENVIRONMENT CANADA, OTTAWA, CANADA K1A 0H3.

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BACK COVER PHOTO CAPTIONS AND CREDITS

1. A Douglas fir/sword fern community near Cowichan Lake, Vancouver Island, British Columbia; this Pseudotsuga menziesii stand is a Tall, Closed, Evergreen Tree stand which is subtended by a nearly continuous cover of sword fern (Polystichum munitum) and mosses (Kindbergia oregana and Rhytidiadelphus loreus). Photo by E.T. Oswald.

2. A white birch/balsam fir community in Pukaskwa National Park, Ontario; this Betula papyrifera-Abies balsamea vegetation is a Tall, Closed, Mixed Tree stand which is subtended by a patchy cover of bush-honeyshuckle (Diervilla lonicera) and wild sarsaparilla (Aralia nudicaulis). Photo by N. Lopoukhine.

3. A rough rose community near Rivière-Ouelle, Quebec; this Rosa rugosa vegetation is an Intermediate, Closed, Deciduous Shrub stand. Photo by M.M. Grandtner.

4. A mountain heather-mountain heath community near Chilkoot Trail, northwest British Columbia; this alpine vegetation is a Low, Closed, Evergreen Shrub stand composed primarily of Cassiope mertensiana and Phyllodoce aleutica. Photo by W. L Strong.

5. A daisy-hawkweed meadow near Quebec City, Quebec; this is a Low, Closed, Forb community with Chrysanthemum leucanthemum, Hieracium aurantiacum, and Ranunculus acris; it is typical of unmanaged fields used for hay production. Rough alder (Alnus rugosa) borders the field. Photo by M. Darveau.

6. An alternate-flowered spartina community in Îles de la Madeleine Archipelago, Quebec; this salt marsh vegetation is a Low, Closed, Graminoid community of Spartina alterniflora. Photo by M.M. Grandtner.

7. An oceanic moss heath community dominated by Rhacomitrium lanuginosum in southeastern Newfoundland. Photo by W.J. Meades.

8. A closed lichen community (except for the rocky openings) on Southampton Island, Northwest Territories; dominant species are the lichens, Cetraria nivalis with C. tilesii, C. islandica, Dactylina arctica, Thamnolia subuliformis, Alectoria ochroleuca, and Stereocaulon alpinum, along with Saxifraga tricuspidata, S. oppositifolia, Salix arctica, Pedicularis sp., and Draba sp. Photo by E.T. Oswald.

Legend for Back Cover Photos

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5	6
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