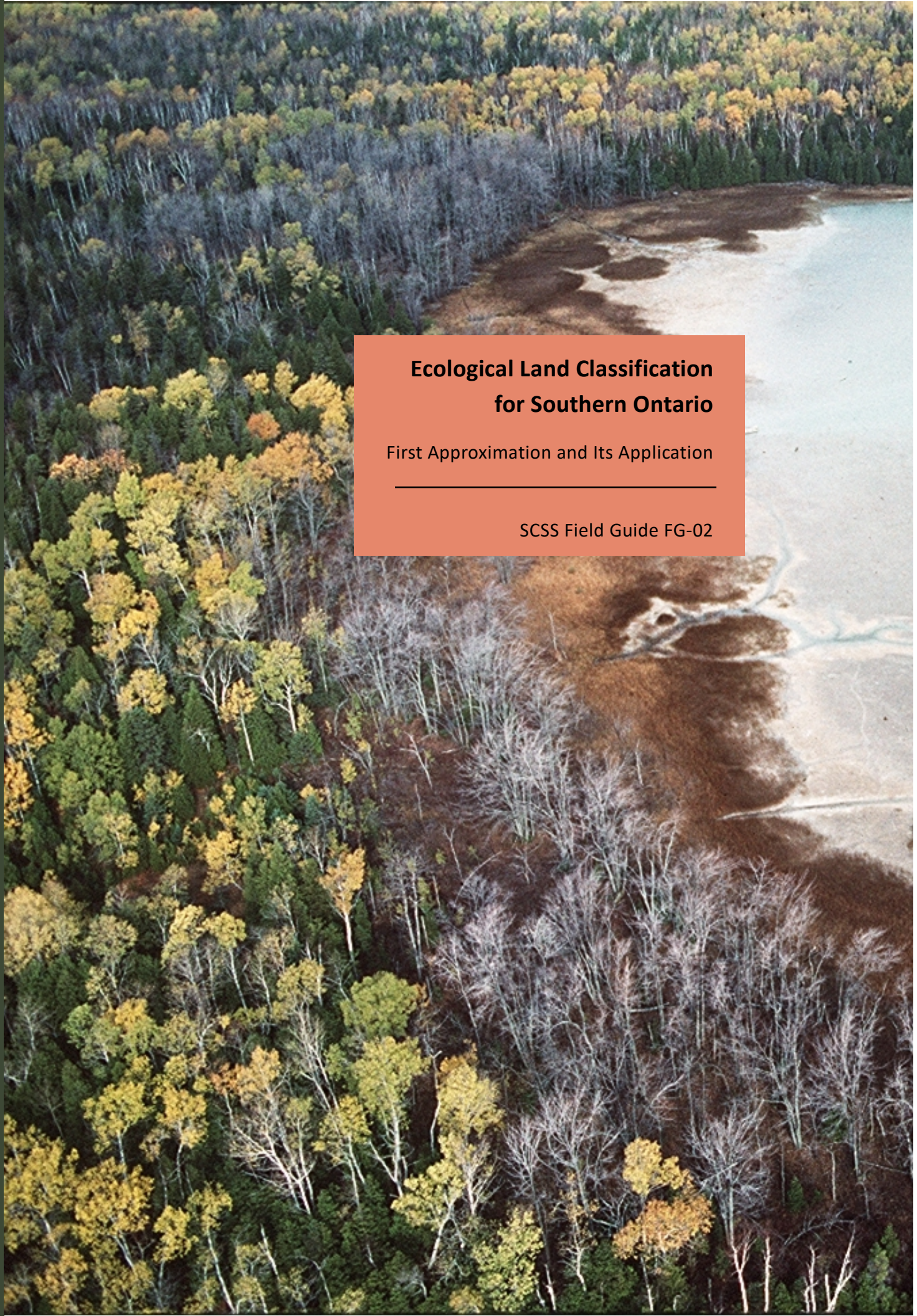

Ecological Land Classification for Southern Ontario

First Approximation and Its Application

SCSS Field Guide FG-02

Ministry of Natural Resources
Ontario

Ecological Land Classification for Southern Ontario

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Sustainable Forestry Initiative

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Ecological Land Classification for Southern Ontario

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About This Manual

This manual presents the tools and techniques that have been developed for the consistent description, identification, classification and mapping of ecological land units in Southern Ontario. This manual has been organized into two parts and contains the following components:

Part I Ecological Land Classification

1. Background
2. Orientation to the Classification
3. ELC Keys
4. ELC Community Tables
5. ELC Photo Album

Part II Application

6. Context for the ELC
7. How to Apply the ELC
8. Description Framework
9. Field Sampling Methods and Data Cards
10. Soil Description
11. Case Study

This first approximation of the ELC is based on an analysis of over 4,000 descriptions of documented communities. For this first approximation, the more natural, less anthropogenic communities found in Southern Ontario have been emphasized. However, better identification and resolution of the more cultural or anthropogenic communities will follow in subsequent editions of the ELC, as more data are collected, analyzed and incorporated into the classification.

The approach to applying the ELC was developed through a cooperative pilot project among the Ecological Land Classification program, Credit Valley Conservation, the Natural Heritage Information Centre, the Forest Resource Inventory Section of the Ontario Ministry of Natural Resources (OMNR) and Jane Bowles (private consultant). It was developed to meet the current needs of ecosystem management and ecological land-use planning.

The ELC presented here should not be considered static; instead, it will develop, over time, through progressive iterations. Expect the ELC to be refined through further analysis and field testing as additional ELC units are described and sampled. Practitioners are encouraged to submit community descriptions and data not currently found in the ELC to the ELC program for review and possible incorporation.

This manual is the first in a series of ELC-related publications. There will be two subsequent publications: one will relate to the data that have been collated and put into a standardized database; the second will be a series of community factsheets to act as a reference source for the ELC. These publications are as follows:

> Bakowsky, W.D., H.T. Lee, and J.L. Riley. In prep. Ecological Land Classification for Southern Ontario: Catalogue of Documented Community Descriptions. Natural Heritage Information Centre, Ontario Ministry of Natural Resources, Peterborough, Ontario.
>
> Lee, H.T. In prep. Ecological Land Classification for Southern Ontario: Community Factsheets. Ontario Ministry of Natural Resources, Southcentral Science Section, Science Development and Transfer Branch. SCSS FG-03.

Part 1: Ecological Land Classification (ELC)

1. Background

ELC in Canada

Since the early 1950s, there has been considerable work done across Canada to develop integrated, ecological approaches to land-unit description and classification (see Bailey et al. 1978; Sims and Uhlig 1992; Uhlig and Baker 1994 for useful reviews). In Canada, this integrated approach to surveying and classifying land and resources has been called Ecological Land Classification (ELC). The goal of such classification schemes is to identify recurring ecological patterns on the landscape in order to reduce complex natural variation to a reasonable number of meaningful ecosystem units (Bailey et al. 1978).

The pioneering work of Hills (1952, 1958) in Ontario, Krajina (1965) in British Columbia and national-level work by Rowe (1962, 1971, 1972; Rowe and Sheard 1981) has provided much of the conceptual basis for developing Ecological Land Classifications in Canada. Hills and other authors have defined ELC in terms of spatial hierarchies (Hills 1958; Bailey 1983, 1987; Bailey et al. 1978; Wickware and Rubec 1989a). Hills's approach designated functionally and spatially related units; from broad to fine scale they are Site Region, Site District, Landscape Unit, Site Type and Site Phase. Hills's hierarchical framework was capable of integrating resource inventories at various scales and it has been used for a variety of purposes by the Ministry of Natural Resources to guide planning and management. The reader is encouraged to consult Sims (1992) and Sims and Uhlig (1992) for recent compilations of the history of this pioneering work.

In Ontario, the ELC program has used Hills's work as a bench-mark, a basis upon which to build quantitatively based ecological units at the site-level scale. This modern effort follows the work of the Canada Committee on Ecological Land Classification (CCELC). The CCELC has generated a uniform terminology and descriptions for the hierarchical levels of the Canadian ecosystem classification system. The CCELC has set six hierarchical levels including Ecozone, Ecoprovince, Ecoregion, Ecodistrict, Ecosite and Ecoelement (Environmental Conservation Service Task Force 1981; Wiken 1986; see Table 1). The Ecological Land Classification program in Ontario is developing a quantitative ecological hierarchy using the levels set out by the CCELC (Sims and Uhlig 1992; Uhlig and Baker 1994). The levels in this proposed hierarchy, along with their operating scale and their applications, are summarized in Table 1.

Many jurisdictions have developed ecological classification schemes, including British Columbia (Krajina 1965; Pojar et al. 1987; Klinka et al. 1991; Meidinger and Pojar 1991), Alberta (Corns and Annas 1986), Ontario (see Sims and Uhlig 1992 for review), Newfoundland (see Meades and Roberts 1992 for review) and many areas in the United States (e.g., Bailey 1976, 1980, 1987; Reschke 1990; Nelson 1987; Kotar et al. 1988). Ecozones to Ecodistricts have been defined and mapped across Canada (Wickware and Rubec 1989b).

In Northern and Central Ontario, the Forest Ecosystem Classifications (FEC) have been developed using the baseline already established by earlier landscape and stand studies (Jones et al.1983; Merchant et al. 1989; Sims et al. 1989; McCarthy et al. 1994; Chambers et al. 1997). These products are the first step towards developing a quantitative ELC hierarchy in Ontario. Through the analysis of data collected in thousands of ELC plots, the Ecosite level in the ELC hierarchy has been well established. In general, the derivation of Ecosites is based on the establishment of identifiable and recurring patterns among analytically derived Vegetation Types and Soil Types (Racey et al. 1996; Chambers et al. 1997). The ELC approach provides a framework whereby ecological units are delineated on the basis of the most stable and significant characteristics of the ecosystem.

Table 1. The proposed spatial hierarchy of Ecological Land Classification units, scales, recommended tools and application for Ontario (modified from Racey et al. 1996; based on Environmental Conservation Service Task Force 1981 and Wiken 1986).

Classification Unit[1]	Appropriate Scale[2]	Recommended Tools[3]	Example of Management Applications
Ecozone	1:3,000,000 10,000-1,000,000 km^2	Wiken (1986)	Ecological context for Ontario; planning; policy
Ecoprovince	1:1,000,000 10,000-100,000 km^2	Wiken (1986)	Ecological context for Ontario; planning; policy
Ecoregion	1:500,000 1000-10,000 km^2	Hills's Site Regions of Ontario (Hills 1961, Burger 1993)	Strategic planning at regional or sub-regional levels; policy
Ecodistrict	1:250,000-1:500,000 100-1000 km^2	Hills's Site Districts of Ontario (Hills 1961)	Strategic planning at sub-regional level, watershed plans; policy
Ecosection	1:100,000-1:250,000 1000-10,000 ha	Ontario Land Inventory (OMNR 1977), Physiography of Southern Ontario (Chapman and Putnam 1984)	Major landform contributions for forest prime land, broad habitat trends, watershed and subwatershed plans
Ecosite	1:10,000-1:20,000 10-100 ha	Ecological Land Classification for Southern Ontario: First Approximation and Its Application	Ecosystem mapping; conservation; inventory; regional planning; evaluation; silvicultural ground rules; wildlife habitat; subwatershed plans
Ecoelement	1:2,000-1:10,000 100-100,000 m^2	Vegetation Type in the Ecological Land Classification for Southern Ontario: First Approximation and Its Application	Site and stand level research; inventory; development proposal; environmental impact assessment; evaluation; conservation

Notes

1. Units according to the Canada Committee on Ecological Land Classification (CCELC) (Environmental Conservation Service Task Force 1981; Wiken 1986).

2. Appropriate scales are identified, first in terms of appropriate cartographic scale, then in terms of typical size or resolution.

3. Not all levels of ELC are represented by products suited for use in Southern Ontario. Recommended tools include existing maps, classifications and publications available to land managers that represent ecological features at appropriate scales.

ELC in Ontario

The goal of the provincial Ecological Land Classification (ELC) program is to establish a comprehensive and consistent province-wide approach for ecosystem description, inventory and interpretation. The ELC framework is being designed to facilitate key conservation, planning and ecosystem management objectives, at various site to landscape scales of resolution (Uhlig and Baker 1994; Lee 1993).

The key focus of the ELC is to improve our ability to manage both natural resources and the information about those resources. Now, more than ever, we need a uniform and consistent way to identify, describe, name, map, manage and conserve important landscape patterns and communities (Riley and Mohr 1994). To accomplish this, all resource management partners will need a common framework by which to collect, organize, analyze and report on ecological information (Brownell and Larson 1995; Riley and Mohr 1994).

Having a standardized community framework will assist in the implementation of ecosystem-based management initiatives. The ELC will provide community descriptions and sampling methodologies for identifying and mapping valuable natural heritage features and areas. This will help municipalities to meet their obligations under the new system of planning in Ontario, as outlined in Policy 2.3 in the Provincial Policy Statement (PPS) (Province of Ontario 1997).

The ELC is an organizational framework, designed to be used at different scales. It is currently being incorporated into the Ministry of Natural Resources' Natural Resources Values and Information System (NRVIS Version 2), which should facilitate linking it to geographic information systems (GIS) and other local and regional databases. Furthermore, the ELC is the framework adopted by the Natural Heritage Information Centre (NHIC) for community ranking (Bakowsky 1998) and database management of community-related data. It will provide decision-making information at several geographical, ecological and administrative levels.

The ELC is designed to be flexible and expandable. This first approximation of the ELC represents a synthesis and organization of over 4,000 community descriptions (Bakowsky et al. in prep). However, as we learn more about the ecology of Southern Ontario through field sampling, reviews of this product and additional community descriptions from others, the ELC will be further refined.

Mapping and inventory will become important components of the ELC. To be useful, ecological units must be mappable. The ELC program must provide, at the minimum, the demonstration of operational mapping technologies at a variety of scales. The approaches to air-photo interpretation and mapping of ELC units have been developed in Northwestern Ontario (Arnup and Racey 1996). We are currently refining these approaches for application to Southern Ontario. Identification of Ecosites and Vegetation Types in the field is another important component of the ELC. The ELC must also include education and technology transfer to train all potential users in understanding the concepts of the ELC and to provide them with the skills to use it effectively.

The ELC will form the basis for ongoing research by providing objective stratification and sampling of ecological conditions. This will be especially important for major applications such as growth and yield studies, vegetation management studies, long-term ecological research, forest management, wildlife habitat analysis, life science inventories, park planning, private land stewardship, restoration and land-use planning.

This manual focuses on the practical application of ELC and should allow users to apply the first approximation of the ELC to a variety of needs while accommodating users to provide additional information for the refinement of the classification system.

Regional Context

This manual and the ELC for Southern Ontario apply to land and water units found within the 1995 Southern Ontario administrative region of the Ontario Ministry of Natural Resources. This area is represented by Hills's Site Regions 6E and 7E (Burger 1993). The manual and ELC, therefore, apply to the area roughly enclosed by the Ontario–Quebec border, along the north shores of Lake Ontario and Lake Erie, up the east shoreline of Lake Huron to the tip of the Bruce Peninsula, around Georgian Bay to Midland, and eastward through Orillia, Marmora and over to Arnprior (Figure 1). This area does not include Manitoulin Island.

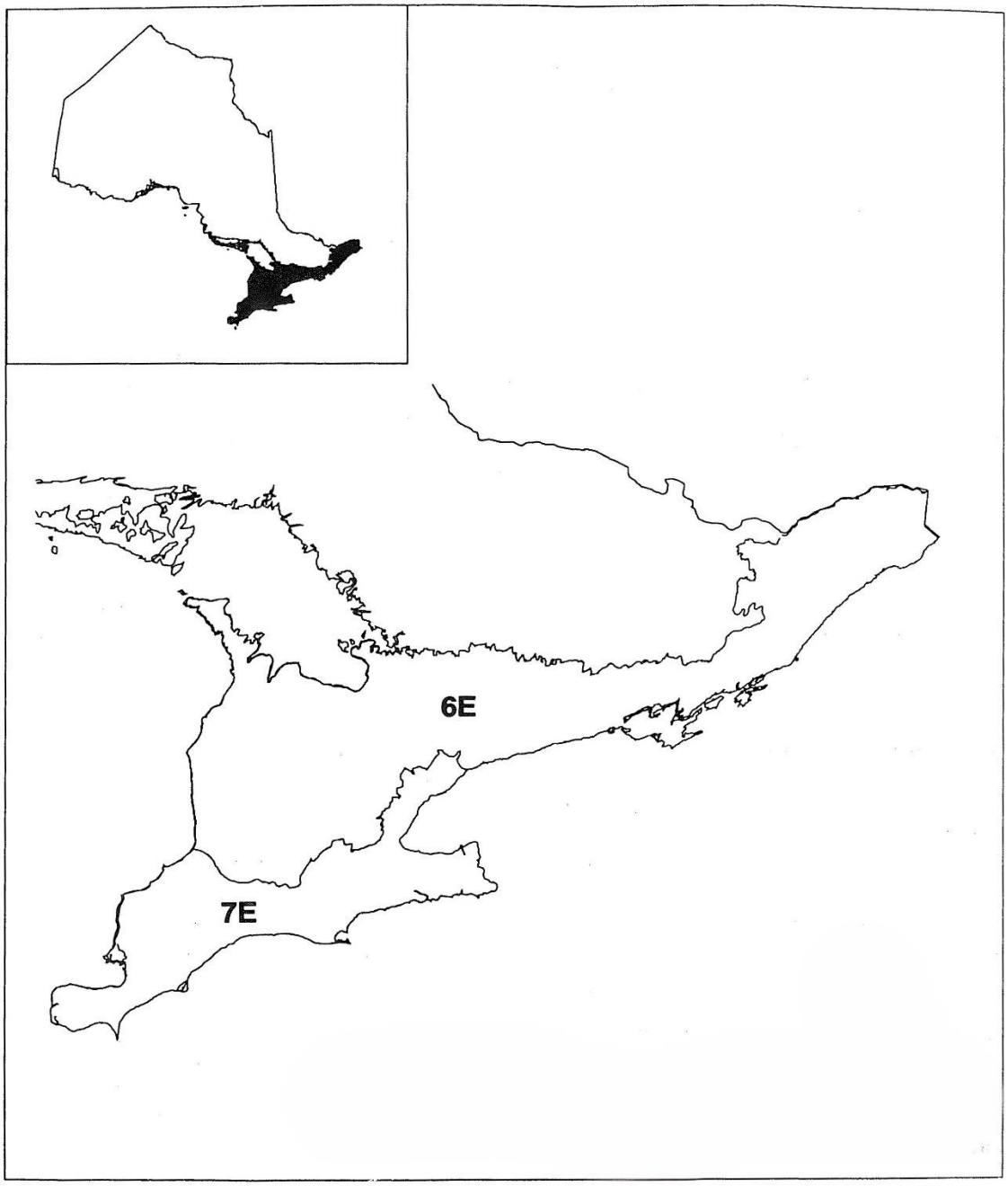


Figure 1. Maps showing the geographical area to which this manual and the Southern Ontario ELC are applicable. Site Region lines according to Jalava et al. 1997.

Development of the ELC in Southern Ontario

The development of the Southern Ontario ELC began by first drawing upon many of the existing community descriptions documented across Southern Ontario. Through examination of these existing data, we have begun approximating the overall hierarchy for the ELC and identifying the different natural communities found in Southern Ontario. While this first approximation of the ELC has been developed from existing information, the ELC field sampling program is concentrating on collecting the quantitative data needed for further, more detailed analyses. By comparing the results of the first approximations with the analysis of the field data, we can go through a series of iterations to progressively define and refine the units in the classification.

Step 1 - Collating Existing Information Sources

The first task was to locate, review and collate existing information on documented community types. This involved evaluating life science inventories, along with various other surveys and data sources. The community-type descriptions found within these sources were collated by systematically cataloguing the data. The primary data sources for this exercise are as follows.

Maycock, Paul, F. 1979. A Preliminary Survey of the Vegetation of Ontario as a Basis for the Establishment of a Comprehensive Nature Reserve System. Provincial Parks Branch, Ontario Ministry of Natural Resources, Toronto. 2 volumes.

In the late 1970s, the Parks and Recreation Branch set up a standard format for the inventory and evaluation of natural areas in Ontario. The criteria were developed principally by Dr. Paul Maycock, a faculty member with the Department of Botany at the University of Toronto. His surveys have been instrumental in developing the framework for a comprehensive nature reserve system in Ontario. Most of the ecological surveys have been done, at least in part, using his system.

Life Science Inventories of Areas of Natural and Scientific Interest (ANSI) and Ontario Provincial Parks

Many of the ANSI and Parks in Southern Ontario have life science inventories. A comprehensive listing of these inventories can be found in either Lee and Brand (1993) or Riley et al. (1998). Community-type descriptions for these inventories have been standardized to include lists of plant species, in order of decreasing dominance, along with corresponding soil texture, soil moisture and microclimate. The principal standards followed for these inventories are those developed by Dr. Paul Maycock, as outlined above.

International Biological Program (IBP) Inventories

In 1968, the International Biological Program set out to identify and describe important natural areas for preservation. For each area identified, a series of check sheets was completed. Included in these check sheets are descriptions of the community types identifying the different plant communities and species lists, as well as documentation of the associated site descriptions and soil properties. Similar standards were used in the IBP inventories as in the above ANSI reports.

Research Surveys

Many research oriented surveys have been conducted of the unique or uncommon community types found in Southern Ontario. Data from selected surveys were collated. These include: Dr. Doug Larson, Dr. Uta Mathes-Sears, Janet Cox, Steven Spring, John Riley, Jarmo Jalava, and Steve Varga – **Niagara**

escarpment cliff and talus data; Wasyl Bakowsky, Don Faber-Langendoen, and Dr. P. Maycock – **Tallgrass prairie and savannah data**; Wasyl Bakowsky, Claudia Schaeffer, Jarmo Jalava, Anthony Goodban, Joyce Belcher and Dr. Paul Keddy – **Alvar data**; John Riley, Ian MacDonald, Harold Lee – **wetland data**; **ELC forest data.**

Although the community descriptions found within these sources represent diverse historical works, done by different people according to different standards, they still provide a large volume of useful data for developing an ELC. The various limitations of such a database are, therefore, overcome by the more general usefulness of such a large number of community descriptions.

The community descriptions found in the above sources have been screened, collated and entered into a database. The minimum data required for this collation was a listing of the plant species in order of decreasing dominance and notes on soil texture and soil moisture. Each community description has been referenced to the original data source.

To date, over 4,000 community-type descriptions have been collated and entered into this database. A listing of these community descriptions, used to generate the ELC, has been developed into a reference document, Ecological Land Classification for Southern Ontario: Catalogue of Documented Community Types (Bakowsky et al. in prep)

Step 2 - Analysis and Organization of Existing Information

With many of Southern Ontario's existing community types catalogued, the establishment of the current approximation proceeded. To aid in this process, existing ecological literature was reviewed to acquire additional general information about community definitions and to understand more fully the ecological factors responsible for the different community types.

Analysis of the catalogued data initially involved the sorting of the database according to species. This sorting of species data is known as tabular sorting, a method first developed by the European ecologist Braun-Blanquet (Mueller-Dombois and Ellenberg 1974). For example, this process brings together all the documented community types with Eastern White Cedar (*Thuja occidentalis*) as the primary dominant. Furthermore, the sorting involves the linking of community descriptions with similar dominants found on the same soil textures, soil moisture and microclimate.

Ultimately, in this first approximation, the individual community-type units were identified and defined based on recurring species patterns and their association with the other community components such as soil texture, soil moisture, topographic position and understorey species associates. To continue with the above example, all community descriptions where White Cedar was dominant were separated into at least 13 separate White Cedar units (at the Ecosite level in the classification). They were divided to distinguish upland dry, lowland moist, swamp, cliff rim, talus, rockland, forest and cultural types that have White Cedar as a dominant tree species. Therefore, the ecosite units are based as much on the patterns of varying environmental or historical conditions as they are on species composition.

Step 3 - Using New Quantitative Field Data

While existing information is being used to generate a first approximation of community-type units, new quantitative field data are being collected. The goal is to collect more detailed field data for the testing and refining of the first approximation of ELC components.

Forested communities have been selected as the first component to be quantitatively sampled in the field by the ELC program. A standard field sampling procedure has been developed for forests following those set by the provincial and other regional ELC programs. These procedures can be found in The Ecological Land Classification Field Manual for Forests (Chambers and Lee 1992). At present, there are 942 ELC forest sample plots spread out across Southern Ontario in Site Regions 6E and 7E.

The next priority for the acquisition of new data will be in wetlands, to develop quantitatively based ELC wetland units.

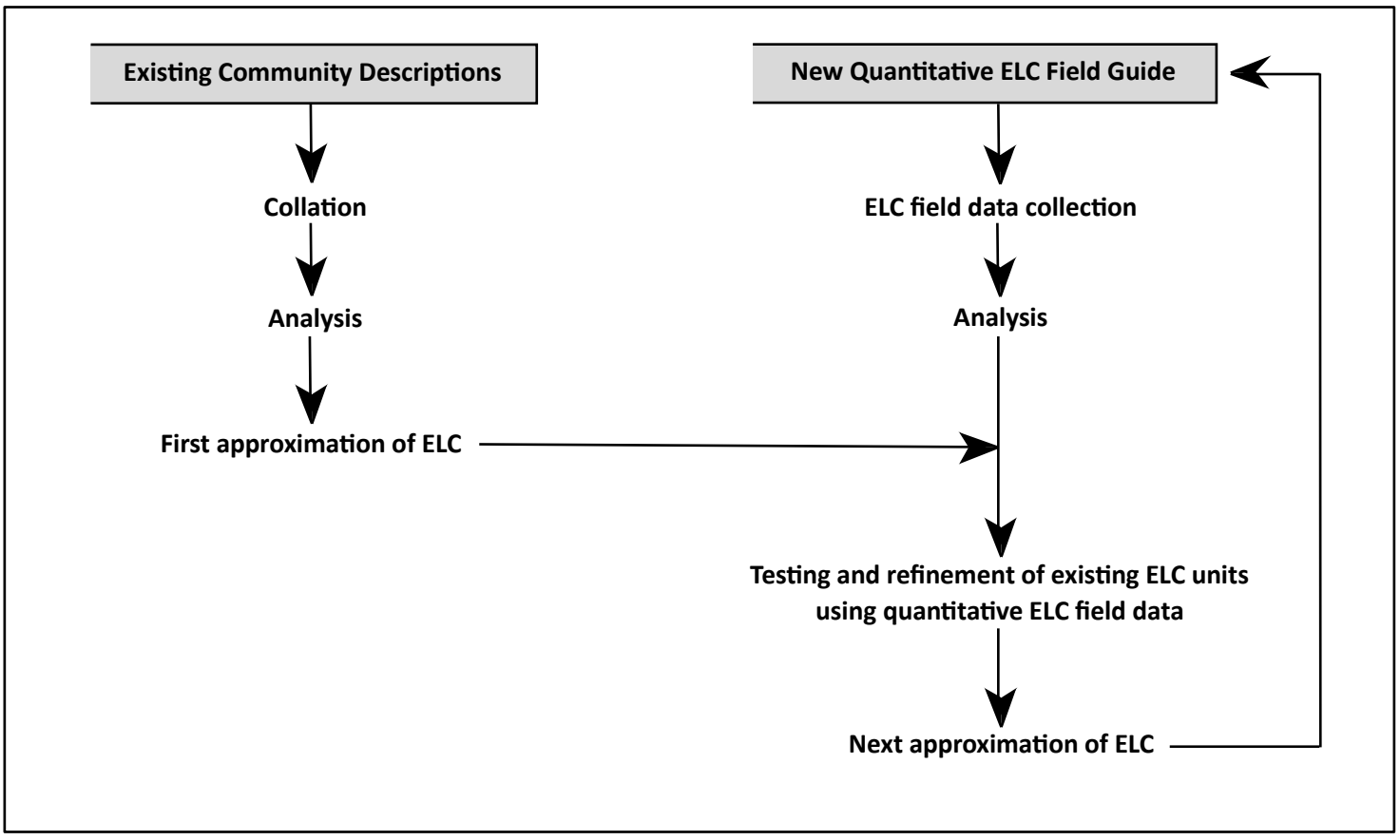


Figure 2. Schematic representation of the iterative approach used to develop the ELC in Southern Ontario.

Steps 4 and on - Further Refinement through Iterations

Currently, the first approximation of the ELC framework is based on existing data. It represents a stable classification framework that can be used now, for the description, classification, mapping, evaluation, planning and management of natural communities in Southern Ontario. The ELC will go through successive iterations as new data are collected, analyzed and used to test and refine the existing units in the classification (Figure 2).

The next target for developing the ELC will be the further refinement of those communities that are culturally derived. Much of Southern Ontario has a legacy of various land-use practices, whether intensive (i.e., clearing) or passive (i.e., grazing, management). Research will be carried out on the variety of communities arising from different land-use practices. Later incorporation of these culturally based communities into the ELC framework will meet the current need to describe, map, plan and manage this diverse set of landscape units.

While the development and refinement of the first approximation continues, based on existing data, there is ongoing field data collection by the ELC program in the forest communities across Southern Ontario. Multivariate analysis of the forest data will test and further refine the existing forest units within the ELC. By comparing the results of the first approximations with the analysis of the field data, we can progressively define and refine the forest units in the classification. This will ultimately lead to the generation of a Forest Ecosystem Classification for Southern Ontario (FEC), much like the FECs that have been produced for the other regions (Jones et al.1983; Merchant et al. 1989; Sims et al. 1989; McCarthy et al. 1994; Chambers et al. 1997).

Refinement and development of the ELC will be an open process. To date, its development has benefited from the diversity and expertise of the many people that have been involved. Its further development could certainly benefit from the involvement of others. We, therefore, encourage any reviews and feedback you may have. Furthermore, we encourage those who know of, or subsequently find, community units that are currently not in the ELC to contact us and submit data for possible incorporation (see Appendix C).

Field Trials

The ELC and the application tools and techniques presented here have been developed and tested through an ELC Pilot Project, a private consulting contract and field trials.

The Field Sampling Methods and Data Cards, along with the integrated database to handle ELC-related information, were developed through a pilot project. The ELC program with Credit Valley Conservation, Jane Bowles, the Forest Resource Inventory Section (OMNR) and the Natural Heritage Information Centre were involved in this pilot. The objective of the pilot was to develop ELC-related field methodologies and databases to meet the planning and management needs of the Credit Valley Conservation's Natural Heritage Project.

The Description Framework and ELC Keys were subsequently developed and field tested by Jane Bowles and the ELC program. They were developed to standardize community descriptions across Southern Ontario. More important, this description framework increases the power of databases by making the description of communities uniform and consistent.

2. Orientation to the Classification

Organization of the ELC Framework

The ELC is made up of six nested levels. From the largest to the smallest scale, they are:

Site Region
System
Community Class
Community Series
Ecosite
Vegetation Type

These six nested levels of the ELC represent an organizational framework. The framework incorporates three levels (shaded above) that allow a community to be placed spatially within ecological zones in Ontario. That is, an Ecosite designation is only meaningful if you know which Site Region you are within. These three levels in the ELC framework put a community into a spatial context, following the hierarchy set by the CCELC (Table 1).

Furthermore, this framework also incorporates three other levels that allow us to understand better a community's ecological organization. That is, there are recurring community patterns across our landscape, based on recurring suites of ecological conditions. These units use the terms that have been well established in the fields of natural science and ecology. Terms such as fen, swamp or alvar summarize suites of ecological conditions that are not confined to any particular geographic location.

Therefore, the ELC in Southern Ontario blends the ability to put landscape units into a spatial context (i.e., "you are here...") with the ability to understand their community-related organization (e.g., "it is a bog").
Definitions of ELC Levels

Definitions of ELC Levels

Site Region

Site Region represents the highest level (coarsest resolution) of the ELC. It was developed by Hills (1952, 1958, 1960, 1976) and his co-workers (Pierpoint 1964; Burger 1972, 1976, 1993; Burger and Pierpoint 1990) to provide forest and land managers with a province-wide ecological framework (Burger 1993). Hills's Site Regions, as modified by Jalava et al. (1997), are being used for the Ecoregion level in the ELC hierarchy (see Figure 1).

In developing the 13 Site Regions of Ontario, Hills and his colleagues stressed the dependance of forest cover on climate, soil moisture, soil nutrients and disturbance. They defined site regions as "areas of land within which the response of vegetation to the features of landform follows a consistent pattern" (Hills 1966). Southern Ontario is composed of two of Hills's Site Regions: 6E and 7E (Figure 1).

Site Region 6E, the Lakes Simcoe – Rideau Site Region, occupies the northern portion of Southern Ontario in what Rowe (1972) called the Great Lakes – St. Lawrence Forest Region. This area is characterized by mixed forests of White Pine (Pinus strobus) and Red Pine (Pinus resinosa), Eastern Hemlock (Tsuga canadensis), Sugar Maple (Acer saccharum), Red Maple (Acer rubrum), Yellow Birch (Betula alleghaniensis), Red Oak (Quercus rubra) , Basswood (Tilia americana) and White Elm (Ulmus americana). Other wide-ranging species include Eastern White Cedar (Thuja occidentalis), Largetooth Aspen (Populus grandidentata), Beech (Fagus grandifolia),

White Oak (Quercus alba), Butternut (Juglans cinerea) and White Ash (Fraxinus americana) (Hills 1959; Rowe 1972).

In contrast, Site Region 7E, the Lakes Erie–Ontario Site Region, occupies the southern-most portion of Southern Ontario in what Rowe (1972) called the Deciduous Forest Region. This region is dominated by deciduous tree species, such as Sugar Maple, White Elm, Beech, Black Cherry (Prunus serotina), White Ash, Red Oak, White Oak, Red Ash (Fraxinus pennsylvanica) and Butternut (Hills 1959; Maycock 1963; Rowe 1972). Other, less common yet distinctive tree species include Tulip-Tree (Liriodendron tulipifera), Paw-Paw (Asimina triloba), Cucumber-Tree (Magnolia acuminata), Kentucky Coffee Tree (Gymnocladus dioicus), Black Gum (Nyssa sylvatica), Blue Ash (Fraxinus quadrangulata), Sassafras (Sassafras albidum), Black Walnut (Juglans nigra), Sycamore (Plantanus occidentalis), Swamp White Oak (Quercus bicolor), Big Shellbark Hickory (Carya laciniosa) and Pignut Hickory (Carya glabra), Black Oak (Quercus velutina) and Pin Oak (Quercus palustris).

System

System is an organizational level in the ELC that helps reduce a complex natural landscape into a small number of community-based units. It serves as a more generalized organizational level that summarizes important ecological patterns and processes. Although System does not represent a level in the proposed spatial hierarchy for Ontario (Table 1), it does represent a useful organizational and conceptual level for the classification system.

System has been frequently used as an organizational level by those responsible for categorizing and classifying natural communities (e.g., Reschke 1990; Kavanagh 1990). Similarly, many other community-oriented classification systems have used comparable units for organizing communities. Various names, such as Community Types (e.g., Nelson 1987) or Formation Types (e.g., Jeglum et al. 1974), may have been used in the past as analogous organizational levels in other classification schemes.

The differences among larger scale Systems is mainly based on the relation between the substrate surface and the depth of the water table (Curtis 1959). Communities are differentiated by the response of the vegetation to differing ecological conditions along a water depth and soil moisture regime gradient. This classification follows the separation of communities into three Systems: Aquatic, Wetland and Terrestrial Systems.

The Aquatic System includes shallow or deep standing or flowing waters with little or no emergent vegetation. The depth of the water from the substrate surface, along with its influence on light penetration, represents the primary influence on such communities. Typically, aquatic communities are in water greater than 2 m deep. Within the Aquatic System, deep, open bodies of water are distinguished from those dominated by submerged and floating-leaved plant species.

The Wetland System includes those areas where water levels fluctuate and are under 2 m in depth. It is the predominance of emergent hydrophytic herbaceous and woody vegetation that best distinguishes wetlands from aquatic communities. Further separation of wetland communities is based on the extent and duration of flooding, combined with substrate type, disturbance (i.e., shoreline energy) and levels of available nutrients (Hutchinson 1975; Van der Valk 1981; Day et al. 1988; Keddy and Reznicek 1986; Zoltai and Vitt 1995).

The Terrestrial System includes all those upland areas where the water table is normally below the substrate surface. In many upland areas, unlike communities in the Aquatic and Wetland Systems, soil moisture is scarce at some point in the growing season. The distribution and abundance of plant species in upland areas are,

therefore, affected by the availability of soil moisture, as well as by the nature of the parent material, physiography, soil depth and texture, drainage, disturbance and the levels of available nutrients (Curtis 1959; Grime 1979).

Community Class

The Community Class level, like System, is a useful organizational level for the classification, but is not part of the proposed spatial hierarchy for Ontario (Table 1). Community Classes are useful for organizing communities into groups, based on some similar, yet generalized, ecological patterns and processes.

Many of the Community Class units will be familiar, having been part of the natural history and community ecology dialogue for many years. They range from units that have been very clearly defined (e.g., forest, marsh, cliff) to those that are broader or more vague (e.g., rock barren, savannah, sand barren). The objective here is not to re-invent any of these terms but to incorporate in the classification the most widely accepted definitions of these units to create a uniform and consistent classification format.

The criteria used to identify or discriminate among different community classes varies. Ultimately, the division of Community Classes is based on recurring patterns in plant species associations that have shared physiognomic characteristics, substrate type, geology and meso- and microclimate, as well as other ecological factors. For example, a cliff is readily identified by a near-vertical exposure of consolidated rock. In contrast, to identify a tallgrass prairie, savannah and woodland, the relative per cent cover of trees along with the identification of a specific tallgrass assemblage of herbaceous species is necessary. The criteria used to identify each Community Class is documented in the ELC Keys and Community Tables.

Community Series

Community Series also represent a useful organizational level for the classification yet are not part of the proposed spatial hierarchy for Ontario (Table 1). Community Series units break down Community Classes into units that are normally visible and consistently recognizable on air-photos or from a combination of maps, air-photo interpretation and other remote sensing techniques. Community Series are the lowest level in the ELC that can be identified without a site visit.

Community Series are distinguished based on the type of vegetation cover or the plant form that characterizes the community. For the most part, Community Series are identified based on whether the community has open, shrub or treed vegetation cover, as well as whether the plant form is deciduous, coniferous or mixed. These differences in vegetation cover typically reflect differences in disturbance levels, light levels and various other environmental gradients.

Ecosite

Ecosite is defined as “a part of an Ecosection having a relatively uniform parent material, soil and hydrology, and a chronosequence of vegetation”, according to the Canada Committee on Ecological Land Classification (Table 1). That is, it is a mappable, landscape unit integrating a consistent set of environmental factors and vegetation characteristics. They represent the recurring plant species patterns selected for, and maintained, by varying ratios of different environmental factors.

In Northern and Central Ontario, the Forest Ecosystem Classifications (FEC) (Jones et al. 1983; Merchant et al. 1989; Sims et al. 1989; McCarthy et al. 1994; Chambers et al. 1997) and the Northwestern Region Wetland Classification (Harris et al. 1996) have been instrumental in refining the concept of Ecosites. This work has found that the principal elements used to define and identify Ecosites are:

Geology	Soils	Vegetation
bedrock type	depth	structure
	texture	species composition
	moisture regime	physiology
	nutrient regime	
	drainage	

Vegetation Type

Vegetation Type is the finest level of resolution in the ELC. Vegetation Type represents a close analogue to the Ecoelement level in the CCELC hierarchy in Table 1.

Vegetation Types are recurring patterns found in the plant species assemblages associated with a particular Ecosite. Vegetation Types are generated by grouping plant communities that are most similar together, based entirely on the plant species composition. The goal is to distill the natural diversity and variability of plant communities to a small number of relatively uniform vegetation units. Naming the Vegetation Types normally includes the names of the species that dominate the plant community, according to relative cover.

Conventions of Terminology

When using the keys and community tables in this manual, use the following terminology and conventions or refer to other terms found in the Glossary.

Vegetation Terms and Conventions

The following terms and conventions apply to vegetation characteristics used in the ELC keys and in the Vegetation Characteristics column of the ELC Community Tables. They are used as criteria to help distinguish communities.

Cover: Is the area of ground covered or the relative proportion of coverage a particular plant species, vegetation layer or plant form represents. Cover can be expressed in relative or absolute terms.

Relative Cover: Cover as a proportion of the total canopy cover a particular species, vegetation layer or plant form represents; e.g., "coniferous species > 75% of canopy cover" means coniferous species make up greater than 75% of the canopy (coniferous forest) but do not necessarily cover at least 75% of the total ground area (refer to Table 2 and the example in Figure 4).

Absolute Cover: Proportion of the ground area, expressed as a per cent, covered by a particular plant species, vegetation layer or plant form; e.g. "shrub cover > 25%" means greater than 25% of the ground surface has shrub cover. Absolute cover is assessed by estimating the area on the ground covered by the shadow created by the vertical projection of the vegetation canopy (refer to Figure 3 and Table 2 and the example in Figure 4).

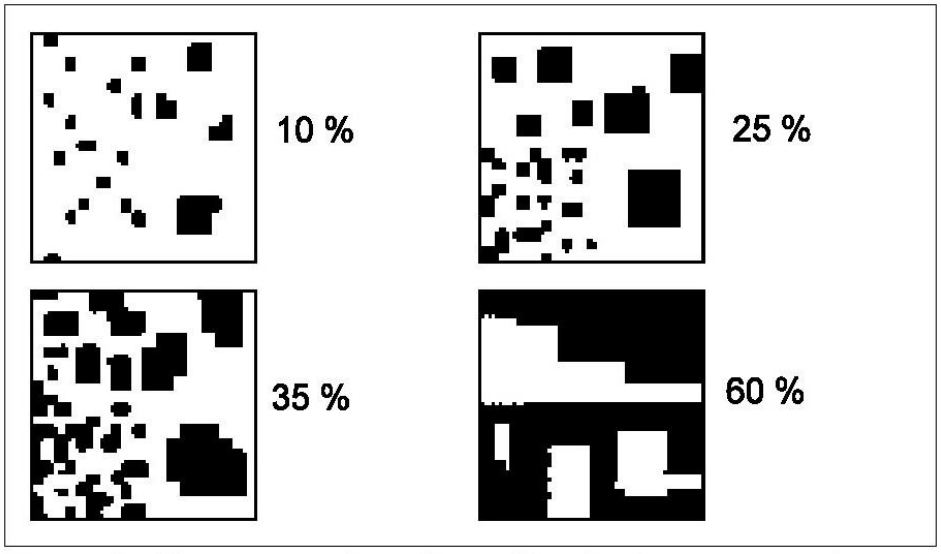
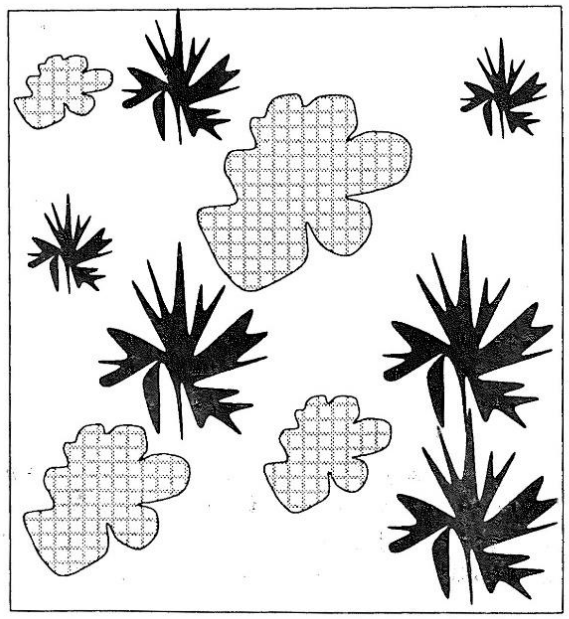


Figure 3. Representation of specific absolute cover values used to define and distinguish ELC communities. Refer to Appendix C for more cover charts.

Table 2. Cover value ranges used to define specific terms used in the ELC.

Terms	% Cover values
Absolute Covers:	
Open	tree cover ≤ 25 %; shrub cover ≤ 25 %
Shrub	tree cover ≤ 25 %; shrub cover > 25 %
Treed	tree cover > 25 % for all communities except Fens and Bogs; use tree cover > 10 % for Treed Fens and Treed Bog
Savannah*	25% < tree cover ≤ 35%
Woodland	35% < tree cover ≤ 60%
Forest	tree cover > 60%
Relative Covers:	
Deciduous	deciduous species > 75% of canopy cover
Coniferous	coniferous species > 75% of canopy cover
Mixed	both deciduous and coniferous species > 25% of canopy cover

***Note:** Savannah is a term relating to a specific range of tree cover and not restricted to being a Tallgrass community modifier.



Tree species A – Deciduous
- approx.. 15% ground cover
- represents 45% of canopy cover

Tree species B – Coniferous
- approx.. 18% ground cover
- represents 55% of canopy cover

Example:
Tree cover = 15 + 18 = 33% making it a Savannah or Treed community (see Table 2)

Both Deciduous and Coniferous species > 25% of canopy cover making this a **Mixed stand**

This example could represent a Tallgrass Savannah (see ELC Community Table 11) or a Treed Rock Barren (see ELC Community Table 8), to name a few.

Figure 4. Diagrammatic representation of cover and how to assess it.

Dominant: A plant species or vegetation layer with the greatest cover or biomass within a community and represented throughout the community by large numbers of individuals. Visually more abundant than other species in the same layer; > 10% cover (absolute cover); > 35% canopy or vegetation cover (relative cover).

Co-dominant: Two or more plant species of similar stature that share more or less equally the greatest importance in a vegetation layer.

Associate(s): One or more plant species that commonly occur together, typically under similar ecological conditions.

Stand or Species Composition: Refers to the plant species making up a particular community; may be separated into different vegetation layers and listed with or without relative abundance values or symbols.

For example, “Sugar Maple40Beech40White Ash15Ironwood5"

represents a stand that has 40% Sugar Maple, 40% Beech, 15% White Ash and 5% Ironwood, as expressed in terms of relative cover.

Species composition may also be presented as a list of species separated by symbols only; > means greater than, >> means much greater than and = means approximately equal to.

Using the above example, “Sugar Maple = Beech >> White Ash > Ironwood”

means that Sugar Maple is approximately equal in abundance to Beech, which is in turn far greater than White Ash, which is in turn greater than Ironwood. These symbols are also used to indicate, in the ELC Community Tables, which species may be more or less common than others. For example, “Red Oak >>

White Oak" in the Vegetation Characteristics column means practitioners should expect Red Oak to be far more commonly found than White Oak, in this particular community unit.

Naming of Ecosites and Vegetation Types: Many of the Ecosites and most of the Vegetation Types have one or more plant species listed. The order of species listed, more often than not, represents an order of decreasing dominance. However, expect variations in the vegetation associations observed in the field. That is, possibly not all the species listed may be found or the species may be found in a different order of dominance.

For example, if we observed a **Beech$_{40}$White Ash$_{30}$Sugar Maple$_{15}$Red Oak$_{15}$** stand

under moderately fresh moisture regime (1) conditions, it would be **classified** as a Dry - Fresh Sugar Maple–Beech Deciduous Forest Type (see ELC Community Table 24). This represents acceptable variation for this forest unit.

Environmental Terms and Conventions

Substrate: The medium in which plants are rooted. Substrate includes organic, parent mineral material, mineral soil and bedrock. The term "substrate", rather than "soil", should be used, since soil specifically applies to only those unconsolidated mineral materials that have undergone soil formation processes to generate horizons (examples of soil horizons are Ah, B and C).

Substrate Types:

Organic Substrate: Substrates of the Organic order in the Canadian System of Soil Classification (Canadian Soil Survey Committee 1978) and the Ontario Institute of Pedology (OIP 1985). These substrates include those that have organic matter accumulations in excess of 40 cm or mineral soil that is heavily enriched with organic material (Of, Om and Oh horizons, OIP 1985). In the field, organic-enriched mineral soils can be identified by their very dark to black colour, along with their greasy feel and dark staining of the hands.

Parent Mineral: Substrate formed from unconsolidated parent mineral material with little or no alteration as a result of soil processes (i.e., weathering, leaching, accumulation of organic matter, horizonation).

Mineral Soil: Substrate formed from unconsolidated mineral material that has undergone alteration as a result of soil processes (i.e., weathering, leaching, accumulation of organic matter), giving rise to soil horizons.

Rock: Unconsolidated rock substrates where all materials are greater than 2 mm in diameter; average substrate depth is greater than 15 cm.

Bedrock: Exposed consolidated bedrock surfaces with variable accumulations of unconsolidated mineral substrates; average substrate depth of less than 15 cm.

Substrate Depth: Represents the average substrate depth for the entire coverage of the community.

Moisture Regime: Refers to the available moisture supply for plant growth estimated in relative or absolute terms; classifications for moisture regimes come from the integration of several factors, including soil texture and drainage, and depth to mottles and gley. The translation from moisture regime defined by Maycock (1979) to the OIP standards is given in Table 3. The moisture regime categories in Table 3 are the more generalized moisture regimes defined by OIP (1985) and used in the classification of communities.

Table 3. Moisture regime terms, based on OIP 1985 moisture regime standards and their Maycock (1979) moisture regime equivalents.

OIP soil moisture regime standards			Maycock (1979) moisture regime equivalents (approximate)
Soil moisture regime categories	Soil moisture regime	Code	
Dry	dry, moderately dry	θ, 0	arid, very dry, dry
Fresh	moderately fresh, fresh, very fresh	1, 2, 3	dry–mesic, mesic
Moist	moderately moist, moist, very moist	4, 5, 6	wet–mesic, wet
Wet	moderately wet, wet, very wet	7, 8, 9	wet, very wet, saturated

Soil Texture: Refers to the soil texture classes defined by the Canadian System of Soil Classification (Canadian Soil Survey Committee 1978). Soil texture classes are based on the relative proportion of three particle sizes found within a soil sample; i.e., sand, silt and clay particles (Table 4).

Table 4. The ELC substrate texture classes and their associated component textures; based on OIP 1985 standards. Soil texture classes are the more generalized categories of soil texture used in the ELC and referred to in the ELC Community Tables.

Soil texture classes	OIP soil textures
Bedrock	consolidated bedrock surfaces
Rock	unconsolidated rock substrates; all materials > 2 mm in diameter; e.g., pure gravels, cobbles, stones
Sand	very coarse Sand, Loamy very coarse Sand, coarse Sand, Loamy coarse Sand, medium Sand, Loamy medium Sand, fine Sand, Loamy fine Sand
Coarse Loam	very fine Sand, Loamy very fine Sand, Silty very fine Sand, Silty very coarse Sand, Silty coarse Sand, Silty medium Sand, Silty fine Sand, Loam, very coarse Sandy Loam, coarse Sandy Loam, medium Sandy Loam, fine Sandy Loam
Fine Loam	Sandy Clay Loam, Clay Loam, Silty Clay Loam, Silt, Silt Loam
Clay	Sandy Clay, Silty Clay, Clay, heavy Clay
Organic	organic matter > 40 cm or mineral soil that is heavily enriched with organic material (Of, Om, Oh horizons, OIP 1985)

Note: Each of the above texture classes can have stones, cobbles or gravel associated with them, which should be noted as modifiers according to OIP (1985).

Rock Type: Refers to categories of rock or bedrock, based on their weatherability, chemical constituents and pH properties (Table 5). The properties of these rock types influence which plant species can grow and, therefore, the plant community composition at a particular site.

Table 5. The defining characteristics and examples of the three rock types used in the ELC.

Rock Type	Defining Characteristics	Examples
Carbonate	sedimentary rocks made up largely of carbonate minerals; **rocks that fizz upon exposure to acid**; rocks that release carbon dioxide upon heating; high pH; easily weathered	calcareous conglomerate greywacke, sandstone, shale, limestone, dolostone and marble
Basic	igneous rocks containing ≤ 66% silica; circumneutral pH; intermediate weatherability	mafic to intermediate volcanic rocks, iron formation, diabase, gabbro and anorthosite
Acidic	igneous rocks containing > 66% silica; low pH; not easily weathered	granite, granodiorite, quartz diorite, quartz monzonite, syenite and gneissic rocks, quartz sandstone, quartzite and arkose

Note: Rock type can be determined usually by referring to other sources of resource information (e.g., Quaternary Geology series of reports and maps, Physiography of Southern Ontario (Chapman and Putnam (1984), or county soils reports).

Soil Drainage: Soil drainage classes represent how quickly water percolates through substrates by gravitational flow, draining away to be no longer available for plant growth. The soil drainage classes are defined by the OIP (1985) (Table 6). Soil drainage is primarily used in the ELC Community Tables to help distinguish different forest Ecosites.

Table 6. Drainage codes (OIP 1985).

OIP drainage classes	Drainage terms
1	very rapid
2	rapid
3	well
4	moderately well
5	imperfect
6	poor
7	very poor

Slope Position: Refers to where on a topographic slope the community is found. Assign the slope position that the community occupies to the largest extent. If a community covers more than one slope position, either: 1) assign a range of slope positions which best represents the community (e.g., upper to mid slope positions); or 2) check to make sure not more than one community is being assessed. Slope positions, for the most part, follow OIP (1985) standards (Table 7). Slope position is primarily used in the ELC Community Tables to help distinguish different forest Ecosites.

Table 7. The slope position codes, their terms and what they mean (modified from OIP 1985).

Code	Term	Definition
1	Crest	the upper-most portion of a slope; shape usually convex in all directions with no distinct aspect
2	Upper Slope	the upper portion of the slope immediately below the crest; slope shape usually convex with a specific aspect
3	Middle Slope	the area of the slope between the upper slope and the lower slope, where the slope shape is usually straight with a specific aspect
4	Lower Slope	the lower portion of the slope immediately above the toe; slope shape usually concave with a specific aspect
5	Toe	the lower-most portion of the slope immediately below, and adjacent to, the lower slope; slope shape concave grading rapidly to level with no distinct aspect
6	Depression	any area that is concave in all directions, usually at the toe of a slope or within level topography
7	Level (Tableland)	any level area excluding toe slopes; generally horizontal with no distinct aspect
8	Complex	any area with complex microtopography; mounds and hollows vary in size and extent

Wetness Index: A numerical value assigned to plant species based on the tendency of that species to occur in wetland habitats (Oldham et al. 1995). The index is based on the definitions in Table 8. A complete plant list with their associated Wetness Index scores can be found in Oldham et al. (1995) or in the ELC Database. A mean wetness score can be determined by taking the average of all the plant species wetness scores for a particular site.

Table 8. The wetland categories, their definitions and the Wetness Index; based on Oldham et al. (1995).

Wetland Category		Definition	Wetness Index	
OBL	Obligate Wetland	Occurs almost always in wetlands under natural conditions (estimated > 99% probability)	OBL	-5
FACW	Facultative Wetland	Usually occurs in wetlands, but occasionally found in non-wetlands (estimated 67-99% probability)	FACW +	-4
			FACW	-3
			FACW -	-2
FAC	Facultative	Equally likely to occur in wetlands or non-wetlands (estimated 34-66% probability)	FAC +	-1
			FAC	0
			FAC -	1
FACU	Facultative Upland	Occasionally occurs in wetlands, but usually occurs in non-wetlands (estimated 1-33% probability)	FACU +	2
			FACU	3
			FACU -	4
UPL	Upland	Occurs almost never in wetlands under natural conditions (estimated < 1% probability)	UPL	5

3. ELC Keys

Using the ELC Keys

The ELC Keys use environmental and vegetation characteristics to identify communities. Refer to the previous section or the glossary for definitions of terms and conventions.

The keys are composed of a series of nested statements based on specific criteria, which lead to the differentiation and identification of communities. At each level of the key (numbers), two or three statements are presented (letters), representing distinct conditions. Decisions are made by selecting the statement that best represents the conditions of the community. Numbers on the right margin provide direction to (i.e., go to) the next set of appropriate statements. When a particular community's conditions are met, following the last statement will be the name of the community unit (in **bold**) along with the ELC Community Table number to refer to (in brackets and in **bold**).

Key to Systems

1a. Water table rarely or briefly above the substrate surface; substrate of parent mineral material, mineral soil or bedrock; depth of accumulated organics < 40 cm; standing pools of water or vernal pooling ≤ 20% of ground coverage; wetland plant species[1] cover ≤ 50% of total plant species cover; mean wetness of a site for native species > 0[1]; moisture regime typically < 5 (OIP 1985) ..... **Terrestrial System**

1b. Water table seasonally or permanently at or above the substrate surface; flooded bedrock or hydric mineral or organic (organics > 40 cm) substrates; standing water, pools or vernal pooling > 20% of ground coverage; wetland plant species[1] cover > 50% of total plant species cover; mean wetness of a site for native species ≤ 0[1]; moisture regime ≥ 5 (OIP 1985) **2**

2a. Fluctuating water levels; sites with shallow water, seasonal flooding with summer drawdown, permanently saturated from high water table or seepage, or organic terrain (e.g., basins, depressions, adjacent low slopes, areas with restricted drainage, drainways, floodplains and littoral zones); water depth ≤ 2 m; emergent herbaceous or woody vegetation cover > 25% ..... **Wetland System**

2b. Permanently flooded sites with persistent water; emergent woody or herbaceous vegetation cover ≤ 25%; vegetation cover absent or of submerged or floating-leaved plant species ..... **Aquatic System**

[1]Wetland plant species refers to those species with Wetness Index scores of -5 or -4, see Table 8; refer to Oldham et al. (1995) or the ELC Database for a list of species and their Wetness Index or for the calculation of mean wetness for a site.

Key to Terrestrial Ecosites

1a. Bedrock-controlled site; typically a mosaic of exposed bedrock surfaces with variable accumulations of unconsolidated mineral substrates; substrates patchy and very shallow; average substrate depth ≤ 15 cm over bedrock; communities maintained by environmental limitations (i.e., rooting depth, drought)..... 18

1b. Communities on unconsolidated mineral substrates > 15 cm deep..... 2

2a. Communities on parent mineral material; substrate with little or no alteration as a result of soil formation processes; no obvious development of soil horizons..... 15

2b. Communities on mineral soil; substrates in which there is clear evidence of soil formation or development of soil horizons to at least 15 cm..... 3

3a. Tree cover > 25%..... 7

3b. Tree cover ≤ 25%..... 4

4a. Open communities originating from, or maintained by, anthropogenic or culturally based disturbances (e.g., planting or agriculture, clearing, recreation, soil movement, grazing or mowing); often having a large proportion of introduced species [Cultural]..... 6

4b. Open communities not originating from, or maintained by, anthropogenic or culturally based disturbances; maintained by environmental limitations (e.g., drought, low nutrient availability) or disturbance (e.g., periodic fire)..... 5

5a. An assemblage of tallgrass prairie species – Little Bluestem (*Schizachyrium scoparium*), Big Bluestem (*Andropogon gerardii*), Indian Grass (*Sorghastrum nutans*) present; vegetation cover usually continuous or closed; maintained by periodic fire with seasonal drought ..... **Open Tallgrass Prairie Ecosites (11)**

5b. Tallgrass prairie species absent; soil sandy; vegetation cover usually low or patchy; trees and shrubs, when present, typically stunted; maintained by severe environmental limitations (e.g., drought, nutrient limitations).... **Open or Shrub Sand Barren Ecosites (10)**

6a. Cover of shrub species > 25%..... **Cultural Thicket Ecosites (30)**

6b. Cover of shrub species ≤ 25%..... **Cultural Meadow Ecosites (30)**

7a. Treed communities where the trees have been planted, or on sites recently disturbed or actively managed by human activity and in the process of regeneration by woody species; site has a legacy of non-treed land use; tree height > 2 m (e.g., orchards, regenerating old fields, plantations).....12

7b. Treed communities of natural origin or undergoing natural processes of seral or successional development (including sites that have been cleared, disturbed or planted in the past but have since regenerated naturally); currently maintained by factors that are not.....8

8a. Tree cover > 60%.....11

8a. Tree cover ≤ 60%.....9

9a. An assemblage of tallgrass prairie species – e.g., Little Bluestem (*Schizachyrium scoparium*), Big Bluestem (*Andropogon gerardii*), Indian Grass (*Sorghastrum nutans*) present; ground-layer vegetation cover usually continuous or closed; tree cover is variable, usually scattered or patchy; trees show opengrown characteristics; community maintained by periodic fire with seasonal drought.....10

9b. Tallgrass prairie species absent; soil sandy; ground-layer vegetation cover usually low or patchy; trees and shrubs typically stunted; maintained by severe environmental limitations (e.g., drought, nutrient limitations)..... **Treed Sand Barren Ecosites (10)**

10a. 25% < tree cover ≤ 35%.....**Tallgrass Savannah Ecosites (11)**

10b. 35% < tree cover ≤ 60%.....**Tallgrass Woodland Ecosites (12)**

11a. Forest community dominated by deciduous trees; deciduous species > 75% of total tree canopy cover..... **Deciduous Forest Ecosites (20 - 28)**

11b. Forest community dominated by coniferous trees; coniferous species > 75% of total tree canopy cover.....**Coniferous Forest Ecosites (13 - 15)**

11c. Forest community with a mixture of deciduous tree species > 25% **and** coniferous tree species > 25% of total tree canopy cover..... **Mixed Forest Ecosites (16 - 19)**

12a. Tree cover > 60%; dominating canopy trees are planted [Plantation].....14

12b. Tree cover # 60%; trees planted or arising from natural regeneration; trees scattered or patches of open-grown trees.....13

13a. 25% < tree cover ≤ 35%..... **Savannah Ecosites (30)**

13b. 35% < tree cover ≤ 60%..... **Cultural Woodland Ecosites (30)**

14a. Community dominated by deciduous trees; deciduous species > 75% of total tree canopy cover ..... **Deciduous Plantation Ecosites (29)**

14b. Community dominated by coniferous trees; coniferous species > 75% of total tree canopy cover ..... **Coniferous Plantation Ecosites (29)**

14c. Community with a mixture of deciduous tree species > 25% **and** coniferous tree species > 25% of total tree canopy cover ..... **Mixed Plantation Ecosites (29)**

15a. Communities on parent mineral material > 15 cm deep; tree cover > 60% ..... go back to couplet 7

15b. Communities originating from, or maintained by, anthropogenic or culturally based disturbances (e.g., planting or agriculture, clearing, recreation, substrate movement, grazing or mowing); often having a large proportion of introduced species; tree cover ≤ 60% ..... **Cultural Ecosites (30)**

15c. Communities not originating from, or maintained by, anthropogenic or culturally based disturbances; usually active sites with recent deposition or erosion, or sites with severe environmental limitations (i.e., extremes in moisture and temperature, nutrient limitations); tree cover ≤ 60%..... 16

16a. Communities restricted to active shorelines or near shore areas of lakes, ponds, rivers and streams 17

16b. Communities not restricted to active shorelines; substrate sand; vegetation cover usually low or patchy; trees and shrubs, when present, typically stunted; maintained by severe environmental limitations (e.g., drought, nutrient limitations) ..... **Sand Barren Ecosites (10)**

17a. Active, often rolling, hills of accumulated sand; above the normal reach of waves and subject to erosion and deposition by wind (i.e., aeolian processes); restricted to Great Lakes shorelines in Site Regions 6E and 7E ..... **Sand Dune Ecosites (2)**

17b. Near shore areas with steep to vertical exposures of unconsolidated mineral material > 2 m high; subjected to active disturbance from slumping, mass wasting and toe erosion..... **Bluff Ecosites (3)**

17c. Shoreline areas with high levels of disturbance; restricted to areas near water level and most subjected to active shoreline processes – periodic high water levels and storm events, wave action, erosion, deposition and ice scour ..... **Beach / Bar Ecosites (1)**

18a. Bedrock-controlled topography; tree cover > 60% ..... back to couplet 7

18b. Communities found on enclosed or exposed steep or near-vertical bare bedrock surfaces and associated rock rubble; tree cover ≤ 60% 21

18c. Communities found on flat to rolling, knob and hollow or block reef and fissure bedrock-controlled topography; patchy soil accumulation; tree cover ≤ 60% 19

19a. Community originating from, or maintained by, anthropogenic or culturally based disturbances (e.g., planting or agriculture, clearing, recreation, substrate movement or extraction, grazing or mowing); often having a large proportion of introduced species ..... **Cultural Ecosites (30)**

19b. Community not originating from, or maintained by, anthropogenic or culturally based disturbances; maintained by severe environmental limitations imposed by very shallow soils over bedrock (e.g., bedrock type, limited rooting depth, extremes in moisture and temperature) 20

20a. More or less level expanses of limestone (carbonate) bedrock; patchy mosaic of exposed bedrock pavement and substrate accumulations in cracks or grykes; alternation of seasonal inundation and extreme drought ..... **Alvar Ecosites (6)**

20b. Block and fissure or rolling, knob and hollow bedrock; variable and extreme bedrock environments; patchy mosaic of bare rock surfaces and shallow substrate accumulations ..... **Rock Barren Ecosites (7 & 8)**

21a. Steep or near-vertical exposures of bedrock >3 m high ..... **Cliff Ecosites (4)**

21b. Community associated with boulder rubble at the base of cliffs ..... **Talus Ecosites (5)**

21c. Deep, very shaded cavities and crevices in bedrock ..... **Crevice and Cave Ecosites (9)**

Key to Wetland Ecosites

1a. Water table seasonally drops below the substrate surface or water seasonally below the surface of a brown moss or *Sphagnum* peat 5

1b. Water table rarely or periodically drops below the substrate surface; water depth up to 2 m; tree cover ≤ 25%; emergent herbaceous and/or woody vegetation cover > 25% [Shallow Water Wetlands] 2

2a. Substrate of unconsolidated parent mineral material or bedrock 4

2b. Substrate organic – build-up of decayed or partially decayed organic material such as humus, muck or peat; organic substrates Of, Om, Oh (OIP 1985); depth of organic material > 40 cm; usually in sheltered areas with little or no wave energy 3

3a. Shrub cover ≤ 25%; vegetation dominated by emergent herbaceous species ..... **Shallow Marsh Ecosite (48)**

3b. Shrub cover > 25%; vegetation dominated by continuous or patchy shrub cover, with variable cover of emergent herbaceous species ..... **Organic Thicket Swamp Ecosites (41)**

4a. Shrub cover ≤ 25%; vegetation dominated by emergent herbaceous species ..... **Mineral or Bedrock Shallow Marsh Ecosites (47)**

4b. Shrub cover > 25%; vegetation dominated by continuous or patchy shrub cover, with variable cover of emergent herbaceous species ..... **Mineral or Bedrock Thicket Swamp Ecosites (40)**

5a. Substrate organic – build-up of decayed or partially decayed organic material such as humus, muck or peat; organic substrates Of, Om, Oh (OIP 1985); depth of organic material > 40 cm 12

5b. Substrate of unconsolidated parent mineral material, mineral soil or bedrock 6

6a. Site restricted to shoreline areas of the Great Lakes 7

6b. Site not restricted to the Great Lakes 8

7a. Shoreline areas on sandy sites that are poorly drained, alternation of seasonal inundation and drought; vegetation typically continuous or closed; dominated by a unique association of hydrophytic prairie grasses: Indian Grass, Little Bluestem, Big Bluestem ..... **Tallgrass Meadow Marsh Ecosites (46)**

7b. Shoreline areas on calcareous (carbonate), nutrient-poor parent mineral material or bedrock substrates; vegetation cover typically sparse or patchy; community dominated by a unique association of hydrophytic graminoids such as Twig Rush (*Cladium marisicoides*), Beak-rushes (*Rhynchospora* spp.), Nut Rushes (*Scleria* spp.) and shrubs such as Shrubby Cinquefoil (*Hypericum kalmianum*). ..... **Great Lakes Coastal Meadow Marsh Ecosites (46)**

8a. Tree cover > 25% [Swamp] 11

8b. Tree cover ≤ 25% 9

9a. Shrub cover > 25%; vegetation dominated by continuous or patchy shrub cover, with variable cover of emergent herbaceous species ..... **Mineral or Bedrock Thicket Swamp Ecosites (40)**

9b. Shrub cover ≤ 25%; vegetation dominated by emergent herbaceous 10

10a. Substrate marl, tufa or other calcareous (carbonate) deposits associated with seepage areas; vegetation cover typically sparse or patchy ..... **Mineral Fen Meadow Marsh Ecosites (46)**

10b. Substrate not composed of marl or other calcareous deposits; vegetation cover typically continuous or closed ..... **Mineral or Bedrock Meadow Marsh Ecosites (44)**

11a. Community dominated by deciduous trees; deciduous species ≥ 75% of total tree cover ..... **Deciduous Mineral Swamp Ecosites (37 - 38)**

11b. Community dominated by coniferous trees; coniferous species ≥ 75% of total tree cover ..... **Coniferous Mineral Swamp Ecosites (31)**

11c. Community with a mixture of deciduous tree species > 25% **and** coniferous tree species > 25% of total tree cover ..... **Mixed Mineral Swamp Ecosites (34)**

12a. Tree cover ≤ 25% 14

12b. Tree cover >25% [Swamp] 13

13a. Community dominated by deciduous trees; deciduous species > 75% of total tree canopy cover ..... **Deciduous Organic Swamp Ecosites (39)**

13b. Community dominated by coniferous trees; coniferous species > 75% of total tree canopy cover ..... **Coniferous Organic Swamp Ecosites (32 - 33)**

13c. Community with a mixture of deciduous tree species > 25% **and** coniferous tree species > 25% of total tree canopy cover ..... **Mixed Organic Swamp Ecosites (35 - 36)**

14a. Substrate of deep (> 40 cm) brown moss peat; water source minerotrophic; alkaline to mildly acidic conditions ..... **Fen Ecosites (42)**

14b. Substrate of deep (> 40 cm) *Sphagnum* spp. peat; prevailing conditions acidic, water source primarily ombrotrophic ..... **Bog Ecosites (43)**

14c. Substrate sedge peat, humus or muck 15

15a. Shrub cover > 25%; vegetation dominated by continuous or patchy shrub cover, with variable cover of emergent herbaceous species ..... **Organic Thicket Swamp Ecosites (41)**

15b. Shrub cover ≤ 25%; vegetation dominated by emergent herbaceous species ..... **Organic Meadow Marsh Ecosites (45)**

Key to Aquatic Ecosites

1a. Deep water (usually >2 m) of lakes, ponds or rivers; open water system dominated by plankton; ≤ 25% cover of vascular vegetation .....**Open Aquatic Ecosites (49)**

1b. Shallow permanent water (usually > 2 m) of lakes, ponds or rivers; floating-leaved or submergent plant species cover > 25%; emergent vegetation cover ≤ 25% [Shallow Water Community Series] 2

2a. Submergent vegetation comprising > 75% of total vegetation cover; floating-leaved or emergent species ≤ 25% .....**Submerged Shallow Aquatic Ecosites (50)**

2b. Floating-leaved species comprising > 25% of the vegetation cover; submergent species cover ≤ 75% 3

3a. Floating-leaved vegetation > 75% of total vegetation cover; submergent or emergent species ≤ 25% **..... Floating-leaved Shallow Aquatic Ecosites (50)**

3b. Floating-leaved and submergent vegetation cover each > 25%; emergent species ≤ 25% **..... Mixed Shallow Aquatic Ecosites (50)**

4. ELC Community Tables

Using the ELC Community Tables

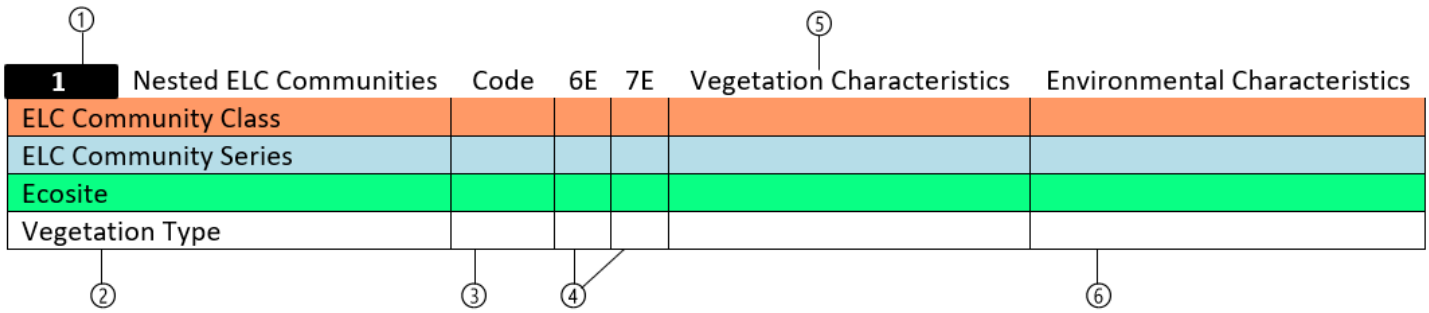


Figure 5. A representation of the ELC Community Tables, showing the format, the column headings and the name of the Nested ELC Community Units.

Figure 5 shows the presentation of the ELC Community Tables.

① Represents the community table number. This number is used as a reference in various keys found in this manual.

② Represents four of the Nested ELC Community Units. The names and colours given to the levels in Figure 5 correspond to the ELC levels applicable in each of the community tables.

③ Refers to the Codes assigned to the community. These codes are aids for identification as well as for data storage and management.

④ These two columns indicate, using an X, whether a particular Vegetation Type is found in Site Region 6E or 7E. Refer to Figure 1 for Site Region

⑤ The Vegetation Characteristics column indicates different aspects of vegetation used to distinguish and identify different ELC Community Units. Refer to the **Conventions and Terminology** section or the **Glossary** for definitions. This column should be used to move through the tables until the vegetation characteristics are met that best match those of the unit being classified.

Order of Vegetation Characteristics: Within the Vegetation Characteristics column, a specific order is followed for the characteristics given:

- ☐ general Vegetation Characteristics and coverage that typify the Community Class;
- ☐ specific cover value criteria (e.g., tree cover > 60%) which further differentiates the Community Series; uses defined vegetation cover values and ranges, as shown in Table 2;
- ☐ plant species lists: specific species or species assemblages, may be used for identification; order typically follows: trees, shrubs, then herbaceous species listings and associates; refer to the Plant Species List in Appendix B for the Latin binomial name for species;
- ☐ may list other community-related generalities.

Note: Trees, shrubs and herbaceous species listed in this column, beside specific community units, are not necessarily indicator or diagnostic species for that community. These species should not be used exclusively to identify and classify communities. Instead, they represent a guide to which species you are **likely** to find in this community unit.

⑥ The Environmental Characteristics column is used to indicate different aspects of the environment which distinguish and identify different ELC Community Units. Refer to the **Conventions and Terminology** section or the **Glossary** for definitions. This column should be used to move through the tables until the environmental characteristics are met that best match those of the unit being classified.

Order of Environmental Characteristics: Within the Environmental Characteristics column, a specific order is followed for the characteristics given:

- ☐ diagnostic characteristics: those environmental criteria that are diagnostic to defining a particular community unit (e.g., for cliffs – vertical or near-vertical exposed bedrock greater than 3 m in height);
- ☐ specific criteria: significant ecological factors or processes important for the maintenance of a particular community; e.g., disturbance, soil moisture, soil drainage or soil depth;
- ☐ generalities: miscellaneous notes and environmental generalities that apply to a community.

Note: Where there are **no** Vegetation Types documented for a particular Ecosite, the community is known to occur, but insufficient data is available to list a Vegetation Type.

Terrestrial Community Tables

1 Nested ELC Communities	Code	6E	7E	Vegetation Characteristics	Environmental Characteristics
Beach / Bar	BB			- vegetation cover varies from patchy and barren to more closed and treed tree cover ≤ 60%	- subject to active shoreline processes: ice scour, wave energy, erosion and deposition - substrate of coarse parent mineral material, rock or bedrock - above seasonal high-water mark; subject to extremes in moisture and temperature
Open Beach / Bar	BBO			- tree cover ≤ 25%; shrub cover ≤ 25%	- openness maintained by active shoreline processes
Mineral Open Beach / Bar Ecosite	BBO1			- cover varies from patchy and barren to continuous meadow	- unconsolidated mineral substrates; sand, loam, gravel, shingle or cobble
Sea Rocket Sand Open Beach Type	BBO1-1	X	X		- sand substrates
Wormwood Gravel Open Beach Type	BBO1-2	X			- gravel substrates
Reed-canary Grass Mineral Open Beach Type	BBO1-3	X	X		
Bedrock Open Beach / Bar Ecosite	BBO2			- cover varies from patchy and barren to continuous meadow	- acidic, basic or carbonate bedrock; average substrate depth < 15 cm; exposed bedrock surfaces cover > 50%
Shrubby Cinquefoil Carbonate Open Bedrock Beach Type	BBO2-1	X	X		- carbonate bedrock
Shrub Beach / Bar	BBS			- tree cover ≤ 25%; shrub cover > 25%	- active processes less severe; woody species invasion is limited to shrubs
Mineral Shrub Beach / Bar Ecosite	BBS1			- cover varies from patchy and barren to continuous thicket	- unconsolidated mineral substrates; sand, loam, gravel, shingle or cobble
Red Cedar – Common Juniper Shingle Shrub Beach Type	BBS1-1	X			- shingle substrates
Willow Gravel Shrub Beach Type	BBS1-2	X	X		- gravel substrates
Bedrock Shrub Beach / Bar Ecosite	BBS2			- cover varies from patchy and barren to continuous thicket	- acidic, basic or carbonate bedrock; average substrate depth < 15 cm; exposed bedrock surfaces cover > 50%

1 Nested ELC Communities	Code	6E	7E	Vegetation Characteristics	Environmental Characteristics
Treed Beach / Bar	BBT			- 25% < tree cover ≤ 60%	- active processes least severe; woody species invasion includes tree species
Mineral Treed Beach / Bar Ecosite	BBT1			- cover varies from savannah to woodland	- unconsolidated mineral substrates; sand, loam, gravel, shingle or cobble
Bedrock Treed Beach / Bar Ecosite	BBT2			- cover varies from savannah to woodland	- acidic, basic or carbonate bedrock; average substrate depth < 15 cm; exposed bedrock surfaces cover > 50%

2 Nested ELC Communities	Code	6E	7E	Vegetation Characteristics	Environmental Characteristics
Sand Dune	SD			- vegetation cover varies from patchy and barren to more closed and treed tree cover ≤ 60%	- active rolling sand hills formed by shoreline and aeolian processes; restricted to the near-shore areas of the Great Lakes in 6E and 7E. - stability of substrate variable; little to no accumulation of organic materials; low nutrient availability - subjected to drought and temperature extremes
Open Sand Dune	SDO			- tree cover ≤ 25%; shrub cover ≤ 25%	
Open Sand Dune Ecosite	SDO1			- cover varies from patchy and barren to continuous meadow - usually dominated by graminoids	- restricted to most active, least stable sand
Little Bluestem – Switchgrass – Beachgrass Open Dune Types	SDO1-1	X	X		
Little Bluestem – Long-leaved Reed Grass – Great Lakes Wheatgrass Open Dune Type	SDO1-2	X	X		
Shrub Sand Dune	SDS			- tree cover ≤ 25%; shrub cover ≤ 25%	
Shrub Sand Dune Ecosite	SDS1			- cover varies from patchy and barren to continuous thicket - usually dominated by graminoids with scattered to dense shrub cover	- more stable, less disturbed
Sand Cherry Shrub Dune Type	SDS1-1	X	X		
Hop-tree Shrub Dune Type	SDS1-2		X		
Juniper Shrub Dune Type	SDS1-3	X	X		
Treed Sand Dune	SDT			- 25% < tree cover ≤ 60%	
Treed Sand Dune Ecosite	SDT1			- cover varies from savannah to woodland - usually variably treed with understory dominated by graminoids	- relatively stable sand
Cottonwood Treed Dune Type	SDT1-1		X		
Balsam Poplar Treed Dune Type	SDT1-2		X		
Red Cedar Treed Dune Type	SDT1-3		X		

3 Nested ELC Communities	Code	6E	7E	Vegetation Characteristics	Environmental Characteristics
Bluff	BL			- vegetation cover varies from patchy and barren to continuous herbaceous or shrub cover - tree cover ≤ 10% - tree invasion restricted by erosion-related disturbances	- active, steep to near-vertical exposures of unconsolidated mineral material - > 2 m in height - subject to active erosional processes - restricted to lacustrine or riverine shorelines - subject to extremes in moisture and temperature
Open Bluff	BLO			- tree cover ≤ 25%; shrub cover ≤ 25% - Field Horsetail, Coltsfoot, Canada Goldenrod, Narrow-leaf Goldenrod and Sweet White Clover	- substrate recently disturbed; subject to ongoing erosional processes - least stable substrates
Mineral Open Bluff Ecosite	BLO1			- cover varies from patchy and barren to continuous meadow	- substrate of sand, coarse loam, fine loam or clay
Open Clay Bluff Type	BLO1-1	X	X		- clay substrates
Shrub Bluff	BLS			- tree cover ≤ 25%; shrub cover ≤ 25% - Staghorn Sumac common - Field Horsetail, Coltsfoot, Canada Goldenrod, Narrow-leaf Goldenrod and Sweet White Clover	- longer time since disturbance or erosional processes less severe - more stable substrates
Mineral Shrub Bluff Ecosite	BLS1	X	X	- cover varies from patchy and barren to continuous thicket	- substrate of sand, coarse loam, fine loam or clay
Treed Bluff	BLT			- 25% < tree cover ≤ 60%	- longer time since disturbance or erosional processes less severe - more stable substrates with tree regeneration
Mineral Treed Bluff Ecosite	BLT1	X	X	- Trembling Aspen, Largetooth Aspen and Staghorn Sumac	- substrate of sand, course loam, fine loam or clay

4 Nested ELC Communities	Code	6E	7E	Vegetation Characteristics	Environmental Characteristics
Cliff	CL			- vegetation cover varies from patchy and barren to more closed and treed tree cover ≤ 60%	- vertical or near-vertical exposed bedrock - > 3 m height; bedrock type important - sharp to variably broken edges, faces and rims; average substrate depth < 15 cm - highly exposed; subject to extremes in temperature and moisture
Open Cliff	CLO			- tree cover ≤ 25%; shrub cover ≤ 25%	- typically found on the vertical or near-vertical bare bedrock faces
Carbonate Open Cliff Ecosite	CLO1			- cover patchy and barren	- acidic bedrock
Cliffbrake – Lichen Carbonate Open Cliff Type	CLO1-1	X	X		
Bulblet Fern – Herb Robert Carbonate Open Cliff Type	CLO1-2	X	X		
Canada Bluegrass Carbonate Open Cliff Type	CLO1-3	X	X		
Moist Open Carbonate Cliff Seepage Type	CLO1-4	X	X		- excess moisture due to seepage
Open Carbonate Cliff Rim Type	CLO1-5	X	X		
Acidic Open Cliff Ecosite	CLO2			- cover patchy and barren	- acidic bedrock
Shrub Cliff	CLS			- tree cover ≤ 25%; shrub cover ≤ 25%	- dependent on how broken and fractured the cliff rim and face are
Carbonate Shrub Cliff Ecosite	CLS1			- cover varies from patchy and barren to continuous thicket	- acidic bedrock
Common Juniper Carbonate Cliff Type	CLS1-1	X	X		
Round-leaved Dogwood Carbonate Cliff Type	CLS1-2	X	X		
Acidic Shrub Cliff Ecosite	CLS2			- cover varies from patchy and barren to continuous thicket	- acidic bedrock
Treed Cliff	CLT			- 25% < tree cover ≤ 60%	- typically restricted to the narrow cliff rim - dependent on how broken and fractured the cliff rim and face are
Carbonate Treed Cliff Ecosite	CLT1		X	- cover varies from patchy and barren to closed in nature (i.e., savannah or woodland)	- carbonate bedrock
White Cedar Treed Carbonate Cliff Type	CLT1-1	X	X		

4 Nested ELC Communities	Code	6E	7E	Vegetation Characteristics	Environmental Characteristics
Sugar Maple – Ironwood – White Ash Treed Carbonate Cliff Type	CLT1-2	X	X		
White Birch – Aspen Treed Carbonate Cliff Type	CLT1-3	X	X		
Acidic Treed Cliff Ecosite	CLT2			- cover varies from patchy and barren to closed in nature (i.e., savannah or woodland)	- acidic bedrock

5 Nested ELC Communities	Code	6E	7E	Vegetation Characteristics	Environmental Characteristics
Talus	TA			- vegetation cover varies from patchy and barren to closed and treed - tree cover ≤ 60%	- slopes of rock rubble at the base of cliffs - coarse rocky debris > 50% of substrate surface; average substrate depth < 15 cm; bedrock type important
Open Talus	TAO			- tree cover ≤ 25%; shrub cover ≤ 25%	- bare rock surfaces predominate; substrate availability is limited
Carbonate Open Talus Ecosite	TAO1			- cover patchy and barren	- carbonate rock
Dry – Fresh Carbonate Open Talus Type	TAO1-1	X	X	- Herb Robert, Poison Ivy, Canada Bluegrass and Maidenhair Spleenwort	- dry (θ, 0) to fresh (1,2,3) moisture regimes
Fresh – Moist Carbonate Open Talus Type	TAO1-2	X	X	- Herb Robert, Spotted Touch-me-not and White Snakeroot	- moist (4,5) to fresh (2,3) moisture regimes
Acidic Open Talus Ecosite	TAO2			- cover patchy and barren	- acidic rock
Shrub Talus	TAS			- tree cover ≤ 25%; shrub cover > 25%	- intermediate proportions of bare rock surfaces and substrate availability
Carbonate Shrub Talus Ecosite	TAS1			- cover varies from patchy and barren to continuous thicket	- carbonate rock
Round-leaved Dogwood Carbonate Shrubs Talus Types	TAS1-1	X	X		
Mountain Maple Carbonate Shrubs Talus Type	TAS1-2	X	X		
Acidic Shrub Talus Ecosite	TAS2			- cover varies from patchy and barren to continuous thicket	- acidic rock
Treed Talus	TAT			- 25% < tree cover ≤ 60% - cover varies from patchy and barren to more closed in nature (i.e., savannah or woodland)	- greater availability of substrate accumulated between rocks
Carbonate Treed Talus Ecosite	TAT1				- carbonate rock
Dry – Fresh Chinquapin Oak Carbonate Treed Talus Type	TAT1-1		X		- dry (θ, 0) to fresh (1,2,3) moisture regimes
Dry – Fresh White Cedar Carbonate Treed Talus Type	TAT1-2	X	X		- dry (θ, 0) to fresh (1,2,3) moisture regimes

5 Nested ELC Communities	Code	6E	7E	Vegetation Characteristics	Environmental Characteristics
Dry – Fresh White Birch Carbonate Treed Talus Type	TAT1-3	X	X		- dry (θ, 0) to fresh (1,2,3) moisture regimes
Fresh – Moist Sugar Maple Carbonate Treed Talus Type	TAT1-4	X	X		- dry (4,5) to fresh (2,3) moisture regimes
Fresh – Moist Basswood – White Ash Carbonate Treed Talus Type	TAT1-5	X	X		- dry (4,5) to fresh (2,3) moisture regimes
Fresh – Moist Hemlock – Sugar Maple Carbonate Treed Talus Type	TAT1-6	X	X		- dry (4,5) to fresh (2,3) moisture regimes
Acidic Treed Talus Ecosite	TAT2				- acidic rock

Nested ELC Communities	Code	6E	7E	Vegetation Characteristics	Environmental Characteristics
Alvar	AL			- vegetation cover varies from patchy and barren to more closed and treed - tree cover	- level, unfractured limestone (carbonate) bedrock - patchy mosaic of bare rock pavement and shallow substrates over bedrock; substrate depth < 15cm - seasonal alternation between inundation and drought
Open Alvar	ALO			- tree cover ≤ 25%; shrub cover ≤ 25%	- typically restricted to bare rock pavement and patchy shallow substrates
Open Alvar Ecosite	ALO1			- cover varies from patchy and barren to continuous meadow	- dry (θ, 0) moisture regimes
Dry Lichen – Moss Open Alvar Pavement Type	ALO1-1	X	X	- vegetation patchy and barren	- dry (θ, 0) moisture regimes
Dry Annual Open Alvar Pavement Type	ALO1-2	X	X	- vegetation patchy and barren	- dry (0) to fresh (1,2,3) moisture regimes
Dry – Fresh Little Bluestem Open Alvar Meadow Type	ALO1-3	X		- vegetation more continuous meadow	- dry (0) to fresh (1,2,3) moisture regimes
Dry – Fresh Poverty Grass Open Alvar Meadow Type	ALO1-4	X		- vegetation more continuous meadow	- moist (4,5) to fresh (1,2,3) moisture regime
Fresh – Moist Tufted Hairgrass Open Alvar Meadow Type	ALO1-5	X		- tree cover ≤ 25%; shrub cover > 25%	- on very shallow substrates or in fractures (grykes)
Shrub Alvar	ALS			- cover varies from patchy and barren to continuous thicket	
Shrub Alvar Ecosite	ALS1	X			
Common Juniper Shrub Alvar Type	ALS1-1	X		- vegetation stunted	
Creeping Juniper-Shrubby Cinquefoil Dwarf Shrub Alvar Type	ALS1-2	X		- White Spruce, White Cedar or Common Juniper	
Scrub Conifer – Dwarf Lake Iris Shrub Alvar Type	ALS1-3	X		- 25% < tree cover ≤ 60%	- on very shallow substrates or in fractures (grykes)
Treed Alvar	ALT			- cover varies from patchy and barren to more closed in nature (i.e., savannah or woodland)	- bedrock more fractured or greater substrate accumulation
Treed Alvar Ecosite	ALT1				- Pelee Island type
Chinquapin Oak – Nodding Onion Treed Alvar Type	ALT1-1		X	- Shrubby Cinquefoil	- Flamborough Plains type

6 Nested ELC Communities	Code	6E	7E	Vegetation Characteristics	Environmental Characteristics
Shagbark Hickory – Prickly Ash Treed Alvar Type	ALT1-2		X		
White Cedar – Jack Pine Treed Alvar Type	ALT1-3	X			
Jack Pine – White Cedar – White Spruce Treed Alvar Type	ALT1-4	X			
Red Cedar – Early Buttercup Treed Alvar Type	ALT1-5	X			

Nested ELC Communities	Code	6E	7E	Vegetation Characteristics	Environmental Characteristics
Rock Barren	RB			- vegetation cover varies from patchy and barren to more closed and treed - tree cover	- variable bedrock; rolling rock knob and hollow, rock reef to block and fissure - rock type important; patchy soil development; substrate depth < 15 cm and variable - extremes in moisture and temperatures
Open Rock Barren	RBO			- tree cover ≤ 25%; shrub cover ≤ 25%	- found where conditions are most extreme; bare rock surfaces or small patches of very shallow substrates
Carbonate Open Rock Barren Ecosite	RBO1			- cover patchy and barren	- carbonate bedrock
Dry Carbonate Open Rock Barren Type	RBO1-1	X		- Harebell, Early Saxifrage, Bristle-leaved Sedge, Poverty Grass and Ebony Spleenwort	
Basic Open Rock Barren Ecosite	RBO2			- cover patchy and barren	- basic bedrock
Dry Basic Open Rock Barren Type	RBO2-1	X		- Poverty Grass, Cow-wheat, Hairgrass, Harebell, Prairie Cinquefoil, Fragile Fern and Spikemoss	
Acidic Open Rock Barren Ecosite	RBO3			- cover patchy and barren	- acidic bedrock
Dry Acidic Open Rock Barren Type	RBO3-1	X		- Poverty Grass, Cow-wheat, Rusty Woodsia, Pale Corydalis, Fringed Buckwheat, Hedwig's Moss and Bristly Sarsaparilla	
Shrub Rock Barren	RBS			- tree cover ≤ 25%; shrub cover > 25% - see Open Rock Barren for understory species	- found where conditions may be less extreme; where rock is broken and cracked or where limited substrates have accumulated
Carbonate Shrub Rock Barren Ecosite	RBS1			- cover patchy and barren to continuous thicket	- carbonate bedrock
Common Juniper Carbonate Shrub Rock Barren Type	RBS1-1	X			
Round-leaved Dogwood Carbonate Shrub Rock	RBS1-2	X			

7 Nested ELC Communities	Code	6E	7E	Vegetation Characteristics	Environmental Characteristics
Barren Type					
Basic Shrub Rock Barren Ecosite	RBS2			- cover patchy and barren to continuous thicket	- basic bedrock
Chokecherry Basic Shrub Rock Barren Type	RBS2-1	X			
Common Juniper Basic Shrub Rock Barren Type	RBS2-2	X			
Acidic Shrub Rock Barren Ecosite	RBS3			- cover patchy and barren to continuous thicket	- acidic bedrock
Blueberry Acidic Shrub Rock Barren Type	RBS3-1	X			
Common Juniper Acidic Shrub Rock Barren Type	RBS3-2	X			

8 Nested ELC Communities	Code	6E	7E	Vegetation Characteristics	Environmental Characteristics
Rock Barren	RB			- vegetation cover varies from patchy and barren to more closed and treed - tree cover ≤ 60%	- variable bedrock; rolling knob and hollow, rock reef to block and fissure - rock type important; patchy soil development; substrate depth < 15 cm and variable - extremes in moisture and temperatures
Treed Rock Barren	RBT			- 25% < tree cover ≤ 60% - see Open Rock Barren for the possible understorey species	- found where bedrock is broken and cracked or where shallow substrates have accumulated
Carbonate Treed Rock Barren Ecosite	RBT1			- cover varies from patchy and barren to more closed in nature (i.e., savannah or woodland)	- carbonate bedrock
Red Cedar Carbonate Treed Rock Barren Type	RBT1-1	X			
Hackberry Carbonate Treed Rock Barren Type	RBT1-2	X			
Oak Carbonate Treed Rock Barren Type	RBT1-3	X			
Basic Treed Rock Barren Ecosite	RBT2			- cover varies from patchy and barren to more closed in nature (i.e., savannah or woodland)	- basic bedrock
Oak – Red Maple – Pine Basic Treed Rock Barren Type	RBT2-1	X			
Red Cedar Basic Treed Rock Barren Type	RBT2-2	X			
Jack Pine Basic Treed Rock Barren Type	RBT2-3	X			
Acidic Treed Rock Barren Ecosite	RBT3			- cover varies from patchy and barren to more closed in nature (i.e., savannah or woodland)	- acidic bedrock
Pitch Pine Acidic Treed Rock Barren Type	RBT3-1	X			
Jack Pine Acidic Treed Rock Barren Type	RBT3-2	X			

9 Nested ELC Communities	Code	6E	7E	Vegetation Characteristics	Environmental Characteristics
Crevice and Cave	CC			- vegetation cover patchy and barren; influenced by extreme shading - trees and shrubs absent	- sheltered, mostly enclosed cavities and crevices in bedrock - extreme shading; cool temperatures - rock type important
Crevice	CCR			- vegetation varies with light availability	- sheltered, mostly enclosed crevices in bedrock - extreme shading; cool temperatures
Carbonate Crevice Ecosite	CCR1				- carbonate bedrock
Moist Liverwort – Moss – Fern Carbonate Crevice Type	CCR1-1	X	X		
Acidic Crevice Ecosite	CCR2				- acidic bedrock
Cave	CCA			- vegetation varies with light availability	- sheltered, mostly enclosed cavities in bedrock - extreme shading; cool temperatures
Carbonate Cave Ecosite	CCA1				- carbonate bedrock
Acidic Cave Ecosite	CCA2				- acidic bedrock

10 Nested ELC Communities	Code	6E	7E	Vegetation Characteristics	Environmental Characteristics
Sand Barren	SB			- vegetation cover varies from patchy and barren to more closed and treed - tree cover	- bare sand substrates not associated with distinct topographic features (i.e., sand dune) - subject to periods of prolonged drought and disturbances (e.g., fire)
Open Sand Barren	SBO			- tree cover ≤ 25%; shrub cover ≤ 25%	
Open Sand Barren Ecosite	SBO1			- cover varies from patchy and barren to continuous meadow	- extremely droughty and disturbed sands
Dry Bracken Fern Sand Barren Type	SBO1-1	X			
Dry Hay Sedge Sand Barren Type	SBO1-2	X			
Dry Slender Wheat-grass Sand Barren Type	SBO1-3	X			
Shrub Sand Barren	SBS			- tree cover ≤ 25%; shrub cover > 25%	
Shrub Sand Barren Ecosite	SBS1			- cover varies from patchy and barren to continuous thicket	
Treed Sand Barren	SBT			- 25% < tree cover ≤ 60%	
Treed Sand Barren Ecosite	SBT1			- cover varies from patchy and barren to more closed (e.g., savannah to woodland)	- least droughty and disturbed sands

11 Nested ELC Communities	Code	6E	7E	Vegetation Characteristics	Environmental Characteristics
Tallgrass Prairie, Savannah and Woodland	TP			- ground layer dominated by prairie graminoids; Big Bluestem, Little Bluestem and Indian Grass - variable cover of open-grown trees - tree cover ≤ 60%	- on unconsolidated mineral substrates; soil depth > 15 cm; well-drained sands, loams and sometimes clay - subject to seasonal extremes in moisture conditions; spring flooding and summer drought; frequent disturbance by fire
Open Tallgrass Prairie	TPO			- tree cover ≤ 25%; shrub cover ≤ 25%	
Dry Tallgrass Prairie Ecosite	TPO1			- dominated by prairie graminoids	- prolonged periods of drought
Dry Tallgrass Prairie Type	TPO1-1	X	X	- associates include Cylindric Anemone, Rock Sandwort, Pinweed, Scribner's Panic Grass and Bluets	- dry (0) to fresh (1,2) moisture regimes
Fresh – Moist Tallgrass Prairie Ecosite	TPO2			- dominated by prairie graminoids and forbs	- seasonal flooding followed by summer drought
Fresh – Moist Tallgrass Prairie Type	TPO2-1		X	- associates include Dense Blazing-star, Gray Coneflower, Ohio Spiderwort, Prairie Dock and Ironweed	- fresh (2,3) to moist (4,5) moisture regimes
Tallgrass Savannah	TPS			- 25% < tree cover ≤ 35% - see Open Tallgrass Prairie vegetation types for understorey vegetation	
Dry Tallgrass Savannah Ecosite	TPS1			- widely spaced, open-grown trees with an understorey of prairie graminoids and forbs	- prolonged periods of drought
Dry Black Oak Tallgrass Savannah Type	TPS1-1		X		- dry (0) to fresh (1,2) moisture regimes
Dry Black Oak – Pine Tallgrass Savannah Type	TPS1-2	X	X		- dry (0) to fresh (1,2) moisture regimes
Fresh – Moist Tallgrass Savannah Ecosite	TPS2			- widely spaced, open-grown trees with an understorey of prairie graminoids and forbs	- seasonal flooding followed by summer drought
Fresh – Moist Pin Oak – Bur Oak Tallgrass Savannah Type	TPS2-1		X		- fresh (2,3) to moist (4,5) moisture regimes

12 Nested ELC Communities	Code	6E	7E	Vegetation Characteristics	Environmental Characteristics
Tallgrass Prairie, Savannah and Woodland	TP			- ground layer dominated by prairie graminoids; Big Bluestem, Little Bluestem and Indian Grass - variable cover of open-grown trees - tree cover	- on unconsolidated mineral substrates; soil depth > 30 cm; well drained sands, loams and sometimes clay - subject to seasonal extremes in moisture conditions; spring flooding and summer drought; frequent disturbance by fire
Tallgrass Woodland	TPW			- 35% < tree cover ≤ 60% - see Open Tallgrass Prairie vegetation types for understory vegetation	
Dry Tallgrass Woodland Ecosite	TPW1			- open-grown trees with an understorey of prairie graminoids and forbs - Pennsylvania Sedge common	- prolonged periods of drought
Dry Black Oak – White OakTallgrass Woodland Type	TPW1-1		X		- dry (0) to fresh (1,2) moisture regimes
Dry Bur Oak – Shagbark Hickory Tallgrass Woodland Type	TPW1-2	X			- dry (0) to fresh (1,2) moisture regimes - shallow soils over carbonate bedrock
Fresh - Moist Tallgrass Woodland Ecosite	TPW2			- open-grown trees with an understorey of prairie graminoids and forbs	- seasonal flooding followed by summer drought
Fresh – Moist Black Oak – White Oak Tallgrass Woodland Type	TPW2-1		X		- fresh (2,3) to moist (4,5) moisture regimes
Fresh – Moist Pin Oak Tallgrass Woodland Type	TPW2-2		X		- fresh (2,3) to moist (4,5) moisture regimes

13 Nested ELC Communities	Code	6E	7E	Vegetation Characteristics	Environmental Characteristics
Forest	FO			- tree cover > 60%	- site conditions and substrate types variable
Coniferous Forest	FOC			- conifer tree species > 75% of canopy cover	
Dry – Fresh Pine Coniferous Forest Ecosite	FOC1			- Jack Pine, White Pine or Red Pine separately dominant or in variable mixtures - Oak species, White Cedar, White Birch, and to a lesser extent Hemlock, Balsam Fir and Red Maple associates - Low Sweet Blueberry, Common Juniper, Wintergreen, Buffalo Berry, Serviceberry spp. and Sweet Fern - Bracken Fern, Gaywings, Bristle-leaved Sedge, Large-leaved Aster and Hairy Goldenrod	- dry (θ, 0) to fresh (1,2) soil moisture regime - occurs on droughty shallow soils over bedrock, rock, sands and coarse loams with rapid (2) to moderately well (4) soil drainage - conditions are extreme enough to limit the growth of other species - upper to middle slope (1,2,3) and tableland (7) topographic positions
Dry – Fresh Jack Pine Coniferous Forest Type	FOC1-1	X		- Jack Pine dominant - White Pine, Red Pine, Oak species and Red Maple more common associates	- xeric and moderately dry (θ, 0) soil moisture regimes - typically on shallow soils over either acidic, basic or carbonate bedrock; most extreme sites
Dry – Fresh White Pine – Red Pine Coniferous Forest Type	FOC1-2	X	X	- White Pine or Red Pine separately dominant or in variable mixtures	- sands, coarse loams and shallow soils over acidic, basic or carbonate bedrock, or rock; less extreme sites

14 Nested ELC Communities	Code	6E	7E	Vegetation Characteristics	Environmental Characteristics
Forest	FO			- tree cover > 60%	- site conditions and substrate types variable
Coniferous Forest	FOC			- conifer tree species > 75% of canopy cover	
Dry – Fresh Cedar Coniferous Forest Ecosite	FOC2			- Red Cedar or White Cedar separately dominant - often represents second growth arising on heavily managed, grazed or disturbed sites - canopy cover varies from patchy to closed conditions - Serviceberry spp., Bush honeysuckle and Low Sweet Blueberry - Bracken Fern, Wild Sarsaparilla and Canada Bluegrass	- dry (θ, 0) to fresh (1,2) soil moisture regime - on shallow soils over bedrock, rock, sands and loams with rapid (2) drainage; more common on carbonate substrates and bedrock - upper to middle slope (1,2,3) and tableland (7) topographic positions
Dry – Fresh Red Cedar Coniferous Forest Type	FOC2-1	X	X	- Red Cedar dominant - Red Oak, White Oak, Chinquapin Oak, Dwarf Chinquapin Oak, Black Oak, White Pine, Red Pine, Black Walnut, Ironwood, Hackberry and Hickory associates - Canada Blue Grass, Switch Grass, Poverty Oat Grass, St. John's-wort, Hawkweeds, Goldenrods and Asters - typically invading cleared areas, such as abandoned fields and pastures, or on extreme sites with shallow or no soil over bedrock (see Treed Rock Barren)	
Dry – Fresh White Cedar Coniferous Forest Type	FOC2-2	X	X	- White Cedar dominant, or shares dominance with White Spruce or Balsam Fir	

15 Nested ELC Communities	Code	6E	7E	Vegetation Characteristics	Environmental Characteristics
Forest	FO			- tree cover > 60%	- site conditions and substrate types variable
Coniferous Forest	FOC			- conifer tree species > 75% of canopy cover	
Fresh – Moist Hemlock Coniferous Forest Ecosite	FOC3			- Hemlock dominated - White Pine, Balsam Fir and White Cedar and, to a lesser extent, Yellow Birch, Sugar Maple, Green Ash and White Birch associates - shrub and herb richness increase on moist sites; fern rich - Wood Ferns, Bluebead Lily, Starflower, Goldthread and Foamflower	- moist (4,5,6) to fresh (2,3) soil moisture regimes - sands, coarse loams and fine loams; typically have finer silt and clay components - well (3) to imperfect (5) soil drainage - middle to lower slopes (3,4,5), seepage areas, bottomlands (5,6) and tablelands with high water table and complex microtopography (8)
Fresh – Moist Hemlock Coniferous Forest Type	FOC3-1	X	X	- Hemlock dominant; White Cedar < 25% of canopy cover	
Fresh – Moist White Cedar Coniferous Forest Ecosite	FOC4			- White Cedar dominant - Balsam Fir, Hemlock and, to a lesser extent, White Pine, Yellow Birch, Sugar Maple, Green Ash and White Birch associates - shrub and herb cover and species richness low; fern rich - Sensitive Fern, Marsh Fern, Spotted Touch-me-not and Cinnamon Fern	- moist (4,5,6) to fresh (2,3) soil moisture regimes - moderately well (4) to poor (6) soil drainage - typically on basic or carbonate substrates and bedrock; moist yet well drained - middle to lower slopes (3,4,5), seepage areas and bottomlands (5,6)
Fresh – Moist White Cedar Coniferous Forest Type	FOC4-1	X	X	- dominated entirely by White Cedar	
Fresh – Moist White Cedar – Hemlock Coniferous Forest Type	FOC4-2	X		- White Cedar dominant (> 25% of canopy cover), with Hemlock	
Fresh – Moist White Cedar – Balsam Fir Coniferous Forest Type	FOC4-3	X		- White Cedar dominant (> 25% of canopy cover), with Balsam Fir	

16 Nested ELC Communities	Code	6E	7E	Vegetation Characteristics	Environmental Characteristics
Forest	FO			- tree cover > 60%	- site conditions and substrate types variable
Mixed Forest	FOM			- conifer tree species > 25% **and** deciduous tree species > 25% of canopy cover	
Dry Oak – Pine Mixed Forest Ecosite	FOM1			- Red Oak, White Oak, Chinquapin Oak, Pitch Pine, White Pine and Red Pine in variable mixtures - canopy typically open in nature - Low Sweet Blueberry, Buffalo Berry and Common Juniper - Bracken Fern	- dry (θ,0) to moderately fresh (1) soil moisture regimes - shallow soils over bedrock, rock, sands and coarse loams - rapid (2) to well (3) soil drainage - droughty conditions and shallow soils play important roles - upper to middle slope (1,2,3) and tableland (7) topographic positions
Dry Pitch Pine – Oak Mixed Forest Type	FOM1-1	X		- Pitch Pine, Red Oak and, to a lesser extent, White Oak in variable mixtures - Common Hair Grass, Panic Grass and Bracken Fern	- restricted to the shallow substrates and bare rock surfaces associated with rock outcrops (knobs and ridges) on the Canadian Shield (Frontenac County)
Dry Chinquapin Oak – Pine Mixed Forest Type	FOM1-2		X	- Chinquapin Oak with Red Pine and White Pine - Prickly Ash and Fragrant Sumac - Bracken Fern	- on droughty, well drained sands or shallow soils over carbonate, basic or acidic bedrock
Dry – Fresh White Pine – Maple – Oak Mixed Forest Ecosite	FOM2			- White Pine with Sugar Maple, Red Oak and, to a lesser extent, White Oak; dominant species varies - Red Maple, Basswood, White Ash and Ironwood associates - Serviceberry, Wintergreen, Downy Arrowwood, Low Sweet Blueberry and Partridgeberry - Bracken Fern, Gaywings, Bristle-leaved Sedge, White Trillium and Rough-leaved Mountain-rice	- dry (θ,0) to fresh (1,2,3) soil moisture regimes - on sands, coarse loams and shallow soils over bedrock or rock - upper to middle slope (1,2,3) and tableland (7) topographic positions
Dry – Fresh White Pine – Oak Mixed Forest Type	FOM2-1	X	X	- White Pine with Red Oak >> White Oak	
Dry – Fresh White Pine – Sugar Maple Mixed Forest Type	FOM2-2	X	X	- White Pine with Sugar Maple	

17	Nested ELC Communities	Code	6E	7E	Vegetation Characteristics	Environmental Characteristics
Forest		FO			- tree cover > 60%	- site conditions and substrate types variable
Mixed Forest		FOM			- conifer tree species > 25% **and** deciduous tree species > 25% of canopy cover	
Dry – Fresh Hardwood – Hemlock Mixed Forest Ecosite		FOM3			- Hemlock with Sugar Maple, Red Maple or Red Oak; dominant species varies - shrub and herb cover and species richness low	- on moderately dry (0) to fresh (1,2,) soil moisture regimes - sands and coarse loams and, to a lesser extent, shallow substrates over bedrock and rock; soils have finer silt and clay components - typically found on slopes with adequate moisture yet good drainage
Dry – Fresh Hardwood – Hemlock Mixed Forest Type		FOM3-1	X	X	- Hemlock with Red Oak, Red Maple and White Pine - Sugar Maple ≤ 25% of the canopy cover	- common where bedrock is relatively close to the surface (30 cm < depth to bedrock < 100 cm)
Dry – Fresh Sugar Maple – Hemlock Mixed Forest Type		FOM3-2	X	X	- Hemlock with Sugar Maple; Sugar Maple > 25% of canopy cover - White Ash, Basswood and Red Maple associates	- typically on deeper sands and loams with finer silt and clay components
Dry – Fresh White Cedar Mixed Forest Ecosite		FOM4			- White Cedar with White Birch, Largetooth Aspen, Trembling Aspen, Sugar Maple and White Ash; dominant species varies - often represents second growth arising on heavily managed, grazed or disturbed sites - low shrub and herb cover	- moderately dry (0) to fresh (1,2) soil moisture regimes - sands, loams and shallow substrates over bedrock; common on basic and carbonate substrates and bedrock
Dry – Fresh White Cedar – White Birch Mixed Forest Type		FOM4-1	X	X		
Dry – Fresh White Cedar – Poplar Mixed Forest Type		FOM4-2	X	X		

17 Nested ELC Communities	Code	6E	7E	Vegetation Characteristics	Environmental Characteristics
Dry – Fresh White Birch – Poplar – Conifer Mixed Forest Ecosite	FOM5			- White Birch, Trembling Aspen and Largetooth Aspen with Balsam Fir, White Pine and White Spruce - typically a young (early successional) forest following a disturbance	- moderately dry (0) to fresh (1,2,3) soil moisture regimes - sands and loams - suggests recent disturbance or management on the site
Dry – Fresh White Birch Mixed Forest Type	FOM5-1	X	X		
Dry – Fresh Poplar Mixed Forest Type	FOM5-2	X	X		

18 Nested ELC Communities	Code	6E	7E	Vegetation Characteristics	Environmental Characteristics
Forest	FO			- tree cover > 60%	- site conditions and substrate types variable
Mixed Forest	FOM			- conifer tree species > 25% **and** deciduous tree species > 25% of canopy cover	
Fresh – Moist Hemlock Mixed Forest Ecosite	FOM6			- Hemlock with Sugar Maple and Yellow Birch; dominant species varies - Red Maple, White Birch, Beech, Black Ash and White Cedar associates - low shrub and herb cover	- moist (4,5,6) to very fresh (3) moisture regimes - sands and loams, less commonly on clays - well (3) to very poor (7) soil drainage - middle to lower slopes (3,4,5), seepage areas and bottomland (6) topographic positions
Fresh – Moist Sugar Maple – Hemlock Mixed Forest Type	FOM6-1	X	X	- Hemlock with Sugar Maple; Sugar Maple > 25% of canopy cover - White Birch, Ash species, Beach and Yellow Birch associates - Jack-in-the-pulpit, Intermediate Wood Fern, Lady Fern and Wild Ginger	- typically on the fresher end of the moisture regime gradient - middle to lower slopes (3,4,5) and tablelands or bottomlands with complex microtopography (8)
Fresh – Moist Hemlock – Hardwood Mixed Forest Type	FOM6-2	X	X	- Hemlock with Yellow Birch, Red Maple, Black Ash and White Cedar associates; Sugar Maple ≤ 25% of canopy cover - Starflower, Oak Fern, Bluebead Lily and Goldthread	- typically on the moist end of the moisture regime gradient - lower slopes (4,5), seepage areas and bottomlands (6,8)
Fresh – Moist White Cedar – Hardwood Mixed Forest Ecosite	FOM7			- White Cedar with Red Maple, Yellow Birch, Ash spp. and White Birch associates - Spinulose Wood Fern, Marginal Wood Fern, Wild Sarsaparilla and Jack-in-the-pulpit	- moist (4,5,6) to very fresh (3) moisture regimes - sands and loams, less commonly on clays - well (3) to very poor (7) soil drainage - middle to lower slopes (3,4,5), seepage areas and bottomland (6) topographic positions
Fresh – Moist White Cedar – Sugar Maple Mixed Forest Type	FOM7-1	X	X	- White Cedar with Sugar Maple - White Ash and Yellow Birch associates	- typically on the fresher end of the moisture regime gradient - especially found along the Niagara Escarpment and on steeper river valley slopes

18 Nested ELC Communities	Code	6E	7E	Vegetation Characteristics	Environmental Characteristics
Fresh – Moist White Cedar – Hardwood Mixed Forest Type	FOM7-2	X	X	- White Cedar with Black Ash, Trembling Aspen, White Birch, Yellow Birch and Red Maple	- typically on the moist end of the moisture regime gradient

19 Nested ELC Communities	Code	6E	7E	Vegetation Characteristics	Environmental Characteristics
Forest	FO			- tree cover > 60%	- site conditions and substrate types variable
Mixed Forest	FOM			- conifer tree species > 25% **and** deciduous tree species > 25% of canopy cover	
Fresh – Moist Poplar – White Birch Mixed Forest Ecosite	FOM8			- Trembling Aspen, Largetooth Aspen and White Birch dominant - Balsam Fir, Hemlock and Black Spruce associates - Bluebead Lily, Starflower and Goldthread - typically a young (early successional) forest following a disturbance	- moist (4,5,6) to very fresh (3) moisture regimes - soil textures variable - lower slopes (4,5), seepage areas and bottomland (6) topographic positions
Fresh – Moist Poplar Mixed Forest Type	FOM8-1	X	X		
Fresh – Moist White Birch Mixed Forest Type	FOM8-2	X	X		

20 Nested ELC Communities	Code	6E	7E	Vegetation Characteristics	Environmental Characteristics
Forest	FO			- tree cover > 60%	- site conditions and substrate types variable
Deciduous Forest	FOD			- deciduous tree species > 75% of canopy cover	
Dry – Fresh Oak Deciduous Forest Ecosite	FOD1	X	X	- Red Oak, White Oak and Black Oak separately dominant or in variable mixtures - Red Maple, White Pine and Black Cherry are common associates - Bracken Fern - canopy cover variable; often relatively open (60 to 80% canopy closure)	- moderately dry (0) to fresh (1,2) moisture regimes - shallow soils over bedrock, rock, sands and coarse loams; absence of finer silts and clays; rapid (2) drainage; absence of gley; mottles > 60 cm in depth; subject to droughty conditions - typically on upper to middle slope (1,2,3) or tableland (7) topographic positions - site subject to some extremes in conditions or disturbance (e.g., fire, historical land use)
Dry – Fresh Red Oak Deciduous Forest Type	FOD1-1	X	X	- Red Oak dominant - Bracken Fern, Lowbush Blueberry, Wintergreen and Starflower	
Dry – Fresh White Oak Deciduous Forest Type	FOD1-2			- White Oak dominant - Bracken Fern, Lowbush Blueberry, Wintergreen and Starflower	
Dry – Fresh Black Oak Deciduous Forest Type	FOD1-3		X	- Black Oak dominant - Bracken Fern	
Dry – Fresh Mixed Oak Deciduous Forest Type	FOD1-4		X	- more than two Oak species dominant - Red Oak >> White Oak > Black Oak - Bracken Fern	

21 Nested ELC Communities	Code	6E	7E	Vegetation Characteristics	Environmental Characteristics
Forest	FO			- tree cover > 60%	- site conditions and substrate types variable
Deciduous Forest	FOD			- deciduous tree species > 75% of canopy cover	
Dry – Fresh Oak – Maple – Hickory Deciduous Forest Ecosite	FOD2			- Oak species dominant (Red Oak >> White Oak) with Red Maple, Hickory, Sugar Maple, White Ash, Beech, Basswood, Ironwood and Black Cherry; Sugar Maple ≤ 25% canopy cover - presence of Trilliums, Hepaticas, Bellwort, Jack-in-the-pulpit and Zigzag Goldenrod - represents a transition from dry to fresher sites	- moderately dry (0) to fresh (1,2) moisture regimes - sands and coarse loams with silt and clay components, along with fine loams and clays; moderate drainage; absence of gley; mottles > 60 cm in depth; less droughty conditions prevail - typically on upper to middle slope (1,2,3) or tableland (7) topographic positions - prevailing conditions limiting yet not extreme
Dry – Fresh Oak – Red Maple Deciduous Forest Type	FOD2-1	X	X	- Red Oak >> White Oak - either Oak or Red Maple can dominate	
Dry – Fresh Oak – Hickory Deciduous Forest Type	FOD2-2	X	X	- Red Oak >> White Oak > Bitternut Hickory > Shagbark Hickory - either Oak or Hickory can dominate	
Dry – Fresh Hickory Deciduous Forest Type	FOD2-3	X	X	- Bitternut Hickory > Shagbark Hickory	
Dry – Fresh Oak – Hardwood Deciduous Forest Type	FOD2-4	X	X	- Oak dominant with Sugar Maple, White Ash, Beech, Basswood, Ironwood and Black Cherry associates; Sugar Maple ≤ 25% canopy cover - if Sugar Maple is close to, or in equal proportions to, Oak (> 25%) see Dry – Fresh Sugar Maple – Oak Deciduous Forest Type	

22 Nested ELC Communities	Code	6E	7E	Vegetation Characteristics	Environmental Characteristics
Forest	FO			- tree cover > 60%	- site conditions and substrate types variable
Deciduous Forest	FOD			- deciduous tree species > 75% of canopy cover	
Dry – Fresh Poplar – White Birch Deciduous Forest Ecosite	FOD3			- Trembling Aspen, Largetooth Aspen or White Birch dominant - often represents second growth arising on heavily managed, grazed or disturbed sites (e.g., cutting, clearing)	- moderately dry (0) to fresh (1,2,3) soil moisture regimes - shallow substrates over bedrock, rock, sands and coarse loams - upper to middle slope (1,2,3) or tableland (7) topographic positions
Dry – Fresh Poplar Deciduous Forest Type	FOD3-1	X	X	- Trembling Aspen, Largetooth Aspen dominant separately or in variable mixtures - Sugar Maple, Red Maple, Red Oak, Black Cherry, White Elm, White Ash and White Birch associates - typically represents an early successional stage with high shrub and herb cover and species richness - Bracken Fern, Kentucky Bluegrass and Showy Tick-trefoil where canopy is open; White Trillium, Bedstraws, Large-leaved Aster and Bracken Fern where canopy is more closed	
Dry – Fresh White Birch Deciduous Forest Type	FOD3-2	X	X	- White Birch dominant - Trembling Aspen and Largetooth Aspen are common associates - typically represents an early successional stage with high shrub and herb cover and species richness	- occurs mainly on the fresh (1,2,3) soil moisture regimes

23 Nested ELC Communities	Code	6E	7E	Vegetation Characteristics	Environmental Characteristics
Forest	FO			- tree cover > 60%	- site conditions and substrate types variable
Deciduous Forest	FOD			- deciduous tree species > 75% of canopy cover	
Dry – Fresh Deciduous Forest Ecosite	FOD4			- tree species associations that are either relatively uncommon or a result of disturbance or management - Sugar Maple absent or less than 10% of canopy cover	- moderately dry (0) to fresh (1,2,3) moisture regimes - sands and loams - well (3) to moderately well (4) drained soils - upper to middle slopes (2,3,4) or tableland (7) topographic positions
Dry – Fresh Beech Deciduous Forest Type	FOD4-1	X	X	- Beech dominant	
Dry – Fresh White Ash Deciduous Forest Type	FOD4-2	X	X	- White Ash dominant - Ironwood, Trembling Aspen, Largetooth Aspen and White Birch associates - likely disturbance- or management-related	
Dry – Fresh Hackberry Deciduous Forest Type	FOD4-3		X	- Hackberry dominant or in association with Red Oak, Basswood, Chinquapin Oak, White Ash and Green Ash - Long-styled Sweet-cicely, Herb Robert, Jumpseed - only found in the extreme southwest of 7E	- usually on carbonate sands or shallow soils over carbonate bedrock

24 Nested ELC Communities	Code	6E	7E	Vegetation Characteristics	Environmental Characteristics
Forest	FO			- tree cover > 60%	- site conditions and substrate types variable
Deciduous Forest	FOD			- deciduous tree species > 75% of canopy cover	
Dry – Fresh Sugar Maple Deciduous Forest Ecosite	FOD5			- Sugar Maple with Beech, Red Oak, White Oak, Ironwood, Basswood, Black Cherry, Bitternut Hickory, Shagbark Hickory, White Ash, Red Maple, White Birch, Trembling Aspen and Largetooth Aspen; dominant species may vary - heavily managed, grazed or disturbed sites tend to be relatively lacking in shrub and understorey vegetation - Alternate-leaved Dogwood, Raspberry and Red Elderberry - Trillium spp., Wild Sarsaparilla, Blue Cohosh, Jack-in-the-pulpit and Wild Leek	- moderately dry (0) to fresh (1,2,3) soil moisture regimes - shallow soils over bedrock, rock, sands and loams - rapid (2) to well (3) drained sites - typically on upper to middle slopes (1,2,3) or tablelands (7) with suitable drainage
Dry – Fresh Sugar Maple Deciduous Forest Type	FOD5-1	X	X	- almost entirely dominated by Sugar Maple	
Dry – Fresh Sugar Maple – Beech Deciduous Forest Type	FOD5-2	X	X		
Dry – Fresh Sugar Maple – Oak Deciduous Forest Type	FOD5-3	X	X	- Sugar Maple with Red Oak >> White Oak	
Dry – Fresh Sugar Maple – Ironwood Deciduous Forest Type	FOD5-4	X	X	- common on managed (e.g., cutting) or historically grazed sites	
Dry – Fresh Sugar Maple – Hickory Deciduous Forest Type	FOD5-5	X	X	- Sugar Maple with Bitternut Hickory >> Shagbark Hickory	- coarse and fine loams with a silt and clay content
Dry – Fresh Sugar Maple – Basswood Deciduous Forest Type	FOD5-6	X	X		
Dry – Fresh Sugar Maple – Black Cherry Deciduous Forest Type	FOD5-7	X	X		
Dry – Fresh Sugar Maple – White Ash Deciduous Forest Type	FOD5-8	X	X		

24 Nested ELC Communities	Code	6E	7E	Vegetation Characteristics	Environmental Characteristics
Dry – Fresh Sugar Maple – Red Maple Deciduous Forest Type	FOD5-9	X	X		
Dry – Fresh Sugar Maple – White Birch – Poplar Deciduous Forest Type	FOD5-10	X	X		

25 Nested ELC Communities	Code	6E	7E	Vegetation Characteristics	Environmental Characteristics
Forest	FO			- tree cover > 60%	- site conditions and substrate types variable
Deciduous Forest	FOD			- deciduous tree species > 75% of canopy cover	
Fresh – Moist Sugar Maple Deciduous Forest Ecosite	FOD6			- Sugar Maple with Green Ash, Black Ash, Red Maple, White Elm, Yellow Birch, Basswood and Beech associates; dominant species varies - Sassafras, Hackberry and, to a lesser extent, Sycamore, Tulip Tree and Pignut Hickory are Carolinian associates found in Site Region 7E - Spicebush and Blue Beech - mixture of terrestrial and wetland species - Sensitive Fern, Spotted Touch-me-not, Ostrich Fern, Fowl Manna Grass, Skunk Cabbage, Marsh Fern, along with Trilliums and Jack-in-the-pulpit	- moist (4,5,6) to fresh (2,3) moisture regimes - imperfect (5) to poor (6) soil drainage - sands, loams, rarely on clays; soils may be peaty phase mineral (accumulations of organic material 20 to 40 cm) - middle to lower slopes (3,4,5), bottomlands (5,6) and poorly drained tablelands with complex microtopography (8) - represents the wetland (swamp) – terrestrial transitional
Fresh – Moist Sugar Maple – Lowland Ash Deciduous Forest Type	FOD6-1	X	X	- Sugar Maple with Green Ash, Black Ash - most common, widespread type	- occurs on a variety of different types of sites
Fresh – Moist Sugar Maple – Black Maple Deciduous Forest Type	FOD6-2	X	X		- moist yet well drained sites; often along floodplains
Fresh – Moist Sugar Maple –Yellow Birch Deciduous Forest Type	FOD6-3	X		- often associated with coniferous species; Hemlock, Balsam Fir or White Cedar may be associate	- moist yet well drained sites; most common on lower slopes and sites with complex microtopography
Fresh – Moist Sugar Maple – White Elm Deciduous Forest Type	FOD6-4	X	X		- moist yet well drained sites; often along floodplains
Fresh – Moist Sugar Maple – Hardwood Deciduous Forest Type	FOD6-5	X		- other more uncommon associations with Sugar Maple on moist soils may include Beech, Basswood, Oak, Hickory, Red Maple and others	- moist yet well drained sites; site typically dries by mid- to late summer; often a site with complex microtopography or along floodplains

26 Nested ELC Communities	Code	6E	7E	Vegetation Characteristics	Environmental Characteristics
Forest	FO			- tree cover > 60%	- site conditions and substrate types variable
Deciduous Forest	FOD			- deciduous tree species > 75% of canopy cover	
Fresh – Moist Lowland Deciduous Forest Ecosite	FOD7			- White Elm, Willows, Black Walnut, Black Maple, Basswood, Green Ash and Black Ash dominate separately or in variable mixtures - Red Maple, White Birch, Hackberry, Sycamore and Sugar Maple associates - typically more open canopies – may be < 60% tree cover - Blue Beech, Alternate-leaved Dogwood and Prickly Gooseberry - greater presence of vines; Virginia Creeper, Poison Ivy and Wild Grape - mixture of herbaceous species common to wet sites, such as Sensitive Fern, Foam Flower and Spotted Touch-me-not along with common upland species such as Wild Leek, Blue Cohosh and Jack-in-the-pulpit	- moist (4,5,6) to fresh (2,3) moisture regimes - coarse and fine loams and occasionally sands and clays; all soils have finer silt and clay components - well (3) to poor (6) soil drainage - lower slopes (4,5) with seepage and bottomlands (5,6), especially floodplains - typically in rich areas where deposition due to flooding occurs yet drying occurs by mid- to late summer
Fresh – Moist White Elm Lowland Deciduous Forest Type	FOD7-1	X	X		
Fresh – Moist Ash Lowland Deciduous Forest Type	FOD7-2	X	X	- Green Ash, Black Ash	
Fresh – Moist Willow Lowland Deciduous Forest Type	FOD7-3	X	X	- often resulting from cultural influences (i.e., historical clearing and planting, shoreline disturbances) or disturbances	- typically associated with riparian zones and terraces; stream and river banks and floodplains
Fresh – Moist Black Walnut Lowland Deciduous Forest Type	FOD7-4		X		- typically associated with riparian zones and terraces; stream and river banks and floodplains
Fresh – Moist Black Maple Lowland Deciduous Forest Type	FOD7-5		X		- typically associated with riparian zones and terraces; stream and river banks and floodplains

27 Nested ELC Communities	Code	6E	7E	Vegetation Characteristics	Environmental Characteristics
Forest	FO			- tree cover > 60%	- site conditions and substrate types variable
Deciduous Forest	FOD			- deciduous tree species > 75% of canopy cover	
Fresh – Moist Poplar – Sassafras Deciduous Forest Ecosite	FOD8			- sites dominated by Trembling Aspen, Largetooth Aspen or Sassafras - typically represents a young (i.e., early successional) forest that has followed a major disturbance - canopy is patchy or relatively open in nature (70 to 85%) - high shrub and herb cover and species richness	- most (4,5,6) to fresh (2,3) moisture regimes - sand, coarse and fine loams and occasionally clay - soil drainage ranges from well (3) to imperfect (5) and occasionally on poor (6) - found on a variety of topographic positions
Fresh – Moist Poplar Deciduous Forest Type	FOD8-1	X	X		
Fresh – Moist Sassafras Deciduous Forest Type	FOD8-2		X		

Nested ELC Communities	Code	6E	7E	Vegetation Characteristics	Environmental Characteristics
Forest	FO			- tree cover > 60%	- site conditions and substrate types variable
Deciduous Forest	FOD			- deciduous tree species > 75% of canopy cover	
Fresh – Moist Oak – Maple – Hickory Deciduous Forest Ecosite	FOD9			- Red Oak, White Oak, Bur Oak, Sugar Maple, Red Maple, Shagbark Hickory and Bitternut Hickory dominate separately or in variable mixtures - represents the forest–swamp (terrestrial–wetland) interface - almost exclusive to Site Region 7E - mixture of terrestrial and wetland species characteristic; Trilliums, Violets, Jack-in-the-pulpit and Wild Geranium with Marsh Fern, Sensitive Fern and Spotted Touch-me-not - higher abundance and diversity of sedges and ferns	- moist (4,5,6) to fresh (2,3) moisture regimes - loams and clays - imperfect (5) to poor (6,7) drainage - lower slopes (4,5), seepage areas, bottomlands (5,6) and tablelands with poor drainage and complex microtopography (8)
Fresh – Moist Oak – Sugar Maple Deciduous Forest Type	FOD9-1		X	- Red Oak >> White Oak with Sugar Maple - White Avens, Wild Geranium, Trilliums and Spotted Touch-me-not	- moist to fresh clays >> loams and sands - lower topographic positions or tablelands with complex microtopography
Fresh – Moist Oak – Maple Deciduous Forest Type	FOD9-2		X	- Red Oak >> White Oak with Red Maple, Silver Maple and Swamp Maple (*Acer freemanII)* - has greater proportion of wetland species - Swamp Fern, Sensitive Fern and Wild Blueflag	- moist sands, loams and clays - lower topographic positions or on tablelands with complex microtopography
Fresh – Moist Bur Oak Deciduous Forest Type	FOD9-3		X	- Bur Oak with White Elm, Green Ash and Basswood - Sensitive Fern	- moist sands and coarse loams - lower valley slopes and bottomlands
Fresh – Moist Shagbark Hickory Deciduous Forest Type	FOD9-4		X	- Shagbark Hickory with Red Maple, White Ash and Green Ash - Blue Beech and Running Strawberry Bush - Wild Geranium, White Avens, Jack-in-the-pulpit and Violets	- moist clays >> fine loams - lower topographic positions and bottomlands - absence of really wet species suggests a drying of soil during the season

28 Nested ELC Communities	Code	6E	7E	Vegetation Characteristics	Environmental Characteristics
Fresh – Moist Bitternut Hickory Deciduous Forest Type	FOD9-5		X	- Bitternut Hickory with Green Ash, White Elm, Sugar Maple and Red Maple - Spotted Touch-me-not, Sensitive Fern, White Avens and May Apple	- moist loams with silt and clay content - lower topographic positions and bottomlands - absence of really wet species suggests a drying of soil during the season

29 Nested ELC Communities	Code	6E	7E	Vegetation Characteristics	Environmental Characteristics
Cultural	CU			- tree cover > 60%	- site conditions and substrate types variable - community resulting from, or maintained by, cultural or anthropogenic-based disturbances
Plantation	CUP				
Deciduous Plantations	CUP1			- deciduous tree species > 75% of canopy cover	
Sugar Maple Deciduous Plantation Type	CUP1-1	X			
Basswood Deciduous Plantation Type	CUP1-2	X			
Black Walnut Deciduous Plantation Type	CUP1-3	X	X		
Hybrid Poplar Deciduous Plantation Type	CUP1-4	X	X		
Silver Maple Deciduous Plantation Type	CUP1-5		X		
Red Maple Deciduous Plantation Type	CUP1-6		X		
Green Ash Deciduous Plantation Type	CUP1-7		X		
Red Oak Deciduous Plantation Type	CUP1-8		X		
Sassafras Deciduous Plantation Type	CUP1-9		X		
Tulip Tree Deciduous Plantation Type	CUP1-10		X		
Mixed Plantations	CUP2			- coniferous tree species > 25% **and** deciduous tree species > 25% of canopy cover	
Black Walnut – White Pine Mixed Plantation Type	CUP2-1		X		
Coniferous Plantations	CUP3			- coniferous tree species > 75% of canopy cover	
Red Pine Coniferous Plantation Type	CUP3-1	X	X		
White Pine Coniferous Plantation Type	CUP3-2	X	X		
Scotch Pine Coniferous Plantation Type	CUP3-3	X			
Jack Pine Coniferous Plantation Type	CUP3-4	X			
Tamarack – European Larch Coniferous Plantation Type	CUP3-5	X			
European Larch Coniferous Plantation Type	CUP3-6	X			
Japanese Larch – European Larch Coniferous Plantation Type	CUP3-7	X			

29 Nested ELC Communities	Code	6E	7E	Vegetation Characteristics	Environmental Characteristics
White Spruce – European Larch Coniferous Plantation Type	CUP3-8	X			
Norway Spruce – European Larch Coniferous Plantation Type	CUP3-9	X			
Red Spruce – European Larch Coniferous Plantation Type	CUP3-10	X			
Black Spruce – European Larch Coniferous Plantation Type	CUP3-11	X			

30 Nested ELC Communities	Code	6E	7E	Vegetation Characteristics	Environmental Characteristics
Cultural	CU			- tree cover ≤ 60% - often having a large proportion of non-native plant species	- site conditions and substrate types variable - community resulting from, or maintained by, cultural or anthropogenic-based disturbances
Cultural Meadow	CUM			- tree cover ≤ 25%; shrub cover ≤ 25%	
Mineral Cultural Meadow Ecosite	CUM1				- parent mineral material or mineral soil
Dry – Moist Old Field Meadow Type	CUM1-1	X	X		
Bedrock Cultural Meadow Ecosite	CUM2				- carbonate, basic or acidic bedrock
Cultural Thicket	CUT			- tree cover ≤ 25%; shrub cover ≤ 25%	
Mineral Cultural Thicket Ecosite	CUT1				- parent mineral material or mineral soil
Sumac Cultural Thicket Type	CUT1-1	X	X		
Serviceberry Cultural Thicket Type	CUT1-2	X	X		
Chokecherry Cultural Thicket Type	CUT1-3	X	X		
Gray Dogwood Cultural Thicket Type	CUT1-4	X	X		
Raspberry Cultural Thicket Type	CUT1-5	X	X		
Poison Ivy Cultural Thicket Type	CUT1-6	X	X		
Bedrock Cultural Thicket Ecosite	CUT2				- carbonate, basic or acidic bedrock
Common Juniper Cultural Alvar Thicket Type	CUT2-1	X			- carbonate (limestone) bedrock
Cultural Savannah	CUS			- 25% < tree cover ≤ 35%	
Mineral Cultural Savannah Ecosite	CUS1				- parent mineral material or mineral soil
Hawthorn Cultural Savannah Type	CUS1-1	X	X		
White Cedar – Green Ash Cultural Savannah Type	CUS1-2	X			
Dry Red Oak Cultural Savannah Type	CUS1-3		X		
Bedrock Cultural Savannah Ecosite	CUS2				- parent mineral material or mineral soil
Cultural Woodland	CUW			- 35% < tree cover ≤ 60%	
Mineral Cultural Woodland Ecosite	CUW1				- parent mineral material or mineral soil
Red Cedar Cultural Woodland Type	CUW1-1	X	X		
Dry Red Oak Cultural Woodland Type	CUW1-2	X	X		
Bedrock Cultural Woodland Ecosite	CUW2				- carbonate, basic or acidic bedrock

30 Nested ELC Communities	Code	6E	7E	Vegetation Characteristics	Environmental Characteristics
Red Cedar Cultural Alvar Woodland Type	CUW2-1	X			- carbonate (limestone) bedrock
Hawthorn Cultural Alvar Woodland Type	CUW2-2		X		- carbonate (limestone) bedrock

31 Nested ELC Communities	Code	6E	7E	Vegetation Characteristics	Environmental Characteristics
Swamp	SW			- tree or shrub cover > 25% - dominated by hydrophytic shrub and tree species	- variable flooding regimes - water depth < 2 m - standing water or vernal pooling > 20% of ground coverage
Coniferous Swamp	SWC			- tree cover > 25%; trees > 5 m in height - conifer tree species > 75% of canopy cover - typically has a more northern compliment of species, including Bunchberry, Dwarf Raspberry, Wintergreen, Starflower, Goldthread, Canada Mayflower, Naked Mitrewort, Dewdrop, Bluebead Lily and Horsetails - richer coniferous swamps, especially on organic substrates, may have Fly Honeysuckle, Swamp Red Currant, Mountain Maple, Cinnamon Fern and Royal Fern	
White Cedar Mineral Coniferous Swamp Ecosite	SWC1			- White Cedar with Balsam Fir, Hemlock, White Spruce and, to a lesser extent, White Birch, Yellow Birch, White Pine, Black Ash and Red Maple; dominant species may vary	- mineral and peaty phase mineral (organic accumulations 20 to 40 cm) substrates - areas where flooding duration is short – substrate aerated by early to mid-summer
White Cedar Mineral Coniferous Swamp Type	SWC1-1	X		- almost entirely dominated by White Cedar - understorey very shaded, having few species and little cover	
White Cedar – Conifer Mineral Coniferous Swamp Type	SWC1-2	X		- White Cedar with Balsam Fir, Hemlock, White Spruce and White Pine - understorey cover and species richness dependant on degree of tree canopy closure and shading	

31 Nested ELC Communities	Code	6E	7E	Vegetation Characteristics	Environmental Characteristics
White Pine – Hemlock Mineral Coniferous Swamp Ecosite	SWC2			- White Pine or Hemlock with Red Maple, Yellow Birch and White Birch; dominant species may vary	- mineral and peaty phase mineral (organic accumulations 20 to 40 cm) substrates - areas where flooding duration is short – substrate aerated by early to mid-summer - typically in hummock and hollow, complex microtopography
White Pine Mineral Coniferous Swamp Type	SWC2-1	X	X		
Hemlock Mineral Coniferous Swamp Type	SWC2-2	X	X		

32 Nested ELC Communities	Code	6E	7E	Vegetation Characteristics	Environmental Characteristics
Swamp	SW			- tree or shrub cover > 25% - dominated by hydrophytic shrub and tree species	- variable flooding regimes - water depth < 2 m - standing water or vernal pooling > 20% of ground coverage
Coniferous Swamp	SWC			- tree cover > 25%; trees > 5 m in height - conifer tree species > 75% of canopy cover - typically has a more northern compliment of species, including Bunchberry, Dwarf Raspberry, Wintergreen, Starflower, Goldthread, Canada Mayflower, Naked Mitrewort, Dewdrop, Bluebead Lily and Horsetails (*Equisetum* spp.) - richer coniferous swamps, especially on organic substrates, may have Fly Honeysuckle, Swamp Red Currant, Mountain Maple, Cinnamon Fern and Royal Fern	
White Cedar Organic Coniferous Swamp Ecosite	SWC3			- White Cedar with Tamarack, Balsam Fir, Black Spruce, Hemlock, White Spruce and, to a lesser extent, White Pine, Yellow Birch and White Birch - understorey typically very shaded, having few species and little cover	- organic substrates – Of, Om, Oh (OIP 1985)
White Cedar Organic Coniferous Swamp Type	SWC3-1	X	X	- almost entirely dominated by White Cedar	
White Cedar – Conifer Organic Coniferous Swamp Type	SWC3-2	X	X	- White Cedar with Tamarack, Balsam Fir, Black Spruce, Hemlock, White Spruce and, to a lesser extent, White Pine, Yellow Birch and White Birch; dominant species will vary	

33 Nested ELC Communities	Code	6E	7E	Vegetation Characteristics	Environmental Characteristics
Swamp	SW			- tree or shrub cover > 25% - dominated by hydrophytic shrub and tree species	- variable flooding regimes - water depth < 2 m - standing water or vernal pooling > 20% of ground coverage
Coniferous Swamp	SWC			- tree cover > 25%; trees > 5 m in height - conifer tree species > 75% of canopy cover - typically has a more northern compliment of species, including Bunchberry, Dwarf Raspberry, Wintergreen, Starflower, Goldthread, Canada Mayflower, Naked Mitrewort, Dewdrop, Bluebead Lily and Horsetails - richer coniferous swamps, especially on organic substrates, may have Fly Honeysuckle, Swamp Red Currant, Mountain Maple, Cinnamon Fern and Royal Fern	
Tamarack – Black Spruce Organic Coniferous Swamp Ecosite	SWC4			- Tamarack and Black Spruce dominant or in variable mixtures - typically found associated with or ringing Bogs and Fens - if associated with Bogs or Fens, species may include Leatherleaf, Bog Rosemary, Small Cranberry, Highbush Blueberry, Pitcher Plant, Sundews and Cotton-grass	- organic substrates – Of, Om, Oh (OIP 1985)
Tamarack – Black Spruce Organic Coniferous Swamp Type	SWC4-1	X	X		
Tamarack Organic Coniferous Swamp Type	SWC4-2	X	X		
Black Spruce Organic Coniferous Swamp Type	SWC4-3	X			

34 Nested ELC Communities	Code	6E	7E	Vegetation Characteristics	Environmental Characteristics
Swamp	SW			- tree or shrub cover > 25% - dominated by hydrophytic shrub and tree species	- variable flooding regimes - water depth < 2 m; standing water or vernal pooling > 20% of ground coverage
Mixed Swamp	SWM			- tree cover > 25%; trees > 5 m in height - deciduous tree species > 25% **and** coniferous tree species > 25% of canopy cover - vegetation is a mixture of typical conifer swamp and deciduous swamp species; Bunchberry, Starflower, Goldthread, Bluebead Lily, Naked Mitrewort along with Bedstraws, Fowl Manna Grass, Spotted Touch-me-not, Skunk Cabbage, Marsh Marigold and Sedges - typically fern rich; Sensitive Fern, Cinnamon Fern, Royal Fern, Marsh Fern Ostrich Fern	
White Cedar Mineral Mixed Swamp Ecosite	SWM1			- White Cedar with White Birch, Yellow Birch, Green Ash, Black Ash, Trembling Aspen, Balsam Fir, Red Maple, Balsam Poplar and White Elm; dominant species will vary	- mineral and peaty phase mineral (organic accumulations 20 to 40 cm) substrates - areas where flooding duration is short – substrate aerated by early to mid-summer
White Cedar – Hardwood Mineral Mixed Swamp Type	SWM1-1	X	X		
Maple Mineral Mixed Swamp Ecosite	SWM2			- Red Maple or Swamp Maple (*Acer freemanii) with He*mlock, Balsam Fir, White Pine, Tamarack, White Birch, Yellow Birch, Balsam Poplar and Trembling Aspen; dominant species will vary	- mineral and peaty phase mineral (organic accumulations 20 to 40 cm) substrates - areas where flooding duration is short – substrate aerated by early to mid-summer
Red Maple – Conifer Mineral Mixed Swamp Type	SWM2-1	X	X		
Swamp Maple – Conifer Mineral	SWM2-2	X	X		

34 Nested ELC Communities	Code	6E	7E	Vegetation Characteristics	Environmental Characteristics
Mixed Swamp Type					
Birch – Poplar Mineral Mixed Swamp Ecosite	SWM3			- White Birch, Yellow Birch, Trembling Aspen, Balsam Poplar with Hemlock, Balsam Fir and White Pine; dominant species will vary	- mineral and peaty phase mineral (organic accumulations 20 to 40 cm) substrates - areas where flooding duration is short – substrate aerated by early to mid-summer
Birch – Conifer Mineral Mixed Swamp Type	SWM3-1	X	X		
Poplar – Conifer Mineral Mixed Swamp Type	SWM3-2	X	X		

35 Nested ELC Communities	Code	6E	7E	Vegetation Characteristics	Environmental Characteristics
Swamp	SW			- tree or shrub cover > 25% - dominated by hydrophytic shrub and tree species	- variable flooding regimes - water depth < 2 m - standing water or vernal pooling > 20% of ground coverage
Mixed Swamp	SWM			- tree cover > 25%; trees > 5 m in height - deciduous tree species > 25% coniferous tree species > 25% of canopy cover - vegetation is a mixture of typical conifer swamp and deciduous swamp species; Bunchberry, Starflower, Goldthread, Bluebead Lily, Naked Mitrewort along with Bedstraws, Fowl Manna Grass, Spotted Touch-me-not, Skunk Cabbage, Marsh Marigold and Sedges - typically fern rich; Sensitive Fern, Cinnamon Fern, Royal Fern, Marsh Fern **and** Ostrich Fern	
White Cedar Organic Mixed Swamp Ecosite	SWM4			- White Cedar with Black Ash, Yellow Birch, White Birch, Red Maple, Hemlock and Balsam Fir	- organic substrates – Of, Om, Oh (OIP 1985)
White Cedar – Hardwood Organic Mixed Swamp Type	SWM4-1	X	X		
Maple Organic Mixed Swamp Ecosite	SWM5			- Red Maple, Swamp Maple (*Acer freemanii*) with Hemlock, Balsam Fir, White Pine and Tamarack	- organic substrates – Of, Om, Oh (OIP 1985)
Red Maple – Conifer Organic Mixed Swamp Type	SWM5-1	X	X		
Swamp Maple – Conifer Organic Mixed Swamp Type	SWM5-2	X			

36 Nested ELC Communities	Code	6E	7E	Vegetation Characteristics	Environmental Characteristics
Swamp	SW			- tree or shrub cover > 25% - dominated by hydrophytic shrub and tree species	- variable flooding regimes - water depth < 2 m - standing water or vernal pooling > 20% of ground coverage
Mixed Swamp	SWM			- tree cover > 25%; trees > 5 m in height - deciduous tree species > 25% coniferous tree species > 25% of canopy cover - vegetation is a mixture of typical conifer swamp and deciduous swamp species; Bunchberry, Starflower, Goldthread, Bluebead Lily, Naked Mitrewort along with Bedstraws, Fowl Manna Grass, Spotted Touch-me-not, Skunk Cabbage, Marsh Marigold and Sedges - typically fern rich; Sensitive Fern, Cinnamon Fern, Royal Fern, Marsh Fern **and** Ostrich Fern	
Birch – Poplar Organic Mixed Swamp Ecosite	SWM6			- Yellow Birch, White Birch, Trembling Aspen, Balsam Poplar with Hemlock, Balsam Fir, White Pine and Tamarack	- organic substrates – Of, Om, Oh (OIP 1985)
Birch – Conifer Organic Mixed Swamp Type	SWM6-1	X	X		
Poplar – Conifer Organic Mixed Swamp Type	SWM6-2	X	X		

37 Nested ELC Communities	Code	6E	7E	Vegetation Characteristics	Environmental Characteristics
Swamp	SW			- tree or shrub cover > 25% - dominated by hydrophytic shrub and tree species	- variable flooding regimes - water depth < 2 m - standing water or vernal pooling > 20% of ground coverage
Deciduous Swamp	SWD			- tree cover > 25%; trees > 5 m in height - deciduous tree species > 75% of canopy cover - common species include Fowl Manna Grass, Spotted Touch-me-not, Bugleweed, Skunk Cabbage, Marsh Marigold, Bedstraws and Stinging Nettle - typically fern and sedge rich	
Oak Mineral Deciduous Swamp Ecosite	SWD1			- Swamp White Oak, Bur Oak, Pin Oak, Shumard's Oak with Shagbark Hickory, Green Ash, Red Maple, Swamp Maple, White Elm, Big Shellbark Hickory and Bitternut Hickory	- mineral and peaty phase mineral (organic accumulations 20 to 40 cm) substrates - areas where flooding duration is short – substrate aerated by early to mid-summer
Swamp White Oak Mineral Deciduous Swamp Type	SWD1-1	X	X		
Bur Oak Mineral Deciduous Swamp Type	SWD1-2	X	X		
Pin Oak Mineral Deciduous Swamp Type	SWD1-3		X		
Shumard's Oak Mineral Deciduous Swamp Type	SWD1-4		X		
Ash Mineral Deciduous Swamp Ecosite	SWD2			- Black Ash, Green Ash with Red Maple, White Elm, Swamp Maple and Silver Maple	- mineral and peaty phase mineral (organic accumulations 20 to 40 cm) substrates - areas where flooding duration is short – substrate aerated by early to mid-summer
Black Ash Mineral Deciduous Swamp Type	SWD2-1	X	X		
Green Ash Mineral Deciduous Swamp Type	SWD2-2	X	X		

38 Nested ELC Communities	Code	6E	7E	Vegetation Characteristics	Environmental Characteristics
Swamp	SW			- tree or shrub cover > 25% - dominated by hydrophytic shrub and tree species	- variable flooding regimes - water depth < 2 m - standing water or vernal pooling > 20% of ground coverage
Deciduous Swamp	SWD			- tree cover > 25%; trees > 5 m in height - deciduous tree species > 75% of canopy cover - common species include Fowl Manna Grass, Spotted Touch-me-not, Bugleweed, Skunk Cabbage, Marsh Marigold, Bedstraws and Stinging Nettles - typically fern and sedge rich	
Maple Mineral Deciduous Swamp Ecosite	SWD3			- Red Maple, Silver Maple, Swamp Maple and Manitoba Maple	- mineral and peaty phase mineral (organic accumulations 20 to 40 cm) substrates - areas where flooding duration is short – substrate aerated by early to mid-summer
Red Maple Mineral Deciduous Swamp Type	SWD3-1	X	X		
Silver Maple Mineral Deciduous Swamp Type	SWD3-2	X	X		
Swamp Maple Mineral Deciduous Swamp Type	SWD3-3	X	X		
Manitoba Maple Mineral Deciduous Swamp Type	SWD3-4	X	X		
Mineral Deciduous Swamp Ecosite	SWD4			- less common associations of Willow, White Elm, White Birch, Aspen and Yellow Birch	- mineral and peaty phase mineral (organic accumulations 20 to 40 cm) substrates - areas where flooding duration is short – substrate aerated by early to mid-summer

38 Nested ELC Communities	Code	6E	7E	Vegetation Characteristics	Environmental Characteristics
					- common on floodplains
Willow Mineral Deciduous Swamp Type	SWD4-1	X	X		
White Elm Mineral Deciduous Swamp Type	SWD4-2	X	X		
White Birch – Poplar Mineral Deciduous Swamp Type	SWD4-3	X	X		
Yellow Birch Mineral Deciduous Swamp Type	SWD4-4	X	X		

39 Nested ELC Communities	Code	6E	7E	Vegetation Characteristics	Environmental Characteristics
Swamp	SW			- tree or shrub cover > 25% - dominated by hydrophytic shrub and tree species	- variable flooding regimes - water depth < 2 m - standing water or vernal pooling > 20% of ground coverage
Deciduous Swamp	SWD			- tree cover > 25%; trees > 5 m in height - deciduous tree species > 75% of canopy cover - common species include Fowl Manna Grass, Spotted Touch-me-not, Bugleweed, Skunk Cabbage, Marsh Marigold, Bedstraws and Stinging Nettles - typically fern and sedge rich	
Ash Organic Deciduous Swamp Ecosite	SWD5			- Black Ash	- organic substrates – Of, Om, Oh (OIP 1985)
Black Ash Organic Deciduous Swamp Type	SWD5-1	X	X		
Maple Organic Deciduous Swamp Ecosite	SWD6			- Red Maple, Silver Maple and Swamp Maple (*Acer freemanii*)	- organic substrates – Of, Om, Oh (OIP 1985)
Red Maple Organic Deciduous Swamp Type	SWD6-1	X	X		
Silver Maple Organic Deciduous Swamp Type	SWD6-2	X	X		
Swamp Maple Organic Deciduous Swamp Type	SWD6-3	X	X		
Birch – Poplar Organic Deciduous Swamp Ecosite	SWD7			- White Birch, Yellow Birch, Trembling Aspen and Balsam Poplar	- organic substrates – Of, Om, Oh (OIP 1985)
White Birch – Poplar Organic Deciduous Swamp Type	SWD7-1	X	X		
Yellow Birch Organic Deciduous Swamp Type	SWD7-2	X	X		

40 Nested ELC Communities	Code	6E	7E	Vegetation Characteristics	Environmental Characteristics
Swamp	SW			- tree or shrub cover > 25% - dominated by hydrophytic shrub and tree species	- variable flooding regimes - water depth < 2 m - standing water or vernal pooling > 20% of ground coverage
Thicket Swamp	SWT			- tree cover ≤ 25%; hydrophytic shrubs > 25%	
Bedrock Thicket Swamp Ecosite	SWT1				- carbonate, basic or acidic bedrock types
Mineral Thicket Swamp Ecosite	SWT2				- mineral and peaty phase mineral (organic accumulations 20 to 40 cm) substrates - areas where flooding duration is short – substrate aerated by early to mid-summer
Alder Mineral Thicket Swamp Type	SWT2-1	X	X		
Willow Mineral Thicket Swamp Type	SWT2-2	X	X		
Mountain Maple Mineral Thicket Swamp Type	SWT2-3	X	X		
Buttonbush Mineral Thicket Swamp Type	SWT2-4		X		
Red-osier Mineral Thicket Swamp Type	SWT2-5	X	X		
Meadowsweet Mineral Thicket Swamp Type	SWT2-6	X	X		
Ninebark Mineral Thicket Swamp Type	SWT2-7		X		
Silky Dogwood Mineral Thicket Swamp Type	SWT2-8		X		
Gray Dogwood Mineral Thicket Swamp Type	SWT2-9		X		
Nannyberry Mineral Thicket Swamp Type	SWT2-10		X		
Southern Arrow-wood Mineral Thicket Swamp Type	SWT2-11		X		
Paw-paw Mineral Thicket Swamp Type	SWT2-12		X		

41 Nested ELC Communities	Code	6E	7E	Vegetation Characteristics	Environmental Characteristics
Swamp	SW			- tree or shrub cover > 25% - dominated by hydrophytic shrub and tree species	- variable flooding regimes - water depth < 2 m - standing water or vernal pooling > 20% of ground coverage
Thicket Swamp	SWT			- tree cover ≤ 25%; hydrophytic shrubs > 25%	
Organic Thicket Swamp Ecosite	SWT3				- organic substrates – Of, Om, Oh (OIP 1985)
Alder Organic Thicket Swamp Type	SWT3-1	X	X		
Willow Organic Thicket Swamp Type	SWT3-2	X	X		
Mountain Maple Organic Thicket Swamp Type	SWT3-3	X	X		
Buttonbush Organic Thicket Swamp Type	SWT3-4	X	X		
Red-osier Organic Thicket Swamp Type	SWT3-5	X	X		
Sweet Gale Organic Thicket Swamp Type	SWT3-6	X	X		
Winterberry Organic Thicket Swamp Type	SWT3-7	X			
Mountain Holly Organic Thicket Swamp Type	SWT3-8	X			
Fen Birch Organic Thicket Swamp Type	SWT3-9	X			
Gray Dogwood Organic Thicket Swamp Type	SWT3-10		X		
Spicebush Organic Thicket Swamp Type	SWT3-11		X		
Nannyberry Organic Thicket Swamp Type	SWT3-12		X		
Poison Sumac Organic Thicket Swamp Type	SWT3-13		X		
Huckleberry Organic Thicket Swamp Type	SWT3-14		X		

42 Nested ELC Communities	Code	6E	7E	Vegetation Characteristics	Environmental Characteristics
Fen	FE			- tree cover (trees > 2m high) ≤ 25% - sedges, grasses and low (< 2 m) shrubs dominate	- substrate organic; > 40 cm of brown moss or sedge peat - rarely flooded, always saturated - pH is slightly alkaline to mildly acidic - minerotrophic peatland
Open Fen	FEO			- tree cover ≤ 10%; shrub cover ≤ 25%	
Open Fen Ecosite	FEO1				
Twig-rush Open Fen Type	FEO1-1	X	X		
Slender Sedge Open Fen Type	FEO1-2	X		- Slender Sedge (Carex lasiocarpa)	
Low Sedge – Clubrush Open Fen Type	FEO1-3	X			
Bog Buckbean – Sedge Open Fen Type	FEO1-4	X			
Beaked Sedge Open Fen Type	FEO1-5	X		- Breaked Sedge (Carex utriculata)	
Shrub Fen	FES			- tree cover ≤ 10%; shrub cover > 25%	
Shrub Fen Ecosite	FES1				
Sweet Gale Shrub Fen Type	FES1-1	X			
Fen Birch Shrub Fen Type	FES1-2	X		- Fen Birch (Betula pumila)	
Shrubby Cinquefoil Shrub Fen Type	FES1-3	X			
Leatherleaf – Forb Shrub Fen Type	FES1-4	X			
Velvet-leaf Blueberry Shrub Fen Type	FES1-5	X			
Mountain Holly Shrub Fen Type	FES1-6	X			
Chokeberry Shrub Fen Type	FES1-7	X			
Highbush Blueberry-Leatherleaf-Chokeberry Shrub Fen Type	FES1-8	X	X		
Low White Cedar Shrub Fen Type	FES1-9	X			
Treed Fen	FET			- 10% < tree cover	
Treed Fen Ecosite	FET1				
Tamarack Treed Fen Type	FET1-1	X	X		
Tamarack – White Cedar Treed Fen Type	FET1-2	X			

43 Nested ELC Communities	Code	6E	7E	Vegetation Characteristics	Environmental Characteristics
Bog	BO			- tree cover (trees > 2m high)	- substrate organic; > 40 cm of *Sphagnum* peat; rarely flooded; always saturated - pH is moderate to highly acidic (< 4.2) - ombrotrophic peatland
Open Bog	BOO			- tree cover ≤ 10%; shrub cover ≤ 25%	
Open Bog Ecosite	BOO1			- ground cover dominated by Sphagnum spp. and sedges (e.g., Carex oligosperma)	
Few-seeded Sedge Open Bog Type	BOO1-1	X			
Cotton-grass Open Bog Type	BOO1-2	X			
Shrub Bog	BOS			- tree cover ≤ 10%; shrub cover > 25% - continuous Sphagnum spp. cover	
Shrub Bog Ecosite	BOS1				
Leatherleaf Shrub Bog Type	BOS1-1	X			
Shrub Kettle Bog Ecosite	BOS2				
Leatherleaf Shrub Kettle Bog Type	BOS2-1		X		
Highbush Blueberry Shrub Kettle Bog Type	BOS2-2		X		
Treed Bog	BOT			- 10% < tree cover ≤ 25% - continuous Sphagnum spp. cover	
Treed Bog Ecosite	BOT1				
Black Spruce Treed Bog Type	BOT1-1	X			
Treed Kettle Bog Ecosite	BOT2				- found in kettle depressions
Tamarack – Leatherleaf Treed Kettle Bog Type	BOT2-1		X		

Nested ELC Communities	Code	6E	7E	Vegetation Characteristics	Environmental Characteristics
Marsh	MA			- tree and shrub cover ≤ 25% - dominated by emergent hydrophytic macrophytes	- variable flooding regimes - water depth < 2 m
Meadow Marsh	MAM			- species less tolerant of prolonged flooding	- flooding seasonal – soils flooded in spring, moist to dry by summer - represents the wetland – terrestrial interface
Bedrock Meadow Marsh Ecosite	MAM1				- carbonate, basic or acidic bedrock
Reed-canary Grass Bedrock Meadow Marsh Type	MAM1-1	X	X		
Red-top Bedrock Meadow Marsh Type	MAM1-2	X	X		
Forb Bedrock Meadow Marsh Type	MAM1-3	X	X		
Horsetail Bedrock Meadow Marsh Type	MAM1-4	X	X		
Mineral Meadow Marsh Ecosite	MAM2			- grasses or sedges usually dominant - richer areas dominated by clonal species; wave swept, ice scoured areas are sparsely vegetated	- mineral substrates (e.g., sand, gravel, cobble) - exposed areas with shoreline energies and disturbance
Buejoint Mineral Meadow Marsh Type	MAM2-1	X	X		
Reed-canary Grass Mineral Meadow Marsh Type	MAM2-2	X	X		
Red-top Mineral Meadow Marsh Type	MAM2-3	X	X		
Fowl Manna Grass Mineral Meadow Marsh Type	MSM2-4	X	X		
Narrow-leaved Sedge Mineral Meadow Marsh	MAM2-5	X	X	< 5 mm leaf width	
Broad-leaved Sedge Mineral Meadow Marsh Type	MAM2-6	X	X	> 5 mm leaf width	
Horsetail Mineral Meadow Marsh Type	MAM2-7	X	X		
Prairie Slough Grass Mineral Meadow Marsh Type	MAM2-8	X	X		
Jewelweed Mineral Meadow Marsh Type	MAM2-9	X	X		
Forb Mineral Meadow Marsh Type	MAM2-10	X	X		

Nested ELC Communities	Code	6E	7E	Vegetation Characteristics	Environmental Characteristics
Marsh	MA			- tree and shrub cover ≤ 25% - dominated by emergent hydrophytic macrophytes	- variable flooding regimes - water depth < 2 m
Meadow Marsh	MAM			- species less tolerant of prolonged flooding	- flooding seasonal – soils flooded in spring, moist to dry by summer - represents the wetland – terrestrial interface
Organic Meadow Marsh Ecosite	MAM3			- Grasses and sedges usually dominant - rich areas dominated by clonal species	- organic substrates – Of, Om, Oh (OIP 1985) - sheltered areas - shoreline energies and disturbance low
Bluejoint Organic Meadow Marsh Type	MAM3-1	X	X		
Reed-canary Grass Organic Meadow Marsh Type	MAM3-2	X	X		
Rice Cut-grass Organic Meadow Marsh Type	MAM3-3	X	X		
Fowl Manna Grass Organic Meadow Marsh Type	MAM3-4	X	X		
Narrow-leaved Sedge Organic Meadow Marsh Type	MAM3-5	X	X	< 5 mm leaf width	
Broad-leaved Sedge Organic Meadow Marsh Type	MAM3-6	X	X	> 5 mm leaf width	
Prairie Slough Grass Organic Meadow Marsh Type	MAM3-7	X	X		
Jewelweed Organic Meadow Marsh Type	MAM3-8	X	X		
Forb Organic Meadow Marsh Type	MAM3-9	X	X		

Nested ELC Communities	Code	6E	7E	Vegetation Characteristics	Environmental Characteristics
Marsh	MA			- tree and shrub cover ≤ 25% - dominated by emergent hydrophytic macrophytes	- variable flooding regimes - water depth < 2 m
Meadow Marsh	MAM			- species less tolerant of prolonged flooding	- flooding seasonal – soils flooded in spring, moist to dry by summer - represents the wetland – terrestrial interface
Great Lakes Coastal Meadow Marsh Ecosite (synonym = Shoreline Fen or Panne)	MAM4			- rushes and reeds usually dominant - vegetation cover is typically short and sparse (i.e., low above-ground and litter biomass) - high incidence of rare or uncommon species	- restricted to the near-shore areas of the Great Lakes - calcareous, coarse textured substrates (sand, gravel, cobble) or shallow substrates over calcareous bedrock (i.e., limestone) - low nutrient levels - minerotrophic
Graminoid Coastal Meadow Marsh Type	MAM4-1	X	X		
Shrubby Cinquefoil Coastal Meadow Marsh Type	MAM4-2	X	X		
Mineral Fen Meadow Marsh Ecosite	MAM5			- rushes and reeds usually dominant - vegetation cover is typically short and sparse (i.e., low above-ground and litter biomass) - high incidence of rare or uncommon species	- deep calcareous, sandy textured substrates or shallow substrates over limestone bedrock - low nutrient levels - minerotrophic
Mineral Fen Meadow Marsh Type	MAM5-1	X	X	- Twigrush	- marl, tufa or other calcareous substrates formed in seepage zones - similar to Great Lakes Coastal Meadow Marsh, but not restricted to the near-shore areas of the Great Lakes
Tallgrass Mineral Fen Meadow Marsh Type	MAM5-2		X	- dominated by fen and prairie grasses: Indian Grass, Little Bluestem, Big Bluestem, Tufted Hairgrass, Richardson's Muhly Grass, Sterile Sedge, Ohio Goldenrod	- organic substrate less developed

46 Nested ELC Communities	Code	6E	7E	Vegetation Characteristics	Environmental Characteristics
Tallgrass Meadow Marsh Ecosite	MAM6			- prairie grasses dominant: Indian Grass, Little Bluestem, Big Bluestem - wet prairies found associated with drier prairies	- occur on low-lying areas of glacial lakeplains - often part of wetland or upland mosaic on dimpled or patterned landscapes
Bluejoint–Prairie Slough Grass Tallgrass Meadow Marsh Type	MAM6-1		X		

Nested ELC Communities	Code	6E	7E	Vegetation Characteristics	Environmental Characteristics
Marsh	MA			- tree and shrub cover ≤ 25% - hydrophytic emergent macrophyte cover	- variable flooding regimes - water depth < 2 m
Shallow Marsh	MAS				- water up to 2 m deep - standing or flowing water for much or all of growing season - varies from bare bedrock or parent mineral material to organic substrates
Bedrock Shallow Marsh Ecosite	MAS1				- carbonate, basic or acidic bedrock - on exposed, active shorelines
Mineral Shallow Marsh Ecosite	MAS2			- grasses, sedges and rushes usually dominant - hydrophytic emergent macrophyte cover	- parent mineral substrates; sand, gravel, shingle or cobble - typically on exposed, active or somewhat sheltered shorelines and depressions
Cattail Mineral Shallow Marsh Type	MAS2-1	X	X		
Bulrush Mineral Shallow Marsh Type	MAS2-2	X	X		
Narrow-leaved Sedge Mineral Shallow Marsh Type	MAS2-3	X	X	< 5 mm leaf width	
Broad-leaved Sedge Mineral Shallow Marsh Type	MAS2-4	X	X	> 5 mm leaf width	
Wild-rice Mineral Shallow Marsh Type	MAS2-5	X	X		
Three-square Mineral Shallow Marsh Type	MAS2-6	X			
Bur-reed Mineral Shallow Marsh Type	MAS2-7		X		
Rice Cut-grass Mineral Shallow Marsh Type	MAS2-8		X		
Forb Mineral Shallow Marsh Type	MAS2-9	X	X		

Nested ELC Communities	Code	6E	7E	Vegetation Characteristics	Environmental Characteristics
Marsh	MA			- tree and shrub cover ≤ 25% - hydrophytic emergent macrophyte cover	- variable flooding regimes - water depth < 2 m
Shallow Marsh	MAS				- water up to 2 m deep - standing or flowing water for much or all of growing season - varies from bare bedrock or parent mineral material to organic substrates
Organic Shallow Marsh Ecosite	MAS3			- grasses, sedges and rushes usually dominant - hydrophytic emergent macrophyte cover > 25%	- organic substrates – Of, Om, Oh (OIP 1985) - sheltered areas; low shoreline energies and disturbance
Cattail Organic Shallow Marsh Type	MAS3-1	X	X		
Bulrush Organic Shallow Marsh Type	MAS3-2	X	X		
Narrow-leaved Sedge Organic Shallow Marsh Type	MAS3-3	X	X	< 5 mm leaf width	
Broad-leaved Sedge Organic Shallow Marsh Type	MAS3-4	X		> 5 mm leaf width	
Wild-rice Organic Shallow Marsh Type	MAS3-5	X	X		
Spike Rush Organic Shallow Marsh Type	MAS3-6	X	X		
Bur-reed Organic Shallow Marsh Type	MAS3-7		X		
Rice Cut-grass Organic Shallow Marsh Type	MAS3-8		X		
Rush Grass Organic Shallow Marsh Type	MAS3-9	X			
Forb Organic Shallow Marsh Type	MAS3-10	X	X		
Calla Lily Organic Shallow Marsh Type	MAS3-11	X	X		
Water Willow Organic Shallow Marsh Type	MAS3-12	X	X		

49 Nested ELC Communities	Code	6E	7E	Vegetation Characteristics	Environmental Characteristics
Open Water	OA			- no macrophyte vegetation; no tree or shrub cover - plankton dominated	- water > 2 m depth - lake trophic status
Open Aquatic	OAO				

50 Nested ELC Communities	Code	6E	7E	Vegetation Characteristics	Environmental Characteristics
Shallow Water	SA			- submerged or floating-leaved macrophytes - emergent vegetation may be present but never dominant - no tree or shrub cover	- water up to 2 m depth - standing water always present - shoreline energy; substrate; nutrients
Submerged Shallow Aquatic	SAS			- dominated (>25%) by submerged macrophytes	
Submerged Shallow Aquatic Ecosite	SAS1				
Pondweed Submerged Shallow Aquatic Type	SAS1-1	X	X		
Waterweed Submerged Shallow Aquatic Type	SAS1-2	X	X		
Stonewort Submerged Shallow Aquatic Type	SAS1-3	X	X		
Water Milfoil Submerged Shallow Aquatic Type	SAS1-4	X	X		
Wild Celery Submerged Shallow Aquatic Type	SAS1-5	X	X		
Water Marigold Submerged Shallow Aquatic Type	SAS1-6	X	X		
Water Stargrass Submerged Shallow Aquatic Type	SAS1-7	X	X		
Mixed Shallow Aquatic	SAM			- dominated (>25%) by a mixture of submerged and floating-leaved macrophytes	
Mixed Shallow Aquatic Ecosite	SAM1				
Pickerel-weed Mixed Shallow Aquatic Type	SAM1-1	X	X		
Duckweed Mixed Shallow Aquatic Type	SAM1-2	X	X		
Watercress Mixed Shallow Aquatic Type	SAM1-3	X	X		
Pondweed Mixed Shallow Aquatic Type	SAM1-4	X	X		
Bur-reed Mixed Shallow Aquatic Type	SAM1-5	X	X		

50 Nested ELC Communities	Code	6E	7E	Vegetation Characteristics	Environmental Characteristics
Bladderwort Mixed Shallow Aquatic Type	SAM1-6	X	X		
Water Milfoil Mixed Shallow Aquatic Type	SAM1-7	X	X		
Floating-leaved Shallow Aquatic	SAF			- dominated (>25%) by floating-leaved macrophytes	
Floating-leaved Shallow Aquatic Ecosite	SAF1				
Water Lily – Bullhead Lily Floating-leaved Shallow Aquatic Type	SAF1-1	X	X		
American Lotus Floating-leaved Shallow Aquatic Type	SAF1-2		X		
Duckweed Floating-leaved Shallow Aquatic Type	SAF1-3	X	X		

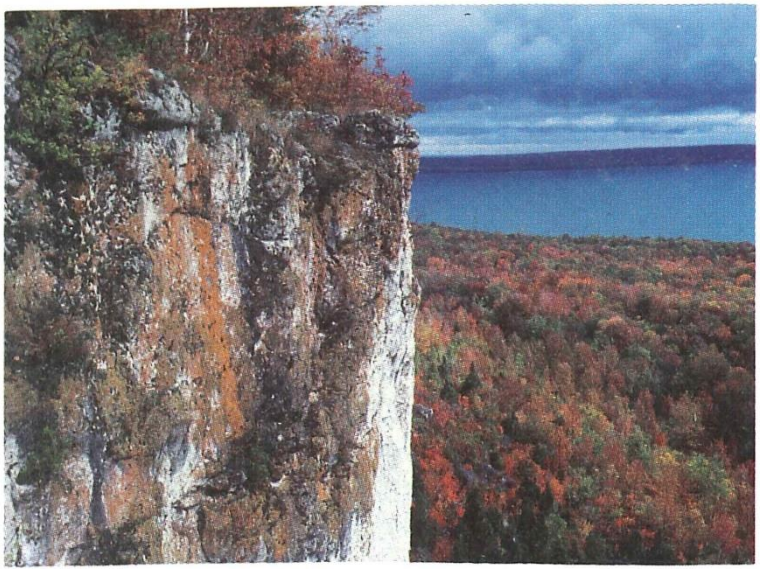
5. ELC Photo Album

Beach / Bar
Wormwood Gravel Open Beach Type (BBO1-2)
(Giant's Tomb Island Nature Reserve, Simcoe County; J.L. Riley)

Sand Dune
Open Sand Dune (SDO) and Shrub Sand Dune (SDS)
(Sandbanks Provincial Park, Prince Edward County; J.L. Riley)

Bluff
Open Clay Bluff Type (BLO1-1)
(Claybanks, Grey County; J.L. Riley)

Cliff
Cliffbrake–Lichen Carbonate Open Cliff Type (CLO1-1)
(Hope Bay Nature Reserve, Bruce County; J.L. Riley)



Talus
Carbonate Open Talus (TAO) and Carbonate Shrub Talus (TAS)
(Cabot Head, Bruce County;
P.S.G. Kor)

Alvar
Tufted Hairgrass–Canada Bluegrass Open Alvar Meadow Type (ALO1-4)
(FON Bruce Alvar Nature Reserve, Bruce County; J.L. Riley)

Rock Barren
Oak–Red Maple–Pine Basic Treed Rock Barren Type (RBT-2-1)
(Kaladar Jack Pine ANSI, Lennox and Addington County; W.D. Bakowsky)

Crevice and Cave
Moist Liverwort –Moss– Fern Carbonate Crevice Type (CCR1-1)
(Mono Cliffs Provincial Park, Dufferin County; J.L. Riley)

Sand Barren
Open Sand Barren (SBO) and Treed Sand Barren (SBT)
(Giant's Tomb Island Nature Reserve, Simcoe County; J.L. Riley)

Tallgrass Prairie, Savannah and Woodland
Fresh–Moist Tallgrass Prairie Type (TPO2-1)
(Walpole Island First Nation, Essex County; J.L. Riley)

Forest - Coniferous Forest
Dry Jack Pine Coniferous Forest Type (FOC1-1)
(Brinkman's Corners, Bruce County; D. Kirk)

Forest - Mixed Forest
Fresh - Moist White Cedar - Hardwood
Mixed Forest Type (FOM7-2)
(Brown Hill, York RM; D. Bradley)

Forest - Deciduous Forest
Dry–Fresh Sugar Maple Deciduous Forest Type (FOD5-1)
(Blue Mountain, Grey County; J.L. Riley)

Cultural
Cultural Coniferous Plantation (CUP3) and Mineral Cultural Meadow (CUM1)
(Glen Major, Durham RM; P. Savoie)

Swamp - Coniferous Swamp
White Cedar–Conifer Organic Coniferous Swamp Type (SWC3-2)
(Centre Dummer Swamp, Peterborough County; J.L. Riley)

Swamp - Coniferous Swamp
Hemlock Mineral Coniferous Swamp Type (SWC2-2)
(Thamesford Woodlot, Middlesex County; D. Bradley)

Note: vernal pooling > 20% of ground coverage

Swamp - Mixed Swamp
White Cedar–Hardwood Mineral Mixed Swamp Type (SWM1-1)
(The Big Swamp, Prince Edward County; J.L. Riley)

Swamp - Deciduous Swamp
Silver Maple Mineral Deciduous Swamp Type (SWD3-2)
(Mohawk Park, City of Brantford, Brant County; W. Bakowsky)

Fen
Bog Buckbean–Sedge Graminoid Open Fen Type (FEO1-4)
(Emily River Fen, Victoria County; J.L. Riley)

Bog
Cotton-grass Graminoid Open Bog Type (BOO1-2)
(Luther Marsh, Dufferin County; J.L. Riley)

Marsh - Meadow Marsh
Graminoid Coastal Meadow Marsh Type (MAM4-1)
(Oliphant, Bruce County; J.L. Riley)

Marsh - Shallow Marsh
Wild-rice Organic Shallow Marsh Type (MAS3-5)
(West Caledon Lake, Peel RM; J.L. Riley)

Open Water
Open Aquatic (OAO) (Wilmot Creek, Durham RM; E. Thimm)

Shallow Water
Water Lily Floating-leaved Shallow Aquatic Type (SAF1-1)
(Point Pelee National Park, Essex County; J.L. Riley)

Part II: Application

Application of This Manual

The first part of this manual described the structure and community units of the Ecological Land Classification for Southern Ontario. The second part addresses the application of the ELC. In this part, the tools and techniques developed to facilitate the consistent description, classification and mapping of ecological land units are presented. Although they represent separate components, which can be used independently of each other, they have been developed to work in conjunction with each other and the ELC (Figure 6).

The tools and techniques presented here rely on the **polygon** as the basic unit for application. A polygon is a discrete and unique area outlined on a map or air-photo that contains more or less homogeneous environmental and vegetation characteristics.

The second part of this manual has the following components.

Part II.

Context
An overview of how the ELC could help address the current challenges facing natural resource planners and managers.

How to Apply the ELC
Proposes a process by which the components of this manual can be applied.

Description Framework
Eight fields are used to describe and document the environment and vegetation conditions of a polygon. The fields are as follows: System, Site, Substrate, Topographic Feature, History, Cover, Plant Form and Community.

Field Sampling Methods and Data Cards
Provides a consistent way to collect ELC information and other polygon characteristics. These methods show what needs to be sampled and the field data cards provided facilitate data input directly into a database.

6. Context for the ELC

Current Challenges

The planning and management of Southern Ontario's natural heritage are subject to incredible challenges. Continued economic growth and development place great demands and stress on a dwindling and fragmented natural landscape. However, the communities within the region are responding by developing approaches that recognize the connections among environment, economy and society. Long-standing and new partnerships involving agencies, municipalities, organizations and individuals from a variety of disciplines are involved in many projects dealing with natural heritage stewardship, planning, management and research (Riley and Mohr 1994). The ecosystem approach, which recognizes these inter-relationships, has become the new paradigm for planning within the region (Nixon and Whitelaw 1994; Puddister and Nelischer 1994).

An understanding of ecological patterns and processes is a fundamental first step in an ecosystem approach to planning and management. Some of the key issues and needs for managers and practitioners are:

- standards for the identification, description, classification and mapping of natural communities at different scales;
- criteria for the evaluation of natural features and areas;
- a framework for the identification of key ecological functions;
- protocols for baseline data collection and monitoring;
- improved consistency across and within areas of jurisdiction;
- a framework for standard data assembly and management.

The most significant weakness of previous inter-disciplinary approaches to such work has been the lack of systematic, and therefore replicable, methods for ecological integration (Bastedo and Theberge 1983). As a result, a critical requirement for agencies responsible for developing and implementing an ecosystem approach is a common framework in which to collect, organize, analyze and report on ecological information (Uhlig and Baker 1994; Riley and Mohr 1994; Brownell and Larson 1995).

The Ecological Land Classification and the tools and techniques for application have been developed to meet these demands. Ecological Land Classification is the process of arranging or ordering information about land units so we can better understand their similarities and relationships (Bailey 1996). The Ecological Land Classification for Southern Ontario provides a framework for consistent community description, classification, mapping and data collection. The framework is based on an inventory of vegetation, community, soils and other site characteristics. Such information is essential if sound resource management decisions are to be made. The potential utility of ELC is considerable, ranging from broad regional or watershed scale studies, land-use planning, inventory, research and management (Table 9).

Table 9. ELC Common Scales and Applications.

Unit	Scale	Applications
Community Class and Community Series	1:50,000 to 1:10,000	Watershed or subwatershed studies; official plans and landscape-level assessments
Ecosite	1:20,000 to 1:10,000	Subwatershed studies; secondary plans and community plans
Vegetation Type	1:10,000 to 1:2,000	Site-level planning; environmental impact assessments; subdivisions; land stewardship; community rankings and recovery plans

Ecological Land-Use Planning

From an administrative and policy perspective, land-use planning in Ontario has undergone a major evolution over the last five years. The most important change has been the approval by the province of the new 1997 Provincial Policy Statement (PPS)(Province of Ontario 1997). Greater responsibility for land-use planning decisions is now placed at the local or municipal level. Policy 2.3 of the PPS provides for the protection of "natural heritage features and areas", and it creates the need for municipalities to describe and evaluate them, in order to understand their ecological functions and their "significance". Municipalities and their partners, therefore, face challenges in synthesizing complex biotic and abiotic relationships into forms that are useful within a land-use planning context.

The ELC is an effective tool to address these needs at a regional, local or site level. It provides a uniform and consistent approach to ecosystem description and classification. It facilitates evaluation of communities and it presents a framework for consistent data collection, assembly and management across municipalities, regions and watersheds. In addition, while the PPS and its supporting reference manuals suggest a number of minimum standards (MNR 1998), municipalities may wish to develop additional approaches with the ELC to ensure ecologically sound management of their remaining natural areas, from landscape to site scales.

Park Planning

Protecting the ecological integrity of natural heritage areas is the basis upon which most park or conservation area planning decisions should be made (see Poser et al. 1993). If a park is created or managed for the protection of species, considerable focus must be placed on habitat. As Hummel (1995) indicated, "if we don't conserve the underlying ecological processes and larger natural systems upon which species depend, we will simply be fiddling."

Ecological community classification can help ensure adequate representation of natural areas and habitats within a park system. It has also proven effective in identifying priority sites for conservation or acquisition (Jalava and Godschalk 1998). As part of the park or area planning exercise, consistent description and mapping of community types will facilitate an analysis of constraints and opportunities. The detailed field data, combined with community mapping, can also provide a framework for monitoring change within the conservation area or park boundaries.

Forest Management

Current forest management planning must address the issue of diversity from the community and ecosystem level rather than the species-by-species approach (Harris 1984). At the Ecosite and Vegetation Type levels, the ELC facilitates an ecosystem-based approach to the management of standardized silvicultural units within Site Regions 6E and 7E (Hills 1966) or Forest Regions (Great Lakes–St. Lawrence and Carolinian Forest Regions, Rowe 1972). In the near future, silvicultural guides will incorporate ELC units as an integral part of forest management (OMNR in prep).

The ELC enables data collection for basal area calculations. In addition, information on vegetative structure and composition, disturbance levels and wildlife is also gathered using the process recommended through the ELC. Therefore, the ELC provides a framework for the collection and analysis of traditional data sets required for silvicultural prescriptions. It also enables a more holistic, community-based analysis of the timber potential of a particular unit.

Private Land Stewardship

With more than 90% of the land base in Southern Ontario privately owned (Riley and Mohr 1994), landowners play a significant role in the protection, management and restoration of natural communities and wildlife habitat. A variety of stewardship programs have shown that education of landowners on the ecological values of their property improves upon conservation efforts (Hilts and Moull 1990). Application of the ELC standards will provide landowners with a wealth of information on their lands and a sound scientific basis for management decisions. Standardized community descriptions will facilitate communication between resource professionals and private landowners. Greater efficiencies will also be possible through stewardship guidelines or recommendations based on standard Ecosite or Vegetation Types and supporting Community Factsheets (Lee in prep.), rather than individual prescriptions.

Restoring Biodiversity

Many areas in Southern Ontario have less than 5% woodland and less than 10 or 15% cover by any native ecosystems. In addition, more than 50 species of plants and animals are thought to have been extirpated from Southern Ontario since European colonization, 40 of them plants (Riley and Mohr 1994). A variety of efforts are underway by individuals, groups and agencies to begin the process of restoring lost or degraded natural communities and species (Daigle and Havinga 1996; Waterfront Regeneration Trust 1995; Hough Stansbury et al. 1994).

The classification and the supporting Catalogue of Documented Community Descriptions (Bakowsky et al. in prep.) can serve as a bench-mark for some of the proposed restoration initiatives. The ELC may also benefit the development and implementation of recovery plans for individual species by assisting agencies in locating existing suitable habitat types.

Research

Our knowledge of community composition and function and species–habitat relationships continues to increase through research conducted by universities, resource management agencies and other individuals and groups. The ELC provides a common language of communication among researchers for sharing their findings. When researchers use this manual for community description, mapping and classification, the ELC itself will be

improved and refined as research results are published. In addition, the Community Tables within the manual provide a form of gap analysis. The lack of information on vegetation and environmental characteristics for certain community types (e.g., Cultural Series) should provide a focus for future research efforts.

7. How to Apply the ELC

Process of Application

Whether the goal is planning (e.g., an official plan or a development proposal) or a life science inventory, the tools and techniques presented in this manual can be applied the same way. Figure 6 shows how these tools and techniques can be applied at both the landscape- and site-level scales of resolution. Table 10 gives further details on how to carry out the required tasks at the desired scale.

Landscape Scale

Application at the landscape scale, using only air-photo or satellite imagery interpretation, is coarse. At this coarse scale of resolution, polygons can only be described, classified and mapped to the Community Class and Community Series levels in the ELC (e.g., Deciduous Swamp, Open Cliff or Coniferous Forest). This level of application gives coarse-level ELC-based inventory on a regional, municipal, watershed or subwatershed scale, upon which official plans or watershed plans can be developed.

Site Scale

Application at the site scale requires field work. At this scale of resolution, it is necessary to collect the detailed site, soil and vegetation data that are used to describe, classify and map polygons to the Ecosite and Vegetation Type levels in the ELC (e.g., Bur Oak Deciduous Mineral Swamp Type, Cliffbrake – Lichen Carbonate Open Cliff Type, Fresh – Moist Hemlock Coniferous Forest Type). This detailed application level provides the information needed for site-level environmental impact assessments, evaluations, forest management, detailed life science inventories, restoration, land stewardship and development proposals, to name a few. Furthermore, important management, disturbance and wildlife information can be collected for other land-use purposes.

Combined Approach

The challenge is that most resource managers and planners need to operate at both levels of scale. The tools and techniques presented here represent an integrated model approach for inventory and information management suitable for meeting these various scale and resolution needs.

In the short term, the landscape level of application provides the necessary coarse-level products for resource management and planning. This establishes the consistent framework by which more detailed site-level information can be accumulated, as sites are visited over the long term. When using the ELC Database, this detailed site-level information simply appends the existing landscape-level records for any particular polygon. Figure 6 shows how all the data and information collected are channeled into a centralized database. Having consistent polygon descriptions and classifications for polygons, therefore, increases the search and query capabilities within this one database.

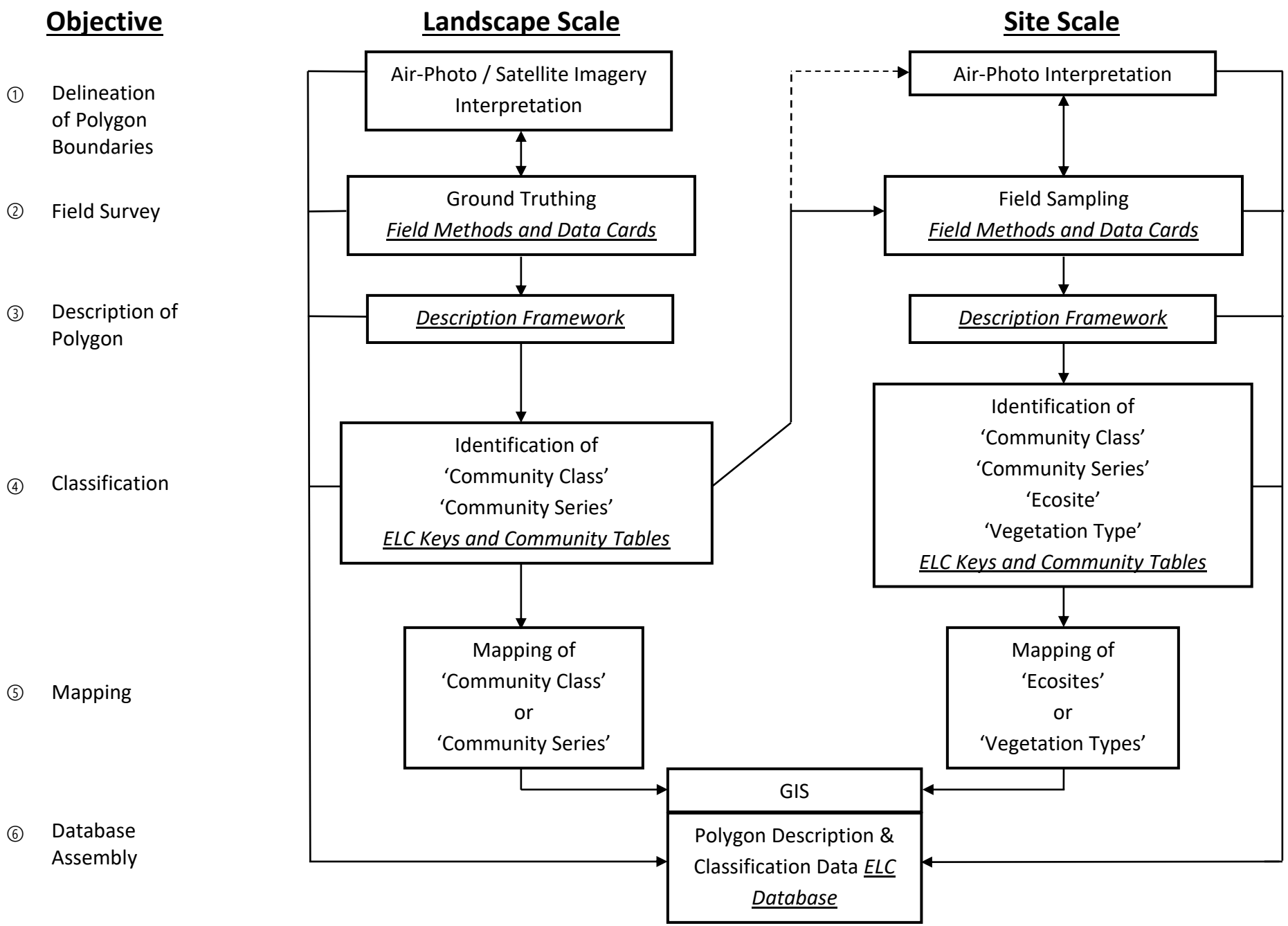


Figure 6. Schematic representation of how the tools and techniques in this manual are applied at different scales of resolution (refer to Table 10 for details).

Table 10. How to apply the tools and techniques in this manual to accomplish the Objectives in Figure 6.

	Objective	Landscape Scale	Site Scale
①	Delineation of Polygon Boundaries	☐ use landform, slope position, hydrological drainage pattern and vegetation form and cover to interpret and delineate polygon boundaries ☐ interpretation and delineation of polygon boundaries, at the landscape scale of resolution, is flexible: 1) all ecological boundaries can be interpreted and delineated — these polygons will typically represent the more detailed Ecosite and Vegetation Type levels in the ELC; or 2) only the more generalized Community Series-level boundaries are interpreted ☐ use additional sources of information to help interpretation ☐ refer to the Case Studies section in this manual and Arnup and Racey (1996) for further details on interpretation of airphotos	☐ use landform, slope position, hydrological drainage pattern and vegetation form and cover to interpret and delineate polygon boundaries ☐ interpret and delineate all ecological boundaries. If interpretation at the landscape level is only taken to the ELC Community Series level, then go back to the air-photos to re-interpret for the finest resolution of ecological land units (this will, more often than not, represent an Ecosite) ☐ use additional sources of information to help interpretation ☐ refer to the Case Studies section in this manual and Arnup and Racey (1996) for further details on interpretation of air-photos
②	Field Survey	☐ select a small set of interpreted polygons, representing a range of site and vegetation conditions ☐ visit the polygon and use the ELC Field Sampling Methods and Data Cards to collect the necessary data to describe and classify the polygon according to the ELC ☐ test and refine the interpretation of polygons done in ①	☐ conduct field surveys for polygons identified for planning purposes (e.g., a development proposal) or for more systematic purposes (e.g., inventory) ☐ collect detailed site and vegetation data for each polygon using the ELC Field Sampling Methods and Data Cards
③	Description of Polygon	☐ use the eight fields in the ELC Description Framework to describe the environmental, historical and vegetation conditions found within the polygon ☐ assigning conditions to History and Plant Form may not be possible at this scale of resolution ☐ use other sources of information to help assign conditions for Site, Substrate and Topographic Features	☐ use the eight fields in the ELC Description Framework to describe the environmental, historical and vegetation conditions found within the polygon ☐ assign conditions to all eight fields; other sources of information may be necessary

	Objective	Landscape Scale	Site Scale
④	Classification	☐ use the information and data documented in ①, ② and ③ classify the polygon to the Community Class and Community Series levels in the ELC ☐ use the ELC Keys and Community Tables to assign ELC units to the polygon ☐ Note: only Community Class and Community Series level classifications can be achieved **without** a field visit and sampling of the polygon	☐ use the information about the polygon, documented in the field in ② and ③, to classify the polygon to the Community Class, Community Series, Ecosite and Vegetation Type levels in the ELC ☐ use the ELC Keys and Community Tables to assign ELC units to the polygon ☐ Note: only by using field data can a polygon be classified according to all the levels in the ELC
⑤	Mapping	☐ polygon boundaries and their corresponding classification scan be mapped by: 1) manually transcribing the boundaries to hard-copy maps; or 2) digitization into Geographical Information Systems (GIS) for digital mapping ☐ mapping is to the Community Class or Community Series level in the ELC	☐ polygon boundaries and their corresponding classifications can be mapped by: 1) manually transcribing the boundaries to hard cover maps; or 2) digitization into Geographical Information Systems (GIS) for digital mapping ☐ mapping can be done to the Community Class, Community Series, Ecosite or Vegetation Type level in the ELC
⑥	Database Assembly and Data Management	☐ the spatial relationship, boundaries and unique identifiers for each polygon are stored in a GIS database ☐ resolution is to the Community Class and Community Series levels in the ELC	☐ the spatial relationship, boundaries and unique identifiers for each polygon are stored in a GIS database ☐ resolution is to the Community Class, Community Series, Ecosite and Vegetation Type levels in the ELC
		☐ the description and classification information is entered into and managed by a database ☐ the ELC Database has been designed to accommodate all the information documented for the polygon; here, only the coarse-level landscape scale information is stored and managed ☐ the database has search and query capabilities	☐ the description and classification information is entered into and managed by a database ☐ the ELC Database has been designed to accommodate all the information documented for the polygon; here, the detailed site scale information is stored and managed ☐ the database has search and query capabilities

8. Description Framework

Description Framework

The Description Framework presented here represents a formal and consistent way to describe the specific environmental, historical and vegetation characteristics of a polygon.

Since a particular community can occur on a range of different site conditions, it is necessary to describe the various conditions observed for each community. The specific attributes recorded to describe a particular polygon are then used to identify and classify the polygon according to the ELC.

One of the challenges faced in collating existing community descriptions (see Part 1, Background) was that the survey work had been done according to different standards, depending on who or which program did the survey. It is difficult to establish patterns when similar site or vegetation conditions are described and named differently. It is also difficult to analyze, sort or query data if the data are inconsistently documented. Such considerations are especially important when you want to integrate information and create centralized databases to manage natural heritage information. Having a description framework will, therefore, improve the ability of resource management and planning partners to collect, organize, analyze and manage ecological information consistently.

How to Apply Description Framework

The Description Framework (Table 11) employs a series of eight fields to define and describe a polygon. In each field, a series of attributes is presented. The first four fields [System, Site, Substrate and Topographic Feature] describe environmental (abiotic) aspects of the polygon. The fifth field [History] discriminates Cultural from Natural units and the remaining three fields [Cover, Plant Form and Community] describe aspects of the vegetation or community.

To begin assigning attributes to these description fields, some basic information on the polygon is required. Some of the information can be derived from maps, air photo interpretation and knowledge of the region, while other data may require field reconnaissance or more detailed knowledge of the site.

Any polygon may be described by choosing the one attribute in each field that best describes the conditions of the polygon. Use the Word Keys in this section to assign the specific attributes to each of the description fields. This description data can then be entered into the ELC Database by selecting the appropriate attribute on the pull-down menus for each of the description fields. Furthermore, the Diagrammatic Keys can be used to direct the practitioner to the appropriate ELC Community Table for further classification of a polygon.

For example, two Sugar Maple stands might be described, according to this Description Framework, as follows:

A. Terrestrial – **Surficial Deposits** – **Mineral Soil** – **Bottomland –** Natural – Treed – Deciduous – Forest

B. Terrestrial – **Bedrock** – **Carbonate Bedrock** – **Tableland** – Natural – Treed – Deciduous – Forest.

(See Table 12 for the demonstration of this example; bold type above represents those conditions that would vary, though the units can be classified as the same ELC unit.)

Similarly, two open grasslands might be described as:

A. Terrestrial – Surficial Deposits – Mineral Soil – Tableland – **Natural** – Open – Graminoid – **Prairie**

B. Terrestrial – Surficial Deposits – Mineral Soil – Tableland – **Cultural** – Open – Graminoid – **Meadow**.

Table 11. The eight fields that make up the ELC Polygon Description Framework, along with their associated defined range of conditions.

System	Site	Substrate	Topographic Features	History	Cover	Plant Form	Community
Terrestrial	Open Water	Organic	Lacustrine	Natural	Open	Plankton	Lake
Wetland	Shallow Water	Mineral Soil	Riverine	Cultural	Shrub	Submerged	Pond
Aquatic	Surficial Deposits	Parent Mineral Material	Bottomland		Treed	Floating-leaved	River
	Bedrock	Carbonate Bedrock	Terrace			Graminoid	Stream
		Basic Bedrock	Valley Slope			Forb	Marsh
		Acidic Bedrock	Tableland			Lichen	Swamp
			Rolling Upland			Bryophyte	Fen
			Cliff			Deciduous	Bog
			Talus			Coniferous	Barren
			Crevice / Cave			Mixed	Meadow
			Alvar				Prairie
			Rockland				Thicket
			Beach / Bar				Savannah
			Sand Dune				Woodland
			Bluff				Forest
							Plantation

Table 12. A demonstration of how to assign conditions to a polygon using the Description Framework. The two examples here show how conditions are assigned (dark shading) to the description fields. They also demonstrate how descriptions for different Sugar Maple could vary, in spite of assigning them the same classification according to the ELC.

A

System	Site	Substrate	Topographic Features	History	Cover	Plant Form	Community
Terrestrial	Open Water	Organic	Lacustrine	**Natural**	Open	Plankton	Lake
Wetland	Shallow Water	**Mineral Soil**	Riverine	Cultural	Shrub	Submerged	Pond
Aquatic	**Surficial Deposits**	Parent Mineral Material	**Bottomland**		**Treed**	Floating-leaved	River
	Bedrock	Carbonate Bedrock	Terrace			Graminoid	Stream
		Basic Bedrock	Valley Slope			Forb	Marsh
		Acidic Bedrock	Tableland			Lichen	Swamp
			Rolling Upland			Bryophyte	Fen
			Cliff			**Deciduous**	Bog
			Talus			Coniferous	Barren
			Crevice / Cave			Mixed	Meadow
			Alvar				Prairie
			Rockland				Thicket
			Beach / Bar				Savannah
			Sand Dune				**Woodland**
			Bluff				Forest
							Plantation

B

System
Terrestrial
Wetland
Aquatic

Site
Open Water
Shallow Water
Surficial Deposits
Bedrock

Substrate
Organic
Mineral Soil
Parent Mineral Material
Carbonate Bedrock
Basic Bedrock
Acidic Bedrock

Topographic Features
Lacustrine
Riverine
Bottomland
Terrace
Valley Slope
Tableland
Rolling Upland
Cliff
Talus
Crevice / Cave
Alvar
Rockland
Beach / Bar
Sand Dune
Bluff

History
Natural
Cultural

Cover
Open
Shrub
Treed

Plant Form
Plankton
Submerged
Floating-leaved
Graminoid
Forb
Lichen
Bryophyte
Deciduous
Coniferous
Mixed

Community
Lake
Pond
River
Stream
Marsh
Swamp
Fen
Bog
Barren
Meadow
Prairie
Thicket
Savannah
Woodland
Forest
Plantation

Word Keys for Description Framework

The Word Keys provide definitions of the attributes in each of the ELC description fields. They represent an ordered series of statements that leads to the discrimination of one attribute from another, based on specific criteria. At each level of the Word Key (numbers), two or three statements are presented (letters), representing distinct conditions. Decisions are made by selecting the statement that best represents the conditions of a polygon. Numbers in the right margin provide direction (i.e., go to) to the next set of appropriate statements.

System

1a. Water table rarely or briefly above the substrate surface; substrate of parent mineral material, mineral soil or bedrock; depth of accumulated organics < 40 cm; standing pools of water or vernal pooling ≤ 20% of ground coverage; wetland plant species[1] cover ≤ 50% of total plant species cover; mean wetness of a site for native species > 0[1]; moisture regime typically < 5 (OIP 1985) ..... **Terrestrial System**

1b. Water table seasonally or permanently at or above the substrate surface; flooded bedrock or hydric mineral or organic (organics > 40 cm) substrates; standing water, pools or vernal pooling > 20% of ground coverage; wetland plant species[1] cover > 50% of total plant species cover; mean wetness of a site for native species ≤ 0[1]; moisture regime ≥ 5 (OIP 1985) **2**

2a. Fluctuating water levels; sites with shallow water, seasonal flooding with summer drawdown, permanently saturated from high water table or seepage, or organic terrain (e.g., basins, depressions, adjacent low slopes, areas with restricted drainage, drainways, floodplains and littoral zones); water depth ≤ 2 m; emergent herbaceous or woody vegetation cover > 25%
..... **Wetland System**

2b. Permanently flooded sites with persistent water; emergent woody or herbaceous vegetation cover ≤ 25%; vegetation cover absent or of submerged or floating-leaved plant species
..... **Aquatic System**

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[1]Wetland plant species refers to those species with Wetness Index scores of -5 or -4, see Table 8; refer to Oldham et al. (1995) or the ELC Database for a list of species and their Wetness Index or for the calculation of mean wetness for a site.

Site

1a. Aquatic or wetland sites controlled by permanent standing or running water **2**

1b. Wetland or terrestrial sites where the water table normally drops below the substrate surface for at least part of the year; vegetation various..... **3**

2a. Aquatic sites with deep water (usually > 2 m) in lakes, ponds or rivers; community dominated by plankton; vascular vegetation cover ≤ 25% ..... **Open Water**

2b. Aquatic or wetland sites with more or less permanent shallow water (usually < 2 m); vegetation cover typically > 25%, except in active or disturbed sites ..... **Shallow Water**

3a. Sites on deep (>15 cm) deposits of unconsolidated organic or mineral material ..... **Surficial Deposits**

3b. Bedrock-controlled topography; typically a mosaic of exposed bedrock surfaces with variable accumulations of unconsolidated mineral substrates; substrates patchy and very shallow; average substrate depth ≤ 15 cm over bedrock..... **Bedrock**

Substrate

1a. Sites on deep (> 15 cm) deposits of unconsolidated organic or mineral material **2**

1b. Bedrock-controlled topography; typically a mosaic of exposed bedrock surfaces with variable accumulations of unconsolidated mineral substrates; substrates patchy and very shallow; average substrate depth ≤ 15 cm over bedrock..... **4**

2a. Substrate of organic deposits of peat or muck > 40 cm deep; Of, Om, Oh substrates (OIP 1985) ..... **Organic**

2b. Substrate mineral, with or without the incorporation of organic material, or with shallow (20 - 40 cm) peaty phase organic deposits..... **3**

3a. Communities on unconsolidated parent mineral material; substrate with little or no alteration as a result of soil formation processes; no obvious development of soil horizons ..... **Parent Mineral Material**

3b. Communities on unconsolidated mineral soil; substrates in which there is clear evidence of soil formation or development of soil horizons to at least 15 cm ..... **Mineral Soil**

4a. Igneous bedrock containing > 66% silica; low pH ..... **Acidic Bedrock**

4b. Igneous bedrock containing ≤ 66% silica, circumneutral pH ..... **Basic Bedrock**

4c. Sedimentary bedrock composed largely of carbonate minerals - **fizzes on exposure to acid**; high pH ..... **Carbonate Bedrock**

Topographic Feature

1a. Aquatic or wetland site associated with the waters of a lake or pond ..... **Lacustrine**

1b. Aquatic or wetland site associated with the waters of a river or stream ..... **Riverine**

1c. Wetland or terrestrial site not associated with the waters of a lake or river **2**

2a. Site associated with bedrock-controlled topography **5**

2b. Site on unconsolidated mineral substrates **3**

3a. Wetland or terrestrial site associated with the active shoreline of a lake or river, or in a clearly incised river valley **8**

3b. Wetland or terrestrial site not restricted to or associated with an active shoreline or river valley **4**

4a. Site on a more or less level plain, not associated with any marked topographic feature ..... **Tableland**

4b. Site on a rolling topography with a complex or repeated pattern of ridges, slopes and hollows ..... **Rolling Upland**

5a. Communities found on flat to rolling, knob and hollow or block reef and fissure bedrock-controlled topography; patchy soil accumulation 7

5b. Communities found on enclosed or exposed steep or near-vertical bare bedrock surfaces and associated rock rubble 6

6a. Site on, or near the rim of, a steep or vertical exposed rock face > 3 m high ..... **Cliff**

6b. Site on fragmented rock or boulders accumulated at the base of a cliff ..... **Talus Slope**

6c. Deep, very shaded cavities and crevices in bedrock ..... **Crevice / Cave**

7a. Site on more or less level expanses of limestone with a patchy exposure of exposed limestone pavement and a pattern of cracks or grykes; seasonal inundation of water and extreme summer drought ..... **Alvar**

7b. Block and fissure or rolling, knob and hollow bedrock; variable and extreme bedrock environments; patchy mosaic of bare rock surfaces and shallow substrate accumulations ..... **Rockland**

8a. Site associated with the shoreline of a lake or river **11**

8b. Site in a clearly incised river valley **9**

9a. Site on the slopes of an incised river valley ..... **Valley Slope**

9b. Site in a river valley on more or less level ground associated with old or current meander terraces or floodplains **10**

10a. Site on level or near level substrate above the reach of modern flood waters; typically represents historical shorelines or floodplains ..... **Terrace**

10b. Site at the base of a river valley subject to periodic flooding and deposition ..... **Bottomland**

11a. Active, often rolling, hills of accumulated sand; above the normal reach of waves and subject to erosion and deposition by wind (i.e., aeolian processes) ..... **Sand Dune**

11b. Near shore areas with steep to vertical exposures of unconsolidated mineral material > 2 m high; subjected to active disturbance from slumping, mass wasting and toe erosion ..... **Bluff**

11c. Shoreline areas with high levels of disturbance; restricted to areas near water level and most subjected to active shoreline processes – periodic high water levels and storm events, wave action, erosion, deposition and ice scour ..... **Beach / Bar**

History

1a. Community created and maintained as a result of anthropogenic influences or cultural factors; adventive species often abundant ..... **Cultural**

1b. Community resulting from natural dynamics of vegetation development; not maintained as a result of anthropogenic disturbance regimes; anthropogenic influences either not of sufficient intensity to have significantly altered the fundamental structure and composition of the site, or long enough ago that the community has recovered some of its original composition and structure ..... **Natural**

Cover

1a. Community with tree cover > 25%; trees > 2m tall ..... **Treed**

1b. Community with tree cover ≤ 25% **2**

2a. Shrub cover > 25% ..... **Shrub**

2b. Shrub cover ≤ 25% ..... **Open**

Plant Form

1a. Plant community composed of free-floating microscopic organisms..... **Plankton**

1b. Plant community dominated by at least some vascular plants **2**

2a. Aquatic community dominated by submergent or floating-leaved plants..... **3**

2b. Wetland or terrestrial community dominated by emergent herbaceous or woody vegetation **4**

3a. Aquatic community with > 75% of the total vegetation cover composed of submergent species

..... **Submerged**

3b. Aquatic community with > 75% of the vegetation cover composed of species with leaves floating on the surface of the water..... **Floating-leaved**

3c. Aquatic community with floating-leaved and submergent plant cover each > 25 % ..... **Mixed**

4a. Community dominated by woody species, tree or shrub cover > 25% **8**

4b. Community dominated by herbaceous species; tree and shrub cover ≤ 25%..... **5**

5a. Community with > 75% of the vegetation cover composed of non-vascular plants; bryophytes or lichens **7**

5b. Community with > 25% of the vegetation cover composed of vascular plants **6**

6a. Community with > 75% of the vegetation cover composed of grasses, sedges, rushes or other narrow-leaved, grass-like, non-woody plants..... **Graminoid**

6b. Community with > 75% of the vegetation cover composed of broad-leaved species, either monocots or dicots ..... **Forb**

6c. Community with graminoid and forb vegetation cover each > 25% ..... **Mixed**

7a. Community with > 50% of the vegetation cover composed of bryophytes; mosses or liverworts

..... **Bryophyte**

7b. Community with > 50% of the vegetation composed of lichens ..... **Lichen**

8a. Deciduous tree or shrub species > 75% of canopy cover..... **Deciduous**

8b. Coniferous tree or shrub species > 75% of canopy cover..... **Coniferous**

8c. Both deciduous and coniferous tree or shrub species > 25% of canopy cover..... **Mixed**

Community

1a. Aquatic community **2**

1b. Wetland community **5**

1c. Terrestrial community **8**

2a. Aquatic site in standing water body of a lake or pond **3**

2b. Aquatic site in flowing water course of a river or stream **4**

3a. Water body large, usually > 2 ha, subject to wave action ..... **Lake**

3b. Water body smaller, ≤ 2 ha, usually too small for wave build-up ..... **Pond**

4a. Water course large, 4th order stream or greater ..... **River**

4b. Water course smaller, 3rd order stream or smaller ..... **Stream**

5a. Wetland community with > 25% tree canopy cover ..... **Swamp**

5b. Wetland community with ≤ 25% tree canopy cover; dominated by shrubs or non-woody species **6**

6a. Community on mineral substrates or on sedge peat or muck organic substrates **7**

6b. Substrate of deep (> 40 cm) *Sphagnum* peat; large mats or hummocks of *Sphagnum* mosses evident in the ground layer; water source ombrotrophic; acidic conditions prevail ..... **Bog**

6c. Substrate of brown moss peat or marl; water source minerotrophic, alkaline to mildly acidic ..... **Fen**

7a. Shrub cover ≤ 25%; vegetation dominated by emergent herbaceous species (macrophytes) ..... **Marsh**

7b. Shrub cover > 25%; vegetation dominated by continuous or patchy shrub cover, with variable cover of emergent herbaceous species (macrophytes) ..... **Thicket**

8a. Community with > 25% tree cover **9**

8b. Community with ≤ 25% tree cover; dominated by shrubs or non-woody species **11**

9a. Tree cover > 60% **10**

9b. 35% < tree cover ≤ 60% ..... **Woodland**

9c. 25% < tree cover ≤ 35% ..... **Savannah**

10a. Trees planted.....**Plantation**

10b. Trees not planted, originating from natural regeneration .....**Forest**

11a. Shrub cover > 25%.....**12**

11b. Shrub cover ≤ 25%; community dominated by non-woody species **13**

12a. Open community dominated by low shrubs; vegetation cover patchy and open; substrate surface a mosaic of exposed bare substrate and vegetation cover; woody vegetation shows stunted growth characteristics .....**Barren**

12b. Open community dominated by shrubs; shrubs typically > 2m high; vegetation cover relatively continuous and closed.....**Thicket**

13a. Open community dominated by herbaceous vegetation; vegetation cover patchy and open; substrate surface a mosaic of exposed bare substrate and vegetation cover; woody vegetation shows stunted growth characteristics.....**Barren**

13b. Open communities dominated by herbaceous graminoid or forb species; vegetation cover relatively continuous and closed **14**

14a. Tallgrass species present (i.e., Indian Grass, Little Bluestem, Big Bluestem) **.....Prairie**

14b. Tallgrass species absent..... **Meadow**

Diagrammatic Keys Linking the ELC Description and Classification Frameworks

The Diagrammatic Keys presented here use the Description Framework attributes to lead to the classification of the polygon. Different branches of the Diagrammatic Keys are followed, based on the attributes assigned to the polygon for each description field. Use the appropriate Word Key to make decisions, where necessary, for each Description Framework field. Decisions do not have to be made for every field. The appropriate branches in the diagrams lead to the ELC community unit found under such conditions. The ELC community unit arrived at will be at the Community Series level in the ELC framework. Table numbers on the right-hand side of each terminal branch lead to the appropriate table in the ELC Community Tables section. Once at the appropriate ELC Community Table, use the Vegetation and Environmental Characteristics columns to further classify the community to the Ecosite and Vegetation Type levels in the ELC.

These Diagrammatic Keys are presented here, separate from the **ELC Keys** (in Part I of this manual), because they are based soley upon the Description Framework attributes. These separate keys should be considered complimentary, rather than exclusive of one and other, and should be used in conjunction.

Note:

Description attributes separated by a slash (/) mean that either attribute may be true for the polygon.

Default branches in the diagrams are **unlabeled** and do not require decisions for the classification of the polygon.

For this first approximation of the ELC, the Cultural or anthropogenic communities have not been fully addressed. That is, how these culturally based units are defined, differentiated and classified has not been entirely worked out yet. For this edition of the ELC, we have accommodated the cultural units by providing a means to describe them, using the Description Framework. Furthermore, a set of generalized cultural units has been included in the ELC Community Tables (Tables 29 and 30). When such a unit is encountered, use the Description Framework to describe it, then follow the Diagrammatic Keys to lead to the ELC Community Tables. If the unit is not found in the Tables, apply an appropriate name that includes the community type designation. For example, a limestone quarry could be classified as a Cultural Open Carbonate Cliff Ecosite.

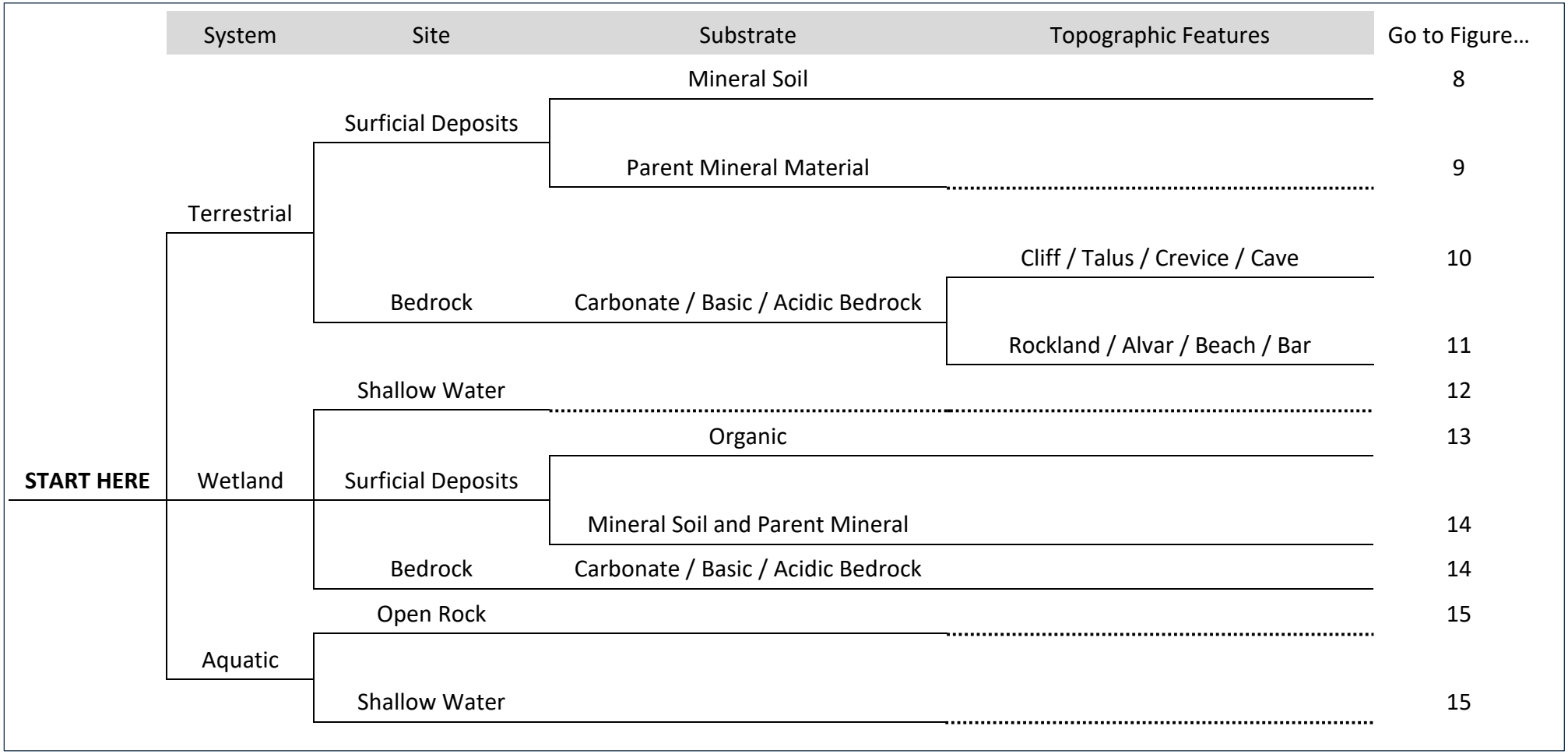


Figure 7. Diagrammatic Key, using the Description Framework fields and their attributes, leading to ELC Community Tables. Follow the Figure number to the next key.

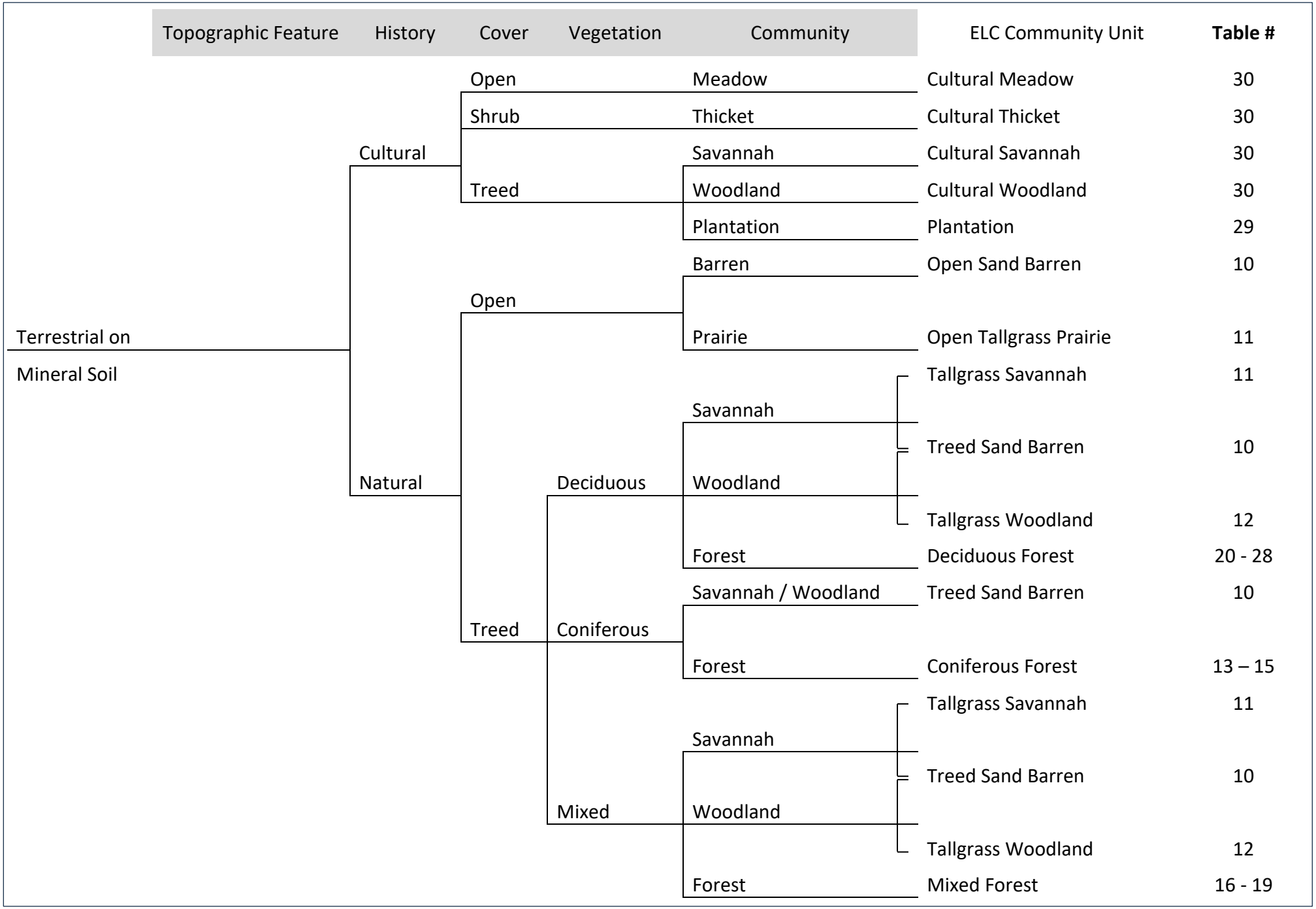


Figure 8. Diagrammatic Key for Terrestrial Communities on Mineral Soil.

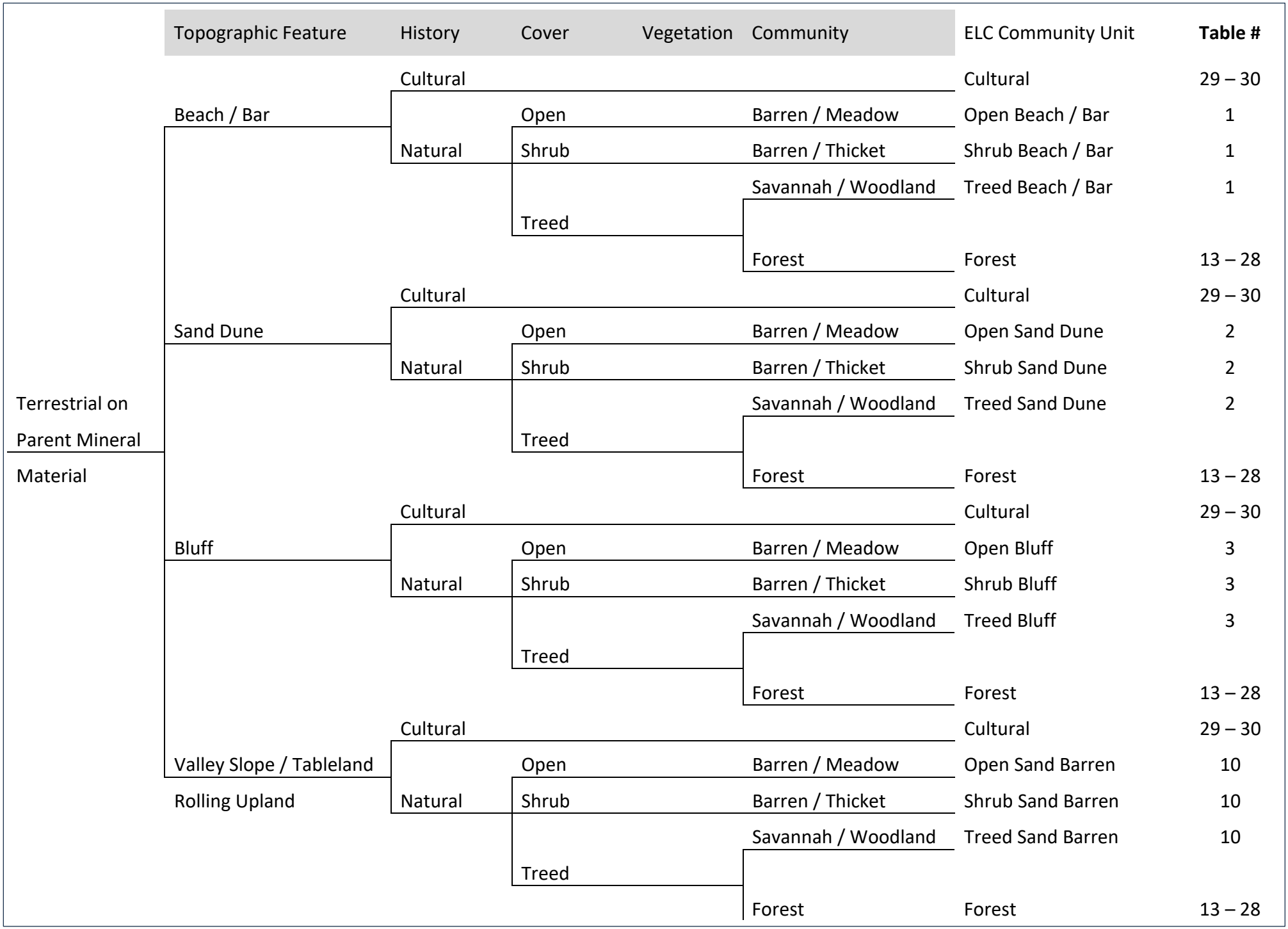


Figure 9. Diagrammatic Key for Terrestrial Communities on Parent Mineral Material.

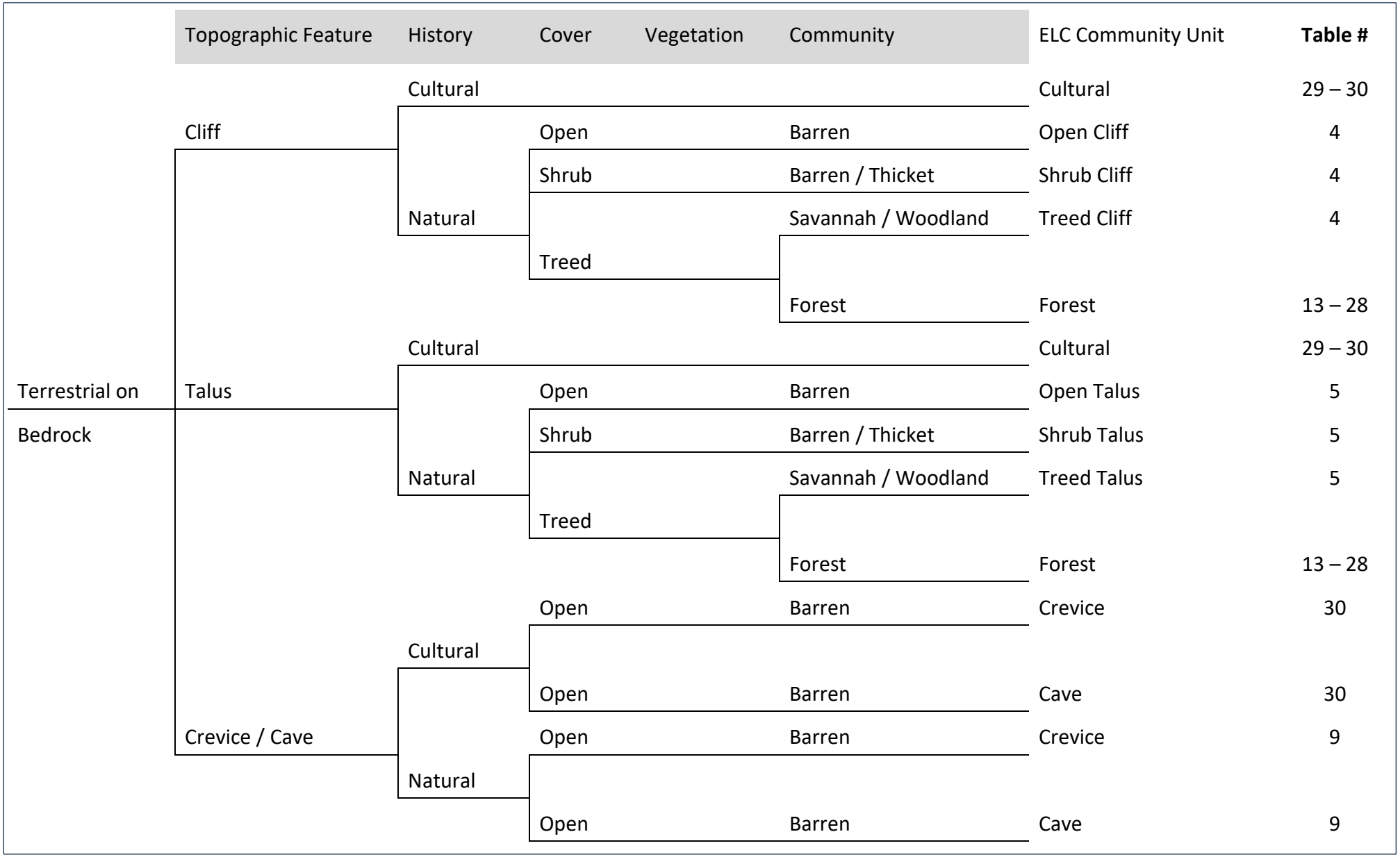


Figure 10. Diagrammatic Key for Terrestrial Communities on Bedrock (one of two Figures).

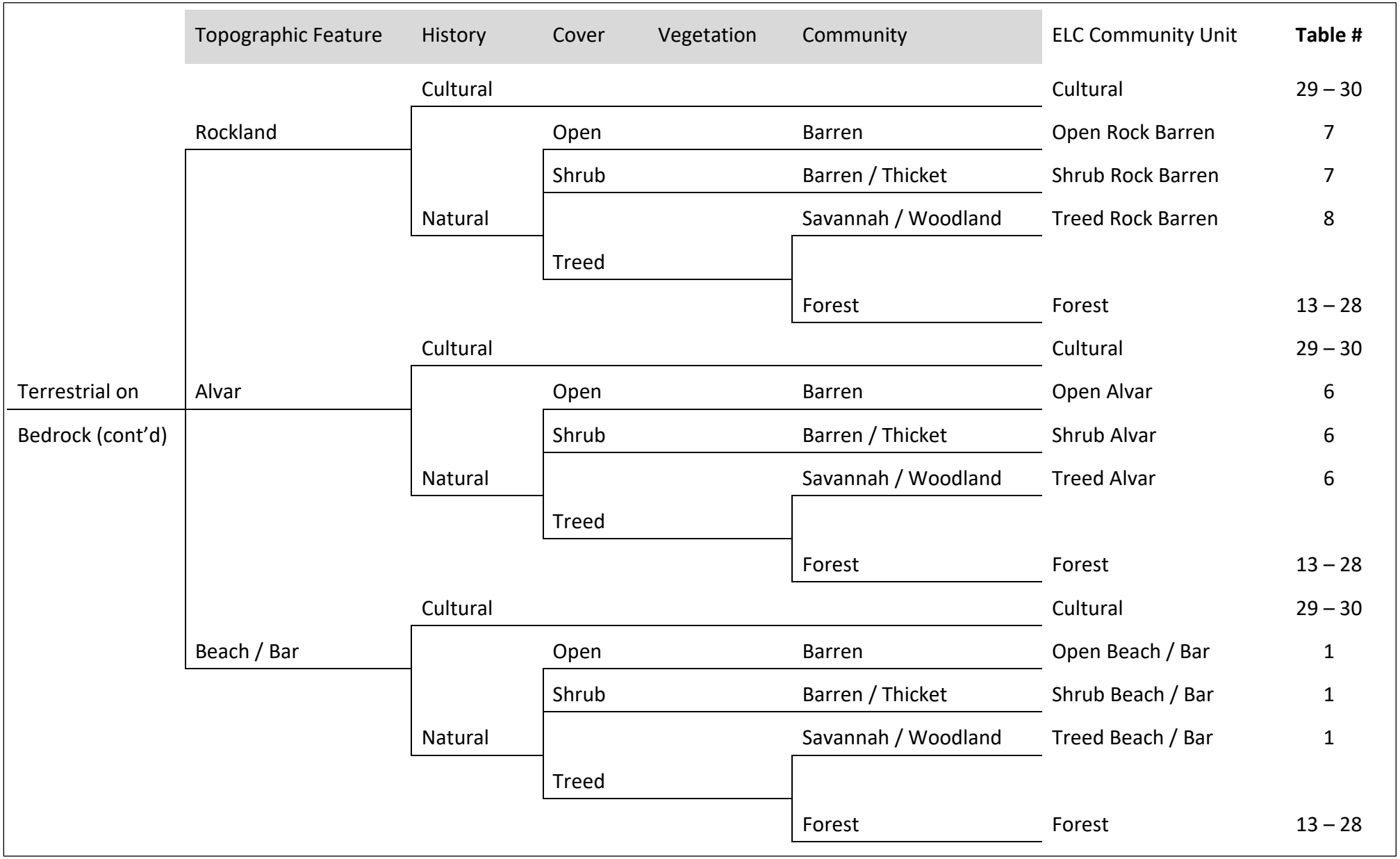


Figure 11. Diagrammatic Key for Terrestrial Communities on Bedrock, continued from Figure 10.

	Substrate	Topographic Feature	History	Cover	Vegetation	Community	ELC Community Unit	**Table #**
Shallow Water Wetlands	Organic	Lacustrine / Riverine		Open		Marsh	Organic Shallow Marsh	48
				Shrub		Swamp	Organic Thicket Swamp	41
	Parent Mineral Material	Lacustrine / Riverine		Open		Marsh	Mineral Shallow Marsh	47
				Shrub		Swamp	Mineral Thicket Swamp	40
	Acidic / Basic / Carbonate Bedrock	Lacustrine / Riverine		Open		Marsh	Bedrock Shallow Marsh	47
				Shrub		Swamp	Bedrock Thicket Swamp	40

Figure 12. Diagrammatic Key for Wetland Communities in Shallow Water.

	Topographic Feature	History	Cover	Vegetation	Community	ELC Community Unit	**Table #**
					Marsh	Organic Meadow Marsh	45
			Open		Fen	Open Fen	42
					Bog	Open Bog	43
					Swamp	Organic Thicket Swamp	41
			Shrub		Fen	Shrub Fen	42
Wetlands on Organic Substrates					Bog	Shrub Bog	43
				Deciduous	Swamp	Organic Deciduous Swamp	39
				Mixed	Swamp	Organic Coniferous Swamp	32 – 33
			Treed		Swamp	Organic Mixed Swamp	35 – 36
				Coniferous	Fen	Treed Fen	42
					Bog	Treed Bog	43

Figure 13. Diagrammatic Key for Wetland Communities on Organic Substrates.

	Topographic Feature	History	Cover	Vegetation	Community	ELC Community Unit	**Table #**
			Open		Marsh	Mineral Meadow Marsh	44, 46
Wetlands on			Shrub		Swamp	Mineral Thicket Swamp	40
Mineral Soil / Parent Mineral Material							
				Deciduous	Swamp	Mineral Deciduous Swamp	37 – 38
			Treed	Coniferous	Swamp	Mineral Coniferous Swamp	31
				Mixed	Swamp	Mineral Mixed Swamp	34
			Open		Marsh	Bedrock Meadow Swamp	44
Wetlands on			Shrub		Swamp	Bedrock Ticket Swamp	40
Acidic / Basic / Carbonate Bedrock							
				Deciduous	Swamp	Mineral Deciduous Swamp	37 – 38
			Treed	Coniferous	Swamp	Mineral Coniferous Swamp	31
				Mixed	Swamp	Mineral Mixed Swamp	34

Figure 14. Diagrammatic Key to Wetland Communities on Mineral Soil, Parent Material and Bedrock Substrates.

	Topographic Feature	History	Cover	Vegetation	Community	ELC Community Unit	**Table #**
Open Water Aquatics	Lacustrine		Open		Lake / Pond	Lacustrine Open Aquatic	49
	Riverine		Open		River / Stream	Riverine Open Aquatic	49
Shallow Water Aquatics	Lacustrine		Open	Submerged	Lake / Pond	Submerged Shallow Aquatic	50
				Mixed	Lake / Pond	Mixed Shallow Aquatic	50
				Floating-leaved	Lake / Pond	Floating-leaved Shallow Aquatic	50
	Riverine		Open	Submerged	River / Stream	Submerged Shallow Aquatic	50
				Mixed	River / Stream	Mixed Shallow Aquatic	50
				Floating-leaved	River / Stream	Floating-leaved Shallow Aquatic	50

Figure 15. Diagrammatic Key for Aquatic Communities in Shallow Water and Open Water.

9. Field Sampling Methods and Data Cards

Overview of ELC Field Sampling Methods

The ELC Field Sampling Methods comprise the set of site, vegetation and community characteristics that need to be sampled, on site, for the detailed description, identification and classification of ecological land units in Southern Ontario. Additional tallies for management or disturbance and wildlife characteristics are further proposed here, providing field data for evaluation purposes and for wildlife habitat analyses. Included here are the description of each characteristic proposed for sampling, details on how to sample characteristics and a set of standardized data cards that can be used to record the collected information. To show how these data cards are filled out, an example of completed data cards is included in the **Case Study** section of this manual.

The core set of data requirements is given in the ELC **Community Description and Classification**, **Stand and Soil Characteristics** and **Plant Species List** data cards included in this section. The optional **Management or Disturbance** and **Wildlife** data cards are also included.

Site and Visit Identification

The following site and visit variables are common to two or more data cards. These variables (with the exception of End Time) should be filled in on **each** card at the start of a survey, before any field work is done.

Site: A unique name or number for a specific area of study. Text field of up to 20 characters.

Polygon: A unique identifier for each polygon. Used for linking most of the tables in the database, including GIS files. Polygon numbers should be complete and of consistent format.

Surveyor(s): The initials of all members of the field crew responsible for filling in the data card.

Date: Date of field survey. Format: DD-MM-YY [25-May-97].

Start Time: Time (24 hour clock) to nearest 10 minutes at which survey begins. Format: HH:MM [09:20; 13:50].

End Time: Time (24 hour clock) to nearest 10 minutes at which survey begins. Format: HH:MM [010:00; 14:40].

Stand and Soil Characteristics

The **Stand and Soil Characteristics** data card represents the data collected within a polygon to adequately describe the composition of treed stands and soils. This information is later summarized and transcribed to the **Community Description and Classification** data card.

Tree Tally by Species: The tree tally, using a wedge prism, represents an objective way to census the tree species within a polygon and to estimate their relative abundance and volume, using basal area. The tree tally is later summarized for the **Stand Composition**. The stand composition is a listing of the tree species found within the polygon, in order of decreasing dominance, along with their relative proportions. This represents the same stand composition assessment that is traditionally found in the Forest Resource Inventory (FRI) in Ontario.

After recording the **Prism Factor** for the wedge prism being used, complete the **Tree Tally by Species** by making prism sweeps. Use the NHIC 7-letter codes to record the species. Each tree that meets the minimum size criterion should be recorded, according to species, and tallied. Refer to **Appendix D** for details on how to use a wedge prism. Dead trees are counted but not identified by species.

Prism sweeps should be made in parts of the polygon that are typical or representative of the stand. Sweeps should not overlap, so no tree is counted in more than one sweep. If the second sweep proves to be essentially similar in number and species composition to the first, no more sweeps may be needed. Otherwise, up to four sweeps will suitably describe the entire polygon. This is largely a judgement call and depends on the type of vegetation and variability of the site.

After the sweeps have been completed, total the tallies for each species. Calculate the relative value for each species by dividing the grand total by the total for each species except dead trees. Multiply the fraction by 100.

Basal Area (m^2/ha) in each sweep is estimated by multiplying the total number of live trees counted by the "factor" of the prism or gauge (e.g., x 2). **Mean Basal Area (BA)** is the average of these estimates.

Stand Composition: This is a formula based on the results of the sweeps. Up to four of the most dominant species are listed in order of importance, followed by the relative abundance. Use NHIC 7-letter species codes to record the species (complete species list and codes are available from the database application).

Format:	SPECIES(%) SPECIES(%) SPECIES(%)
Example:	$ACESACU_{75}$ - $FAGGRAN_{10}$ - $FRAAMER_{10}$ - $TILAMER_5$
Stand:	Stand is made up of 75% Sugar Maple (***Acer saccharum***), 10% Beech (***Fagus grandifolia***), 10% White Ash (***Fraxinus americana***) and 5% Basswood (***Tilia americana***).

Soil Analysis: At prism sweep locations, use a soil auger or Oakfield tube to sample a soil core. Assess the following characteristics for each soil auger or tube sample using the keys and guidelines found in the OIP Manual (1985 or 1993) (excerpts are found in the **Soil Description** section of this manual):

1. effective texture of the soil;
2. depth to distinct mottles (**g =**) or gley (**G =**);
3. depth of the organic layer;
4. depth to bedrock;
5. soil moisture regime.

If two soil assessments indicate a consistent or uniform soil, no further sampling may be needed. Otherwise take additional cores to arrive at an overall assessment for the polygon.

The standard approach to sampling soil is to auger or core to a depth of at least 120 cm. As you auger or core, lay out the samples on the ground, in a contiguous fashion that reflects the profile of the soil. Use this profile to identify features and take depth measurements. Use the **Soil Profile** diagram to draw a composite picture of the soil horizonation found within the polygon, noting where mottles, gley, bedrock and other features are observed.

Stand Profile Diagram: This is a local profile indicating the structural nature of the polygon. Indicate local topographic features, microtopography and vertical structure to the vegetation. Give a scale on the vertical axis.

Notes: Include special features or considerations and other information about the polygon.

Plant Species List

Maintain a running list of all plant species identified within the core part of the polygon (Figure 16). To do this, conduct a botanical reconnaissance of the polygon, documenting as many of the plant species as possible.

It is very important to stay within the boundaries of the polygon while doing the botanical reconnaissance and documenting the plant species. This will minimize the number of plant species documented from adjacent ecological land units and save sampling time. The more variation in plant species that is recorded, because species from other polygons are included, the more difficult it will be to describe and classify the polygon. We strongly recommend that only the core of the polygon is used for the documented plant species list. Stay within a perimeter buffer strip of 10 metres or more, depending on the size of the polygon (Figure 16). When doing the plant species list, use the changing patterns in understorey, ground layer vegetation and site conditions (i.e., topography, slope position, moisture conditions) as a guide to stay within the core area and to minimize heterogeneity.

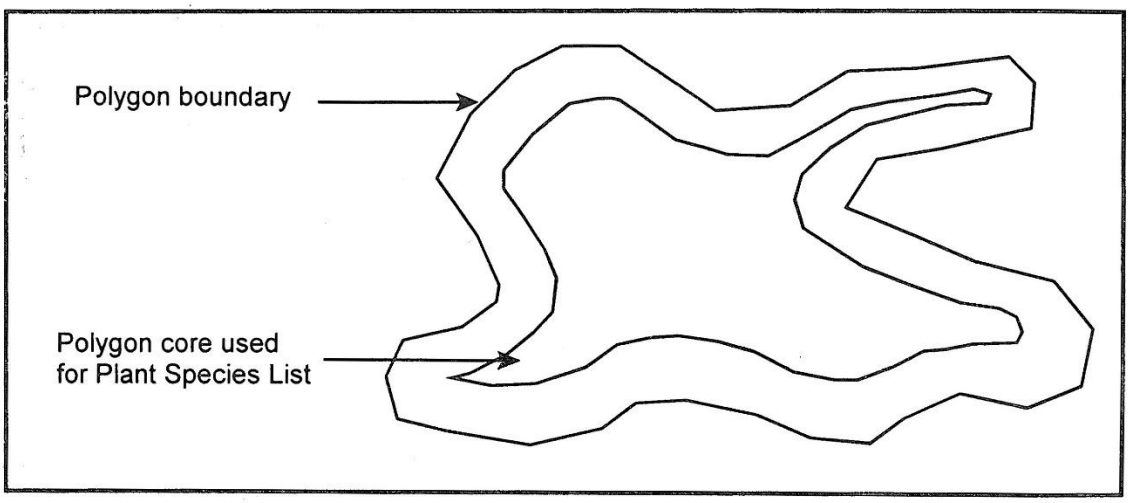


Figure 16**.** Diagrammatic representation of the core area of the polygon used for documenting the **Plant Species List**.

When recording the plant species on the data card, use the 7-letter codes for species names.
(**Note:** A complete list of plant species and their codes is available at the following internet address - https://www.publicdocs.mnr.gov.on.ca/srb/Ontario_Species_list.xlsx)

For each species, record the layers in which the species occurs and indicate the abundance (Tables 13 and 14). The **Layer** designations in Table 13 correspond to those used on the **Community Description and Classification** data card. Unknown species should be collected and a unique collection number (**Coll**) recorded.

Note: The plant species list and vegetation descriptions use layer codes (Table 13) which are applicable to any type of community. That is, these layer codes could be used to describe a Dry-Fresh Sugar Maple Deciduous Forest Type or a Cattail Mineral Shallow Marsh Type. In these two examples, both Sugar Maple and Cattail would be documented in the canopy layer (Layer 1).

Table 13. Codes used to stratify vegetation according to layers.

Code	Layer	Definition
1	Canopy	highest layer of vegetation; receives incident (direct) sunlight
2	Sub-Canopy	vegetation layer under the canopy; does not, for the most part, receive direct sunlight
3	Understorey	vegetation layer intermediate in height between the canopy and ground layer; e.g., in a forest it would be represented by the shrub and sapling layer
4	Ground (GRD) layer	vegetation layer that is nearest to the substrate surface

Table 14. Codes used in estimating the abundance of plant species within the polygon.

Code	Abundance	Definition
R	Rare	represented in the polygon by less than about three to five individuals or small clumps
O	Occasional	present as scattered individuals throughout the polygon or represented by one or more large clumps of many individuals; most species will fall into this category
A	Abundant	represented throughout the polygon by large numbers of individuals or clumps; likely to be encountered anywhere in the polygon; usually forming > 10% ground cover
D	Dominant	represented throughout the polygon by large numbers of individuals or clumps; visually more abundant than other species; forming > 10% ground cover and >35% vegetation cover in any one stratum

Community Description and Classification

The **Community Description and Classification** data card provides, in part, a synthesis of the information collected on the **Stand and Soil Characteristics** and **Plant Species List** data cards. This card provides a consistent and formal polygon description upon which the community identification and classification are based.

Community Description

Polygon Description: For each of the **ELC Polygon Description** variables (e.g., System, Site, Substrate, Topographic Feature, History, Cover, Plant Form and Community; refer to the **Description Framework** section of this manual) select the suitable attribute for the polygon, using the keys, and check the appropriate box on the data card. Only one box can be checked in each description field.

Stand Description: The vegetation of the polygon is described by assessing the height, cover and species composition by layer. Assessing the plant species composition by layer is easier once the **Stand and Soil Composition** and **Plant Species List** data cards have been completed.

First, stratify the vegetation according to the layer codes (Table 13) and record the height which best describes that layer (Table 15). Since the vertical structure of vegetation can be complex, up to two height codes can be recorded to characterize a particular layer of vegetation. For example, in a forest, the understorey layer can comprise shrubs and tree saplings from 0.5 m to 10 m. In this case, a height code of 3-5 or 5-3 can be recorded, depending on which height class is considered to be most important.

Then, by **Layer**, assess the overall vegetation cover and score according to the **Cover (CVR)** codes in Table 16.

Table 15. Height (HT) codes used to describe vegetation within polygon.

Height (HT) Codes	Definition
1	HT > 25 m
2	10 m < HT ≤ 25 m
3	2 m < HT ≤ 10 m
4	1 m < HT ≤ 2 m
5	0.5 m < HT ≤ 1 m
6	0.2 m < HT ≤ 0.5 m
7	HT ≤ 0.2 m

Table 16. Cover codes used to estimate vegetation cover (i.e., absolute cover) by layer.

Cover (CVR) Codes	Definition
0	none (vegetation layer not represented in the stand)
1	0% < CVR ≤ 10%
2	10% < CVR ≤ 25%
3	25% < CVR ≤ 60%
4	CVR > 60%

Finally, characterize the vegetation by listing up to four (4) plant species, in each layer, in order of decreasing cover or importance. Use the following symbols to characterize the relative abundance of species in the listing: **>>** much greater than; **>** greater than; or **=** equal to. Use 7-letter species codes.

Format: SPECIES **>>** SPECIES **=** SPECIES **>** SPECIES
Example: ARANUDI **>>** TRIGRAN **=** ACESACU **>** ALLTRIC
Vegetation: Ground layer within this forest is dominated by Sarsaparilla (***Ara****lia* ***nudi****caulis*), which is much greater than White Trillium (***Tri****llium* ***gran****diflorum*), which is about equal in abundance to Sugar Maple (***Ace****r* ***sac****charu****m***), which is greater than Wild Leek (***All****ium* ***tric****occum*).

Note: Any type of vegetation community can be characterized using all four of the **Layer** codes, the **Height** codes and the **Cover** codes shown above, whether it be a Cattail Mineral Shallow Marsh Type or a Dry – Fresh Sugar Maple Deciduous Forest Type. In the case of the Cattail Mineral Shallow Marsh Type, Cattail would be recorded in the **Canopy** layer, along with the appropriate **Height** and **Cover** codes. This system can, therefore, characterize the vertical structure of herbaceous and shrub vegetation communities in the same way treed communities have traditionally been characterized.

Stand Composition: Copy the **Stand Composition** and the basal area estimate (**BA**) from the **Stand and Soil Characteristics** data card.

Size Class Analysis: For each of the four tree diameter size classes (Table 17), make a visual estimate of the abundance of stems using the codes provided in Table 18. This is to provide a general portrayal of the size class distribution within the stand.

Table 17. Tree size classes. Represents DBH (diameter at breast height; 1.3 m above ground) measured in cm.

Tree Size Classes
< 10 cm
10 - 24 cm
25 - 50 cm
> 50 cm

Standing Snags and **Deadfall** assesses the amount of standing and fallen dead woody material within the polygon. The number of **Standing Snags** is estimated using the abundance codes (Table 18) by four tree diameter size classes. Similarly, the amount of **Deadfall** is estimated by using the abundance codes (Table 18) by four tree diameter size classes.

Table 18. Abundance codes for standing snags and deadfall, along with their definitions.

Abundance Codes	Term	Definition
N	None	no standing or fallen woody stems
R	Rare	represented by only one to a few standing or fallen woody stems
O	Occasional	represented as scattered standing or fallen woody stems throughout a community, or represented by one or more large clumps
A	Abundant	represented throughout the polygon or community by large numbers of standing or fallen woody stems; likely to be encountered anywhere in the polygon

Community Age: Check one box representing the estimated seral age or successional stage of the community represented in the polygon, using the terms defined in Table 19.

Table 19. Codes for community age and their associated definitions (adapted from National Vegetation Working Group 1990).

Code	Definition
Pioneer	a community that has invaded disturbed or newly created sites and represents the early stages of either primary or secondary succession
Young	a community that has not yet undergone a series of natural thinnings and replacements; plants are essentially growing as independent individuals rather than as members of a phyto-sociological community
Mid-aged	a community that has undergone natural thinning and replacement as a result of species interaction and often contains examples of both early successional and late successional species
Mature	a successionally maturing community dominated primarily by species that are replacing themselves and are likely to remain an important component of the community if it is not disturbed again; significant remnants of early seral stages may still be present
Old Growth	a self-perpetuating community composed primarily of late seral species that show uneven stand age distribution, including large old trees (generally older than 120 years) without open-grown characteristics

Soil Analysis: Transfer a synthesis of the soil work done on the **Stand and Soil Characteristics** data card. Determine an overall effective soil texture assessment, the depth of organics, depth to distinct or prominent mottles (**g =**) and gley (**G =**)(cm), depth to bedrock and the moisture regime for the entire polygon, according to OIP (1985 or later versions). Indicate whether the soil conditions within the polygon are **variable** and heterogeneous or relatively consistent and **homogeneous**.

Community Classification

Community Class: Determine the ELC Community Class for the polygon, using the ELC Keys and Community Tables, and record it with its appropriate code on the data card.

Community Series: Determine the ELC Community Series for the polygon, using the ELC Keys and Community Tables, and record it with its appropriate code on the data card.

Ecosite: Use the ELC Keys and Community Tables, along with the moisture regime of the polygon, to determine the Ecosite designation and code for the polygon. If the polygon does not fit an existing Ecosite designation, record a provisional name and fill out a **New Ecosite** form (see Appendix C) and submit it to the Southern Region ELC Working Group.

Vegetation Type: Use the ELC Keys and Community Tables to determine the Vegetation Type of the polygon. If the polygon does not fit an existing Vegetation Type, assess whether it represents an acceptable variation of an existing Vegetation Type. If the polygon still does not fit an existing type, record a provisional name and fill out a **New Vegetation Type** form (see Appendix C) and submit it to the Southern Region ELC Working Group.

Inclusions and Complexes: Inclusions and complexes represent two or more distinct community types present within a single polygon or where a polygon represents complex and variable site and vegetation conditions. They help document variation or heterogeneity within polygons. **Inclusions** represent distinct communities that can be found within a polygon but are too small to be visible on air-photos or to map (< 0.5 ha; see Figure 17). Inclusions typically represent a single, or sometimes a few, separate and isolated community elements. **Complexes** occur where site and vegetation conditions are variable, represented by two or more communities intermingled in a mosaic that is too complex to map (see Figure 17).

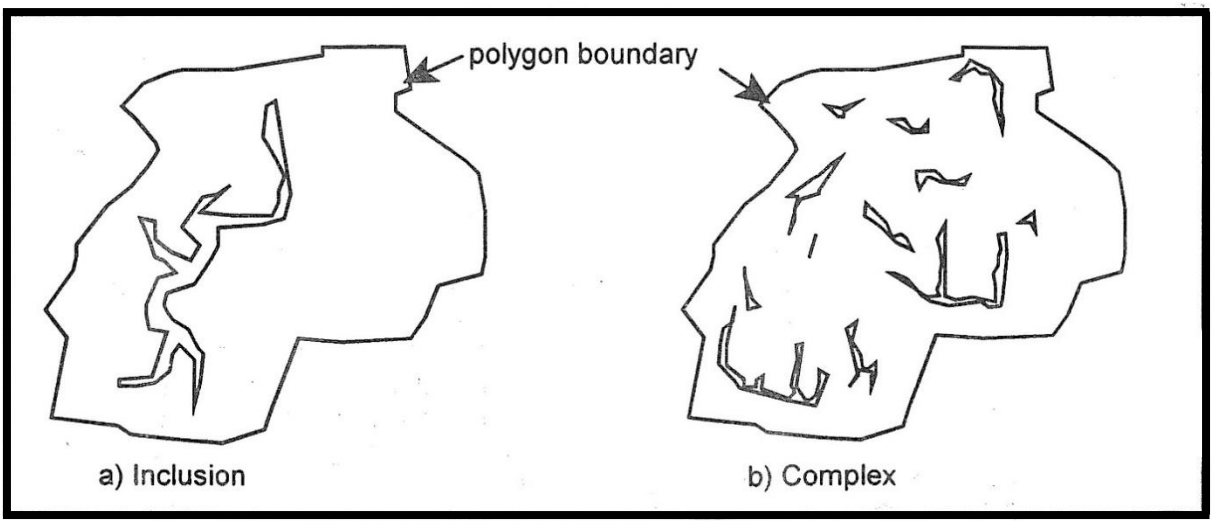


Figure 17. Diagrammatic representation of inclusions and complexes.

Indicate whether inclusions or complexes are present within the polygon by putting a check mark beside the appropriate term. Record the ELC codes for Ecosites or Vegetation Types that represent the inclusions or complexes. A separate **Community Description and Classification** data card may be completed for each type and included with the polygon data package.

Disturbance

The **Disturbance** data card lists common disturbance factors. Each disturbance factor is scored on a scale from 0 to 3 for both **Intensity** and **Extent**. The two scores can be multiplied to produce a rating per disturbance. Score the time that has passed since the last major logging event separately on a single scale.

Each disturbance factor should be scored in every polygon, even if the overall score is 0 (**none** x **none**). Some judgement and experience may be required to score certain disturbances. The following provides a guide to individual factors:

Time since logging: Use the time since the last important logging event that altered the overall structure or composition of the stand. Estimate time since logging from clues such as the condition of stumps and scars, the size of released saplings and the extent and shape of trees showing open-grown characteristics. Large stumps and logs will normally completely degrade in Southern Ontario in about 30 years.

Logging: Intensity is based on evidence of recent logging events. Fuel-wood cutting is assumed when occasional trees, especially dead or diseased individuals, have been removed. Evidence of selective cutting includes a more intensive level of tree removal, signs of skidding operations, one or more tree species targeted and so on. A diameter limit cut is indicated by heavy removal of large trees often resulting in an even-aged sapling response.

Livestock: Historic (>15 years) livestock grazing is inferred from the condition of the ground-layer flora and the tree species composition (such as the abundance of Hop-hornbeam (*Ostrya virginiana*) or Hawthorn (*Crataegus* spp.), both species tolerant of livestock impact). Other clues to previous grazing influences include the presence of old fences and open-grown trees in the forest canopy. Indications of livestock grazing in the last five to15 years are damage and compaction around tree roots and evidence of old browse lines.

Alien species: The presence of non-native (adventive) species in a patch is an indicator of non-pristine conditions. Some alien species, such as Common Buckthorn (*Rhamnus cathartica*) and Garlic Mustard (*Alliaria petiolaris*) can be highly invasive and dominate woodland areas to the detriment of the native flora. Intensity is judged from the number of alien species and the abundance of individuals.

Gaps in forest canopy: Only gaps caused by disturbance events such as logging, windstorm or disease should be recorded. Gaps due to local topography are not usually a result of disturbance. Intensity is judged by the number and size of gaps. The vegetation in gaps is generally distinct because gaps are frequently occupied by shade-intolerant species rather than shade-tolerant woodland species. Shade-intolerant species tend to replace slower growing woodland species when light levels are high.

Plantations or plantings: The presence of planted non-native or native species (usually, but not exclusively, coniferous trees) is treated as a disturbance event. Planting intensities range from individuals planted among existing vegetation to closed canopy plantations.

Tracks and trails: Only roads, paths and trails made and maintained by humans should be considered disturbances. Animal trails resulting from wildlife movement are not included. Faint trails are visible mostly as compacted and vegetation-free strips on the ground surface. Well-marked trails are usually actively managed; the trail itself is wider and some brush may be cut at the side of the trail. There are often signs of erosion on the

trail itself and there may be a change in the trail-side vegetation. Tracks or roads are, or have been, used by vehicles. There is commonly a gap in the canopy above the trail and a distinct flora along the trail.

Dumping: Any dumping of material, including field stone top-soil or organic material, should be recorded.

Earth displacement: Excavation of soil for any reason is recorded, including extraction of sand and drainage operations.

Recreational use: Signs of recreational use include tracks and recreational vehicle trails, signs of hunting (deer platforms, large numbers of spent cartridges), fire pits, empty bottles and drink cans, forts and so on.

Sugar bush operations: Light or occasional sugar bush operations include historic evidence, tapping of occasional trees and instances where there is little recent evidence of selective cutting for sugar bush. Heavy impact includes the presence of a permanent network of sap tubes and forest management towards the sugar bush operation.

Noise: Persistent or repeated noise, for example from highways, railways, airports or manufacturing operations, should be recorded. Occasional noise such as from farm machinery need not be recorded.

Disease or death of trees: This disturbance category should be applied to generalized events, not to the senescence and death of individuals in the forest canopy. Generalized tree death can occur, for example, as a result of changes in site drainage or pathogens such as Dutch Elm Disease.

Wind throw (blow down): Evidence that trees have been uprooted or broken by wind should be recorded. Isolated, single tree falls or damage to small branches should not be noted.

Deer browse: Evidence of deer browse ranges from light pruning of favoured food species to distinct browse lines above an open ground layer.

Beaver activity: Beaver activity can range from removal of occasional small stems, through alteration of vegetation structure (e.g., felled trees) to flooding.

Flooding: Both seasonal inundation (swamps, vernal pools) and flooding events along water courses should be recorded.

Fire: Evidence from fire includes charcoal in the soil horizons, tree scarring and burned trees. Do not record recreational fire pits for which there is no evidence of spread to the surrounding vegetation.

Ice damage: Any damage to the vegetation resulting from ice storms should be recorded.

Other: Record and name other disturbances.

Wildlife

Weather information is recorded on the **Wildlife** data card. Such information can be useful for helping to interpret records or results.

Temperature: Record of approximate ambient temperature (ºC) during the field survey.

Cloud: Record, in tenths, the proportion of the sky covered by clouds.

Wind: Record the Beaufort Scale number according to Table 20

Table 20. Beaufort Wind Scale (adapted from Whittow 1984).

Force	Descriptive term	Effects observed on land
0	Calm	smoke rises vertically
1	Light Air	smoke drifts, but wind vanes do not
2	Light Breeze	wind felt on face, leaves rustle
3	Gentle Breeze	leaves and small twigs in constant motion; light flags extended
4	Moderate Breeze	wind raises dust and loose paper; small branches move
5	Fresh Breeze	small trees in leaf begin to sway
6	Strong Breeze	large branches in motion; whistling in phone wires; umbrella use difficult
7	Near Gale	whole trees in motion; inconvenience felt when walking against wind
8	Gale	twigs break off trees; progress impeded
9	Strong Gale	slight structural damage – roofing shingles, TV antennae
10	Storm	trees uprooted; considerable structural damage

Precipitation: Brief statement of precipitation, e.g ., none, steady rain, fog.

Conditions: Brief statement of conditions, surveyor mood, etc., which might affect the survey; a text field of 50 characters.

Indicate the presence of **Potential Wildlife Habitat** by checking the appropriate box of features that are present within the polygon.

Wildlife: All wildlife sightings and signs should be recorded while in the polygon. Record each sighting by **type** (TY) (B = bird, H = herpetofauna, etc.) and by **species** (SP. CODE). Use four-letter codes, provided in the database, for recording species.

Evidence Codes: (EV) should be used to record the type of observation. If possible, give an indication of the estimated number of individuals, pairs or signs for each wildlife species.

ELC **COMMUNITY DESCRIPTION & CLASSIFICATION**	SITE:			POLYGON:	
	SURVERYOR(S):		DATE:		UTME:
	START:	END:		UTMZ:	UTMN:

POLYGON DESCRIPTION

SYSTEM	SUBSTRATE	TOPOGRAPHIC FEATURE	HISTORY	PLANT FORM	COMMUNITY
☐TERRESTRIAL ☐WETLAND ☐AQUATIC	☐ORGANIC ☐MINERAL SOIL ☐PARENT MIN. ☐ACIDIC BEDRK. ☐BASIC BEDRK. ☐CARB.MEDRK.	☐LACUSTRINE ☐RIVERINE ☐BOTTOMLAND ☐TERRACE ☐VALLEY SLOPE ☐TABLELAND ☐ROLL. UPLAND ☐CLIFF ☐TALUS ☐CREVICE / CAVE ☐ALVAR ☐ROCKLAND ☐BEACH / BAR ☐SAND DUNE ☐BLUFF	☐NATURAL ☐CULTURAL	☐PLANKTON ☐SUBMERGED ☐FLOATING-LVD ☐GRAMINOID ☐FORM ☐LICHEN ☐BRYOPHYTE ☐DECIDUOUS ☐CONIFEROUS ☐MIXED	☐LAKE ☐POND ☐RIVER ☐STREAM ☐MARSH ☐SWAMP ☐FEN ☐BOG ☐BARREN ☐MEADOW ☐PRAIRIE ☐THICKET ☐SANANNAH ☐WOODLAND ☐FOREST ☐PLANTATION
SITE			**COVER**		
☐OPEN WATER ☐SHALLOW WATER ☐SURFICIAL DEP. ☐BEDROCK			☐OPEN ☐SHRUB ☐TREED		

STAND DESCRIPTION:

LAYER		HT	CVR	SPECIES IN ORDER OF DECREASING DOMINANCE (>> MUCH GREATER THAN; > GREATER THAN; = ABOUT EQUAL TO)
1	**CANOPY**			
2	**SUB-CANOPY**			
3	**UNDERSTOREY**			
4	**GRD. LAYER**			

HT CODES: **1=**>25m **2=**10<HT≤25m **3=**2<HT≤10m **4=**1<HT≤2m **5=**0.5<HT≤1m **6=**0.2<HT≤0.5m **7=**HT<0.2m

CVR CODES **0=** NONE **1=** 0%<CVR≤10% **2=** 10<CVR≤25% **3=** 25<CVR≤60% **4=** CVR>60%

STAND COMPOSITION:								**BA:**
SIZE CLASS ANALYSIS:		< 10		10 – 24		25 – 50		< 50
STANDING SNAGS:		< 10		10 – 24		25 – 50		< 50
DEADFALL / LOGS:		< 10		10 – 24		25 – 50		< 50

ABUNDANCE CODES: **N =** NONE **R =** RARE **O =** OCCASIONAL **A =** ABUNDANT

COMM. AGE:		PIONEER		YOUNG		MID-AGE		MATURE		OLD GROWTH

SOIL ANALISIS:

TEXTURE:	**DEPTH TO MOTTLES / GLEY**	g =	G =
MOISTURE:	**DEPTH OF ORGANICS:**		**(cm)**
HOMOGENEOUS / VARIABLE	**DEPTH OF ORGANICS:**		**(cm)**

COMMUNITY CLASSIFICATION:

COMMUNITY CLASS:	**CODE:**
COMMUNITY SERIES:	**CODE:**
ECOSITE:	**CODE:**
VEGETATION TYPE:	**CODE:**

	INCLUSION		**CODE:**
	COMPLEX		**CODE:**

Notes:

ELC STAND & SOIL CHARACTERISTICS	SITE:
	POLYGON:
	DATE:
	SURVEYOR(S):

TREE TALLY BY SPECIES:

PRISM FACTOR ____

SPECIES	TALLY 1	TALLY 2	TALLY 3	TALLY 4	TOTAL	RELATIVE AVERAGE
TOTAL						100
BASAL AREA (BA)						MEAN:
DEAD						

STAND COMPOSITION:				
SOIL ASSESSMENT	**1**	**2**	**3**	**4**
TEXTURE				
DEPTH TO MOTTLES: **DEPTH TO GLEY:**	g = G =	g = G =	g = G =	g = G =
DEPTH OF ORGANICS				
DEPTH TO BEDROCK				
MOISTURE REGIME				

COMMUNITY PROFILE DIAGRAM

SOIL PROFILE

Notes:

# ELC **PLANT SPECIES LIST**	
	SITE:
	POLYGON:
	DATE:
	SURVEYOR(S):

LAYERS: **1** = CANOPY > 10M **2 =** SUB-CANOPY **3 =** UNDERSTOREY **4 =** GROUND (GRD.) LAYER

ABUNDANCE CODES: **R** = RARE **O =** OCCASIONAL **A =** ABUNDANT **D =** DOMINANT

SPECIES CODE	LAYER				COLL.
	1	2	3	4	

SPECIES CODE	LAYER				COLL.
	1	2	3	4	

Page . . . . . . of . . . . . .

ELC MANAGEMENT / DISTURBANCE	SITE:				
	POLYGON:				
	DATE:				
	SURVEYOR(S):				
DISTURBANCE / EXTENT	**0**	**1**	**2**	**3**	**SCORE †**
TIME SINCE LOGGING	>30 YRS	15 – 30 YRS	5 – 15 YRS	0 – 5 YRS	
INTENSITY OF LOGGING	NONE	FUEL WOOD	SELECTIVE	DIAMETER LIMIT	
EXTENT OF LOGGING	NONE	LOCAL	WIDESPREAD	EXTENSIVE	
SUGAR BUSH OPERATIONS	NONE	LIGHT	MODERATE	HEAVY	
EXTENT OF OPERATIONS	NONE	LOCAL	WIDESPREAD	EXTENSIVE	
GAPS IN FOREST CANOPY	NONE	SMALL	INTERMEDIATE	LARGE	
EXTENT OF GAPS	NONE	LOCAL	WIDESPREAD	EXTENSIVE	
LIVESTOCK (GRAZING)	NONE	LIGHT	MODERATE	HEAVY	
EXTENT OF LIVESTOCK	NONE	LOCAL	WIDESPREAD	EXTENSIVE	
ALIEN SPECIES	NONE	OCCASIONAL	ABUNDANT	DOMINANT	
EXTENT OF ALIEN SPECIES	NONE	LOCAL	WIDESPREAD	EXTENSIVE	
PLANTING (PLANTATION)	NONE	OCCASIONAL	ABUNDANT	DOMINANT	
EXTENT OF PLANTING	NONE	LOCAL	WIDESPREAD	EXTENSIVE	
TRACKS AND TRAILS	NONE	FAINT TRAILS	WELL MARKED	TRACKS OR ROADS	
EXTENT OF TRACKS/TRAILS	NONE	LOCAL	WIDESPREAD	EXTENSIVE	
DUMPING (RUBBISH)	NONE	LIGHT	MODERATE	HEAVY	
EXTENT OF DUMPING	NONE	LOCAL	WIDESPREAD	EXTENSIVE	
EARTH DISPLACEMENT	NONE	LIGHT	MODERATE	HEAVY	
EXTENT OF DISPLACEMENT	NONE	LOCAL	WIDESPREAD	EXTENSIVE	
RECREATIONAL USE	NONE	LIGHT	MODERATE	HEAVY	
EXTENT OF RECR. USE	NONE	LOCAL	WIDESPREAD	EXTENSIVE	
NOISE	NONE	SLIGHT	MODERATE	INTENSE	
EXTENT OF NOISE	NONE	LOCAL	WIDESPREAD	EXTENSIVE	

DISEASE/DEATH OF TREES	NONE	LIGHT	MODERATE	HEAVY	
EXTENT OF DISEASE/DEATH	NONE	LOCAL	WIDESPREAD	EXTENSIVE	
WIND THROW (BLOW DOWN)	NONE	LIGHT	MODERATE	HEAVY	
EXTENT OF WIND THROW	NONE	LOCAL	WIDESOREAD	EXTENSIVE	
BROWSE (e.g. DEER)	NONE	LIGHT	MODERATE	HEAVY	
EXTENT OF BROWSE	NONE	LOCAL	WIDESPREAD	EXTENSIVE	
BEAVER ACTIVITY	NONE	LIGHT	MODERATE	HEAVY	
EXTENT OF BEAVER ACTIVITY	NONE	LOCAL	WIDESPREAD	EXTENSIVE	
FLOODING (pools & pudding)	NONE	LIGHT	MODERATE	HEAVY	
EXTENT OF FLOODING	NONE	LOCAL	WIDESPREAD	EXTENSIVE	
FIRE	NONE	LIGHT	MODERATE	HEAVY	
EXTENT OF FIRE	NONE	LOCAL	WIDESPREAD	EXTENSIVE	
ICE DAMAGE	NONE	LIGHT	MODERATE	HEAVY	
EXTENT OF ICE DAMAGE	NONE	LOCAL	WIDESPREAD	EXTENSIVE	
OTHER	NONE	LIGHT	MODERATE	HEAVY	
EXTENT	NONE	LOCAL	WIDESPREAD	EXTENSIVE	
					† INTENSITY x EXTENT = SCORE

ELC WILDLIFE	SITE:	
	POLYGON:	
	DATE:	
	SURVEYOR(S):	
	START TIME:	END TIME:

TEMP (°C):	CLOUD (10th):	WIND:	PRECIPITATION:
CONDITIONS:			

POTENTIAL WILDLIFE HABITAT:

	VERNAL POOLS		SNAGS
	HIBERNACULA		FALLEN LOGS
	_____		_____

SPECIES LIST:

TY	SP. CODE	EV	NOTES	#

TY	SP. CODE	EV	NOTES	#

FAUNAL TYPE CODES (TY):

B = BIRD **M** = MAMMAL **H** = HERPETOFAUNA **L** = LEPIDOPTERA **F** = FISH **O** = OTHER

EVIDENCE CODES (EV):

BREEDING BIRD – POSSIBLE:

SH = SUITABLE HABITAT **SM** = SINGING MALE

BREEDING BIRD – PROBABLE:

T = TERRITORY **D** = DISPLAY **P** = PAIR

A = ANXIETY BEHAVIOUR **N** = NEST BUILDING **V** = VISITING NEST

BREEDING BIRD – CONFIRMED:

DD = DISTRACTION **NU** = USED NEST **FY** = FLEDGED YOUNG

NE = EGGS **NY** = YOUNG **FS** = FOOD/FAECAL SACK

AE = NEST ENTRY

OTHER WILDLIFE EVIDENCE:

OB = OBSERVED **VO** = VOCALIZATION **CA** = CARCASS

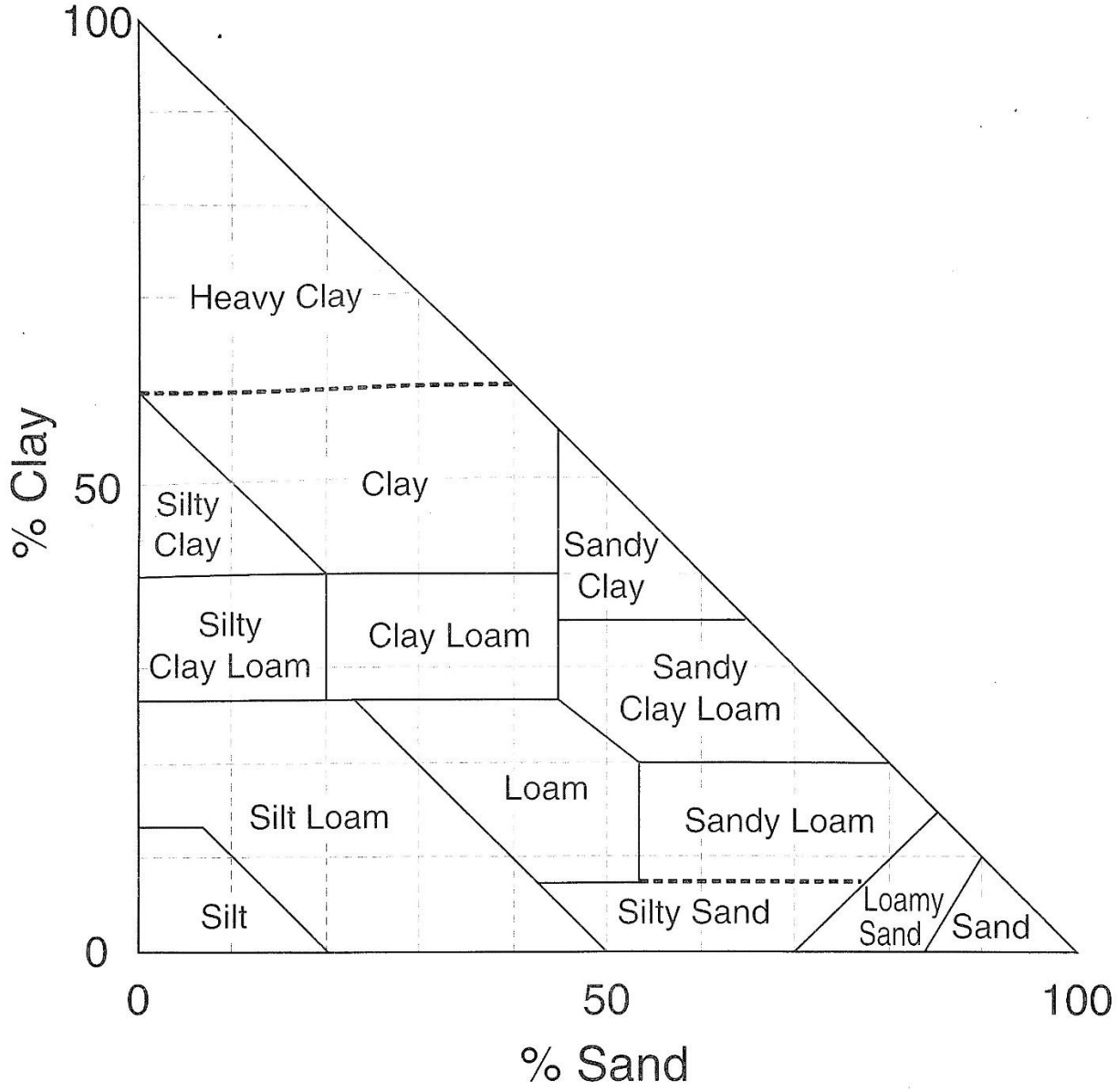
DP = DISTINCTIVE PARTS **HO** = HOUSE/DEN **FY** = EGGS OR YOUNG

TK = TRACKS **FE** = FEEDING EVIDENCE **SC** = SCAT

SI = OTHER SIGNS (specify)

10. Soil Description

Textural Triangle



Notes:

1. The sand portion of the sand, loamy sand, sandy loam and silty sand texture classes are described more specifically based on the dominant sand size class.
For example: very coarse sand, loamy very fine sand and fine sandy loam.

2. The texture classes may be modified by adding suitable adjectives when coarse fragments occupy > 20 percent of the soil volume. For volumes 20 to 50 percent, use coarse fragment class name (boulder, stone, cobble, gravel) plus texture (e.g. gravelly sandy loam). For volumes > 50 percent, use additional adjective very (e.g. very stony clay loam).

Texture Field Tests

Feel Tests

Graininess Test: soil is rubbed between thumb and fingers to assess the percentage of sand. Sand feels grainy.

Dry Feel Test: for soils with > 50 percent sand. Soil is rubbed in the palm of the hand to dry it and to separate and estimate the size of the individual sand particles. The sand particles are then allowed to fall out of the hand and the amount of finer material (silt and clay) remaining is noted.

Stickiness Test: soil is wetted and compressed between the thumb and forefinger. Degree of stickiness is determined by noting how strongly it adheres to the thumb and forefinger upon release of pressure and how much it stretches.

Moist Cast Test: compress some moist soil by clenching it in your hand. If the soil holds together (i.e. forms a cast), then test the strength of the cast by tossing it from hand to hand. The more durable it is, the more clay is present.

Ribbon Test: moist soil is rolled into a cigarette shape and then squeezed out between the thumb and forefinger to form the longest and thinnest ribbon possible. Soils with a high silt content will form flakes or peel-like thumb imprints rather than a ribbon.

Taste Test: a small amount of soil is worked between the front teeth. Sand is distinguished as individual grains which grit sharply against the teeth. Silt particles are identified as a general fine grittiness, but individual grains cannot be identified. Clay particles have no grittiness.

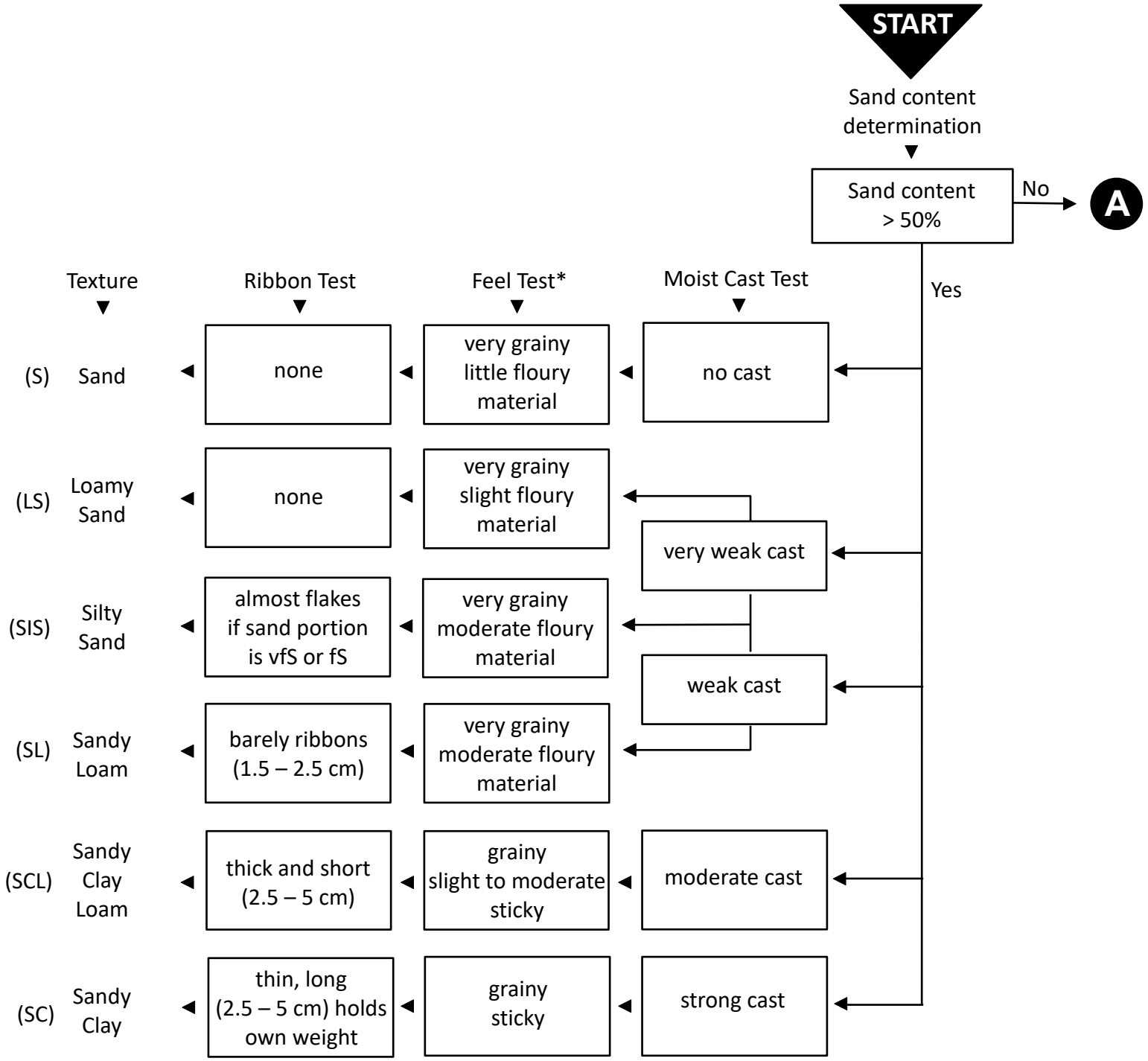
Shine Test: a small amount of moderately dry soil is rolled into a ball and rubbed once or twice against a hard, smooth object such as a knife blade or a thumb nail. A shine on the ball indicates clay in the soil.

Field Test Characteristics of Texture Class

Texture Class	Feel Class	Moist Cast Test
Sand	grainy with little floury material	no cast
Loamy Sand	grainy with slight amount of floury material	very weak cast, no handling
Silty Sand	grainy with moderate amount of floury material	weak cast, no handling
Sandy Loam	grainy with moderate amount of floury material	weak cast, allows careful handling
Loam	fairly soft and smooth with evident graininess	good cast, readily handled
Silt Loam	floury with slight graininess	weak cast, allows careful handling
Silt	very floury	weak cast, allows careful handling
Sandy Clay Loam	very substantial graininess	moderate cast
Clay Loam	moderate graininess	strong cast
Silty Clay Loam	smooth and floury	strong cast
Sandy Clay	substantial graininess	strong cast
Silty Clay	smooth	very strong cast
Clay	smooth	very strong cast

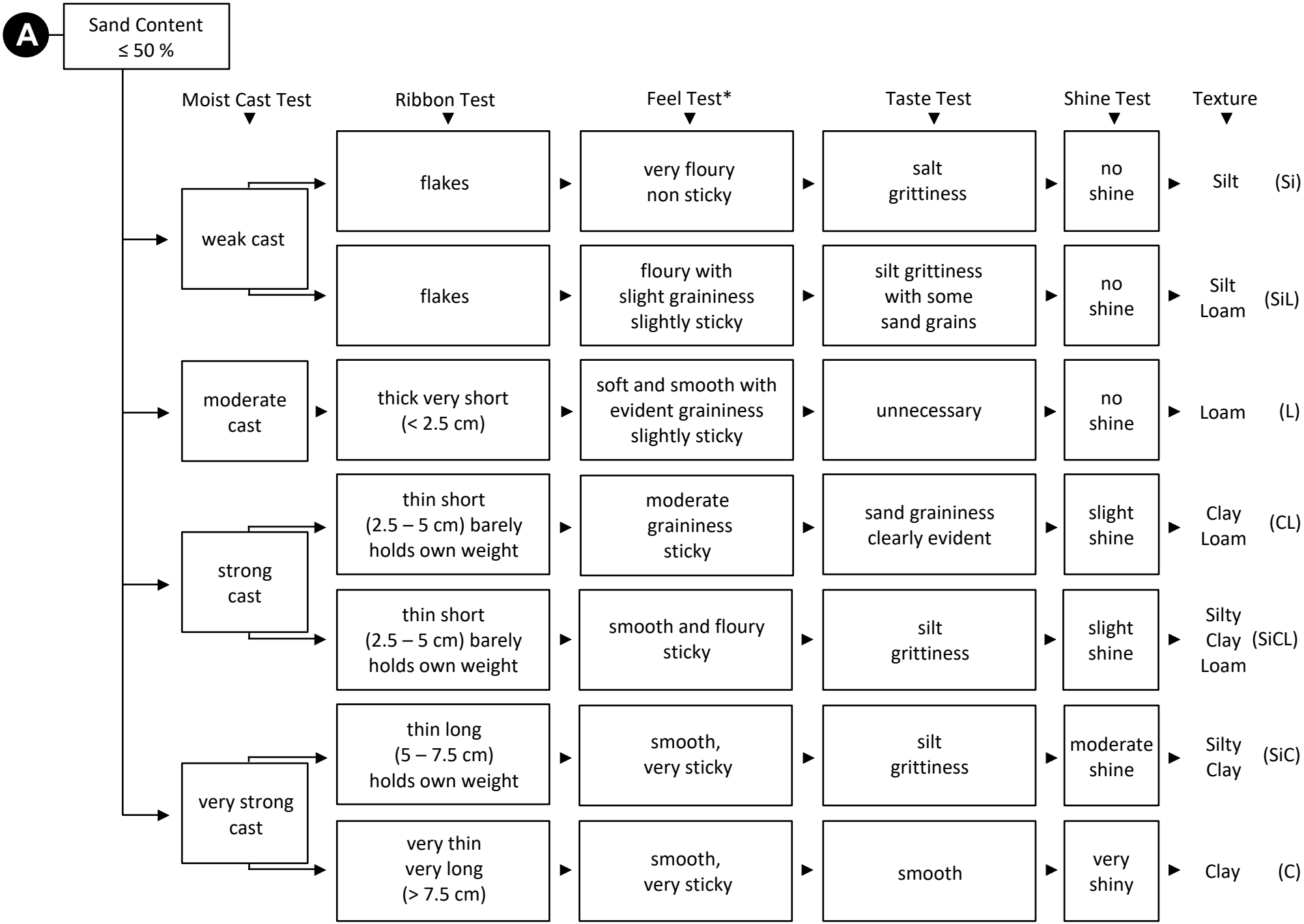
Ribbon Test	Taste Test	Shine Test
None	Unnecessary	Unnecessary
None	Unnecessary	Unnecessary
Almost flakes if sand portion is vfS or fS	Unnecessary	Unnecessary
Barely ribbons (1.5 – 2.5 cm)	Unnecessary	Unnecessary
Thick and very short (< 2.5 cm)	Unnecessary	Unnecessary
Flakes, rather than ribbons	Silt grittiness, some sand graininess	Unnecessary
Flakes, rather than ribbons	Silt graininess	Unnecessary
Short and thick (2.5 – 5 cm)	Sand graininess clearly evident	Slightly shiny
Fairly thin, breaks readily, barely supports own weight	Sand graininess clearly evident	Slightly shiny
Fairly thin, breaks readily, barely supports own weight	Silt grittiness	Slightly shiny
Thin, fairly long (5 – 7.5 cm), holds own weight	Sand graininess clearly evident	Moderately shiny
Thin, fairly long (5 – 7.5 cm), holds own weight	Silt graininess	Moderately shiny
Very thin, very long (> 7.5 cm)	Smooth	Very shiny

Finger Assessment of Soil Texture

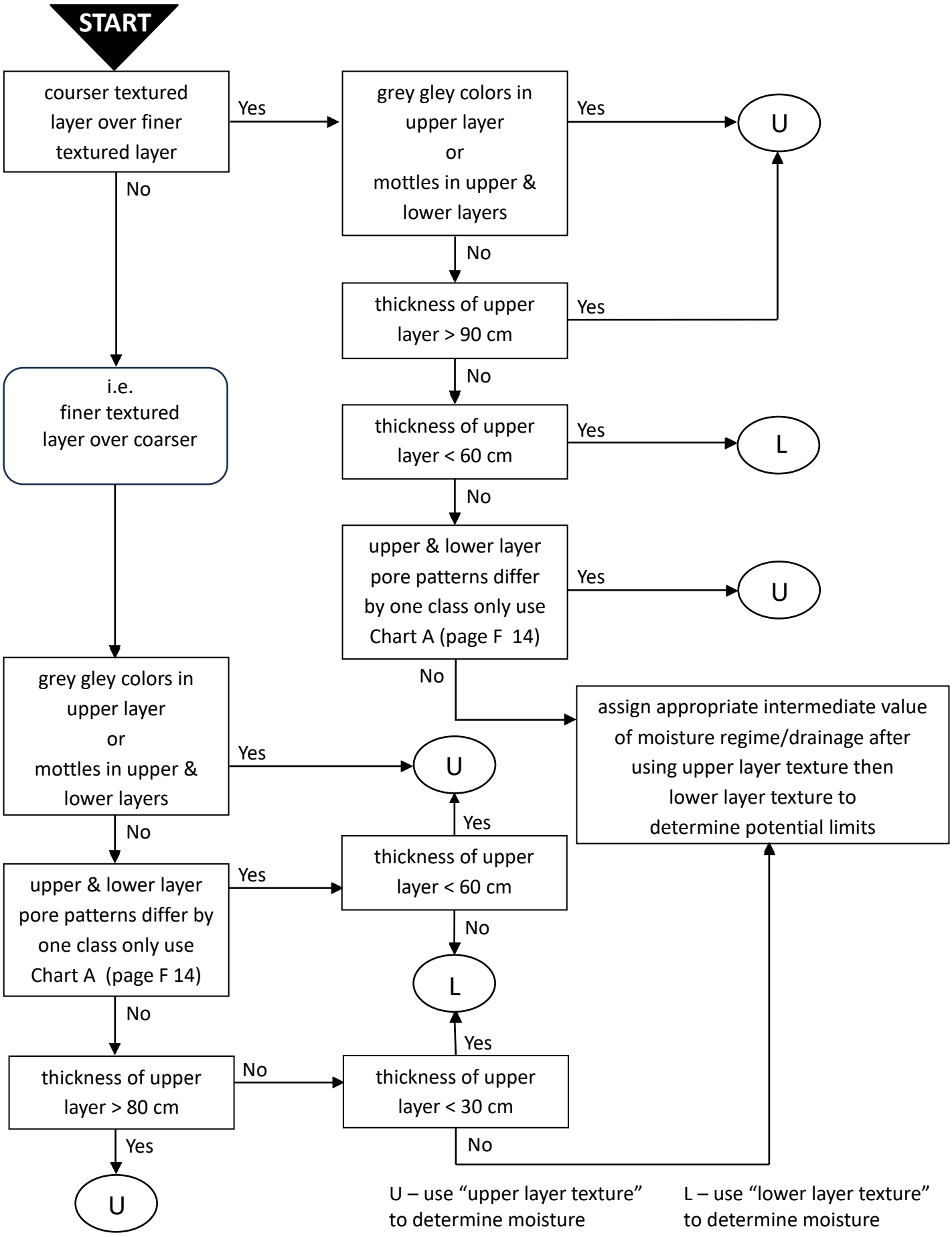


*Guide to Floury Material

D	Description
Little	10 % by volume
Slight	10 – 30 % by volume
Moderate	30 – 50 % by volume
Very	> 50 % by volume


A
Sand Content
≤ 50 %
Moist Cast Test
Ribbon Test
Feel Test*
Taste Test
Shine Test
Texture
weak cast
flakes
very floury
non sticky
salt
grittiness
no
shine
Silt (Si)
weak cast
flakes
floury with
slight graininess
slightly sticky
silt grittiness
with some
sand grains
no
shine
Silt
Loam (SiL)
moderate
cast
thick very short
(< 2.5 cm)
soft and smooth with
evident graininess
slightly sticky
unnecessary
no
shine
Loam (L)
strong
cast
thin short
(2.5 – 5 cm) barely
holds own weight
moderate
graininess
sticky
sand graininess
clearly evident
slight
shine
Clay
Loam (CL)
strong
cast
thin short
(2.5 – 5 cm) barely
holds own weight
smooth and floury
sticky
silt
grittiness
slight
shine
Silty
Clay
Loam (SiCL)
very strong
cast
thin long
(5 – 7.5 cm)
holds own weight
smooth,
very sticky
silt
grittiness
moderate
shine
Silty
Clay (SiC)
very strong
cast
very thin
very long
(> 7.5 cm)
smooth,
very sticky
smooth
very
shiny
Clay (C)

Effective Texture in Stratified Mineral Soils (Chart A)



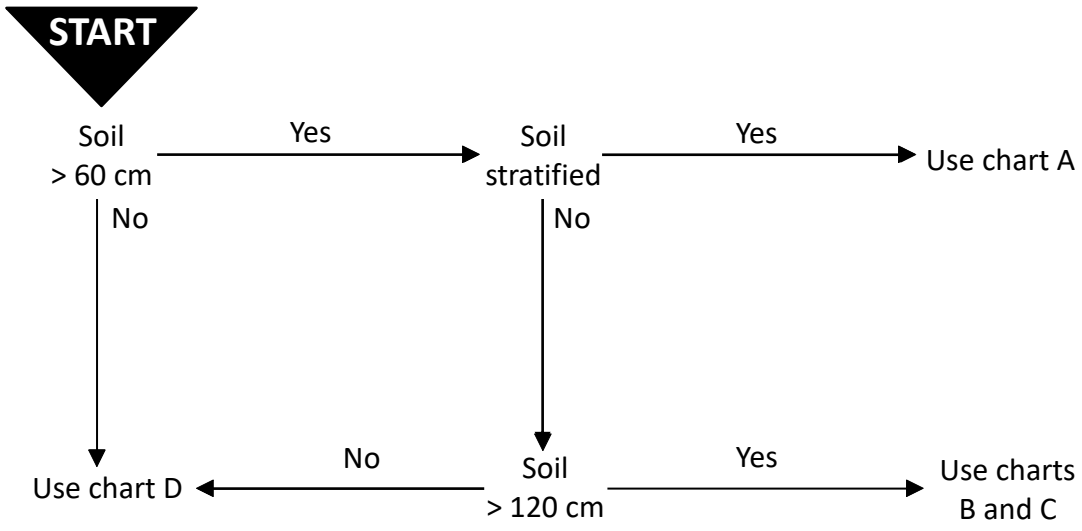
Determining Soil Moisture Regime and Drainage

1. Determine organic matter depth, mineral soil depth, texture, structure, pore pattern, coarse fragment content and stratification.

2. If mineral soil is stratified and depth is > 60 cm use “Effective Texture in Stratified Mineral Soils – Chart A” (page 181) to determine the effective texture.

3. If organic matter depth is > 40 cm or mineral soil depth is ≥ 120 cm, use “Soil Moisture Regime for Deep Soils – Chart B” (page 183) to determine moisture regime, and “Deep Soil Drainage – Chart C” (page 189) to determine soil drainage.

4. If mineral soil depth is < 120 cm, use “Soil Moisture Regime and Drainage for Shallow Soils – Chart D” (page 190) to determine both moisture regime and drainage.



Soil Moisture Regime for Deep Soils (Chart B)

Using This Chart

This chart is for rating the moisture regime of a site in the field by examination of soil physical properties and soil profile characteristics.

Soil Moisture Regime is an integration of all the variations in soil moisture supply throughout the complete vegetation cycle. The moisture regime classes are inferred from the pore pattern and depth of the mineral soil material, the topographic position of the site and characteristics of the soil profile such as mottling or grey gley horizons, which indicate impeded drainage.

In the depth of organic material over mineral soil is less than that required for an organic soil (see right side of chart) and the mineral soil depth is > 120 cm over bedrock, first determine the pore pattern from the texture, allowing for an increased pore pattern if significant compaction is evident (left side of chart). Next, determine if and where mottles (designated “g”) or a grey gley layer (designated “G”) are present in the soil profile. If g and G are absent, proceed horizontally into the centre section of the chart, along the appropriate pore pattern line, to the shaded box. If the box is labelled “ALL SLOPES”, read the moisture regime class at the top of that column. If the box has a slope designation (“s”), determine the degree of slope on which the site is located, then choose the appropriate box between the shaded box and the box to the left and read the moisture regime at the top of the appropriate column. If g or G is present, measure the minimum depth from the top of the mineral soil to g or G and proceed horizontally along the appropriate pore pattern line to the box containing the correct depth value. Then read the moisture regime class at the top of that column, e.g. fresh (2).

For organic soils, determine if the depth of organic material exceeds the criterion for MR 7. If this is so, choose between MR 8 and MR 9 as indicated. If this is not so, determine the depth from mineral surface to g and decide if this meets the MR 7 criterion (g: 0 to 5 cm) or if the mineral soil criteria are to be used to rate the moisture regime in a class lower than 7.

Pore pattern indicates the number and sizes of spaces (pores) between the soil particles which determine the drainage and moisture retention characteristics of the soil. The classes are inferred from soil texture, structure and compaction.

Significant compaction can increase the pore pattern, usually by one class.

Symbols:

g	a layer with distinct or prominent mottles indicative of periodic saturation and aeration g: 15 to 30 the top of the mottles layer lies between 15 and 30 cm below the mineral surface
G	a grey gley layer indicative of prolonged saturation. G:60 to 90 the top of the grey gley layer lies between 60 and 90 cm below the mineral surface G < 45 the top of the grey gley layer lies within 45 cm of the mineral surface.
s	degree of slope which results in significant surface runoff.
	the normal site with no slope or drainage restriction.

Soil Drainage is the rapidly and extent of removal of water from soils in relation to additions.

W/R	most probable drainage class(es); the dominant drainage class is shown in the first position.
VR	very rapid
R	rapid
W	well
MW	moderately well
I	imperfect
P	poor
VP	very poor

O	organic horizons developed mainly from mosses, rushes and woody material (numbers indicate depth of O).
Of	(fibric) the least decomposed organic horizon containing large amounts of well-preserved fibre.
On	(mesic) an intermediately decomposed organic horizon with properties intermediate to an Of and Oh horizon.
Oh	(humic) the most decomposed horizon containing only small amounts of well preserved fibre and the major amount of material at an advanced stage of decomposition.

Deep Mineral Soils (≥ 120 cm)

Pore Pattern of Mineral Soil Material				Soil Moisture Regime				
				Dry (d)		Fresh (f)		
Mineral Soil Texture	Pore Pattern			dry	mod. dry	mod. fresh	fresh	very fresh
				ø	0	1	2	3
All material > 2 mm	extremely open	ø	▶	all slopes VR				
very coarse and coarse sands; loamy very coarse and coarse sands	very open	0	▶		all slopes R/VR	g: 100-180 or G: 150-200 R/VR	g: 80-100 or G: 120-150 MW/I	g: 50-80 or G: 90-120 MW/I
medium sand; loamy medium sand	open	1	▶		all slopes R/VR	g: 100-180 or G: 180-240 R/VR	g: 80-100 or G: 150-180 MW/I	g: 50-80 or G: 90-150 MW/I
find sand; loamy fine sand; silty fine sand	moderately open	2	▶			all slopes R/W	g: 100-150 or G: 150-210 R/W	g: 60-100 or G: 120-150 MW/I
sandy loam; very fine sand; loamy very fine sand; silty very fine sand	moderately retentive	3	▶				all slopes W	g: 60-120 or G: 150-210 MW/I
loam; silt loam; sandy clay loam; structured silty clay and clay (aggregates < 10 mm)	retentive	4	▶				all slopes W/MW	g: 60-120 MW/I
silt; silty clay loam; clay loam; sandy clay structured silty clay and clay (aggregates > 10 mm)	very retentive	5	▶			s > 100 % W/MW	s > 100 % MW/W	g: 60-120 MW/I

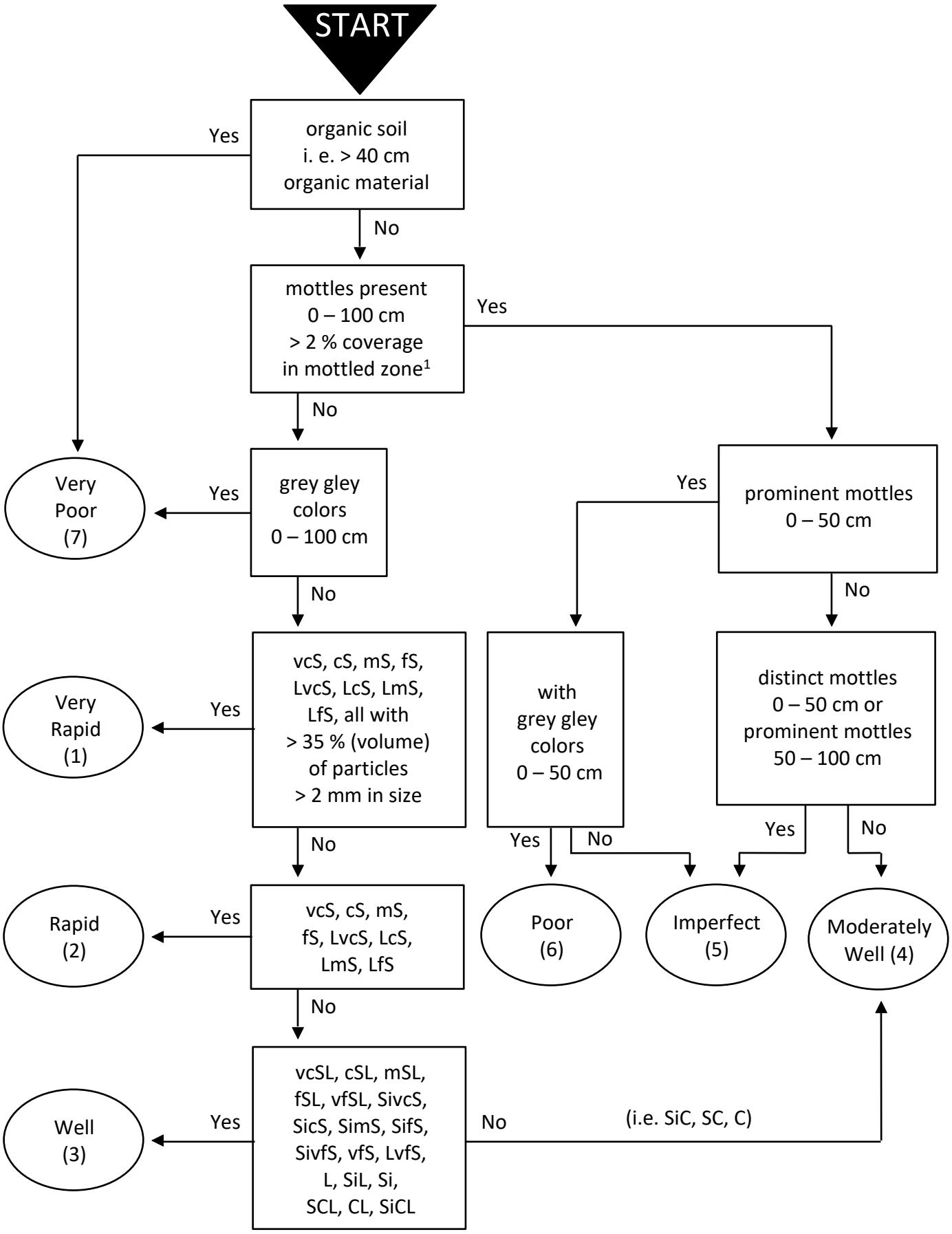
structureless silty clay and clay	moderately restrictive	6	►			s > 70 % MW	s > 70 % MW	g: 60-120 MW/I
porous or fractured bedrock	restricted to very restricted	7 8	►					
non-porous bedrock	extremely restricted	9	►					

Deep Mineral Soils (≥ 120 cm)	Wet Organic Soils

Soil Moisture Regime					
Moist (m)			Wet (w)		
mod. moist	moist	very moist	mod. wet	wet	very wet
4	5	6	7	8	9
g: 30-50 or G: 60-90 MW/I	g: 15-30 or G: 45-60 I/P	g: 5-15 or G: < 45 P/I	Of: 60-160 or Om: 40-100 or Oh: 40-100 with g: 0-5 if g is > 5 use mineral soil criteria	Of: > 160 or Om: > 100 or Oh: > 100 with upper part not saturated all year and G present to top of mineral soil	Of: > 160 or Om: > 100 or Oh: > 100 with saturation to surface all year and G present to top of mineral soil
g: 30-50 or G: 60-90 MW/I	g: 15-30 or G: 45-60 I/P	g: 5-15 or G: < 45 P/I			
g: 40-60 or G: 60-120 MW/I	g: 20-40 or G: 45-60 I/P	g: 5-20 or G: < 45 P/I			
g: 40-60 or G: 90-150 MW/I	g: 20-40 or G: 60-90 I/P	g: 5-20 or G: < 60 P/I			
g: 45-60 MW/I	g: 30-45 I/P	g: 5-30 P/I			
g: 45-60 MW/I	g: 30-45 I/P	g: 5-30 P/I			

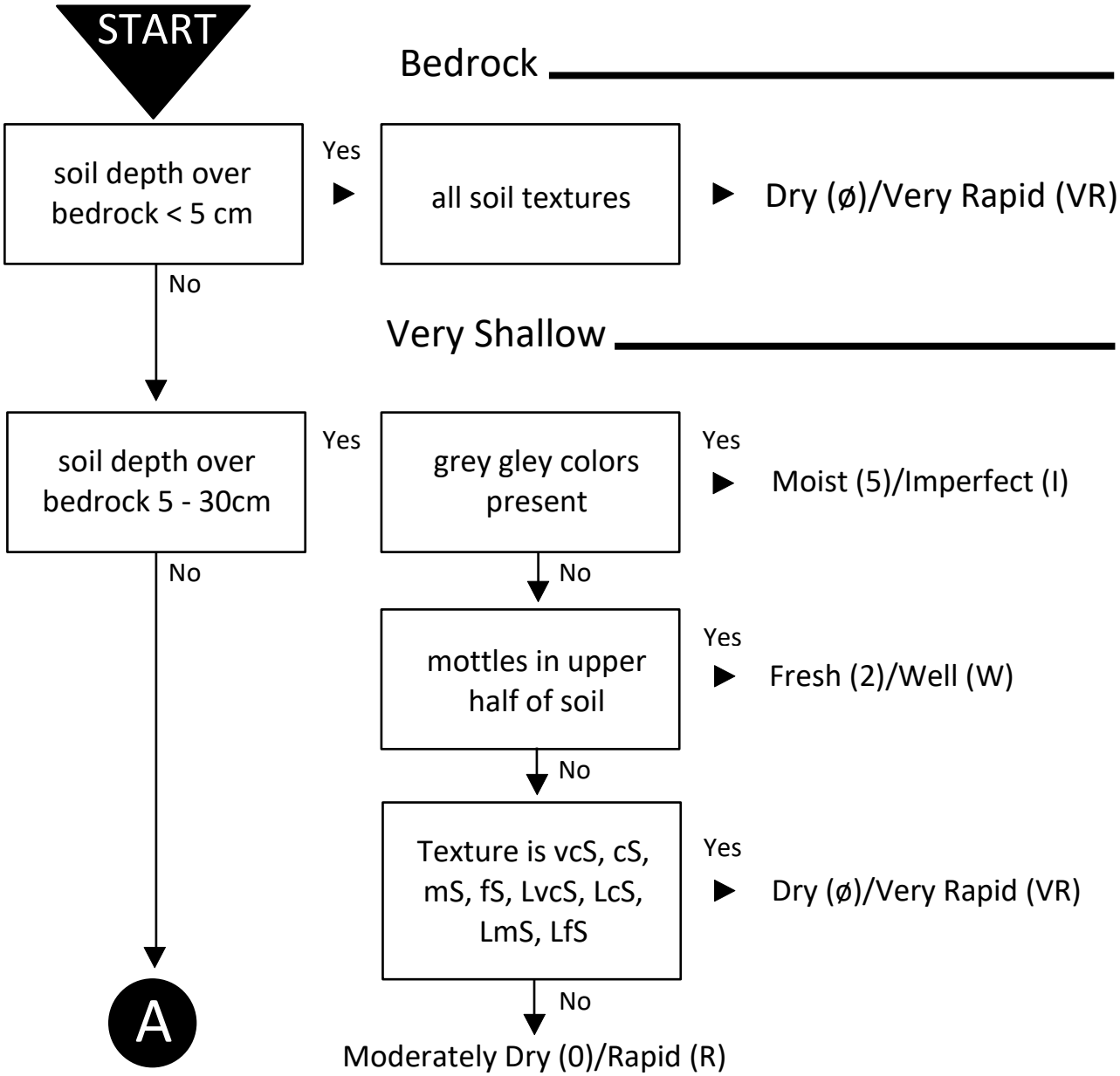
g: 45-60	g: 30-45	g: 5-30
MW/I	I/P	P/I

Deep Soil Drainage Class (Chart C)

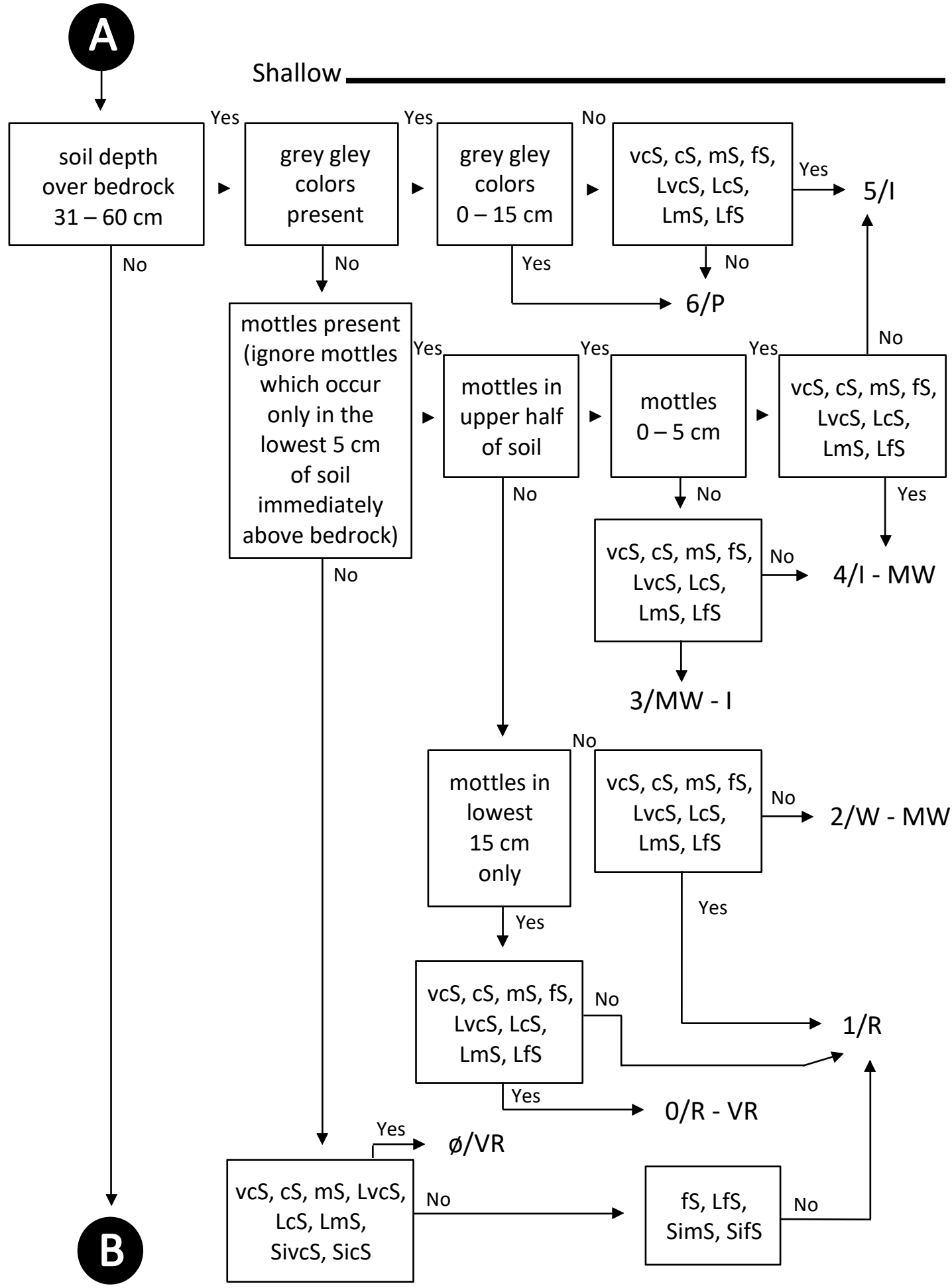


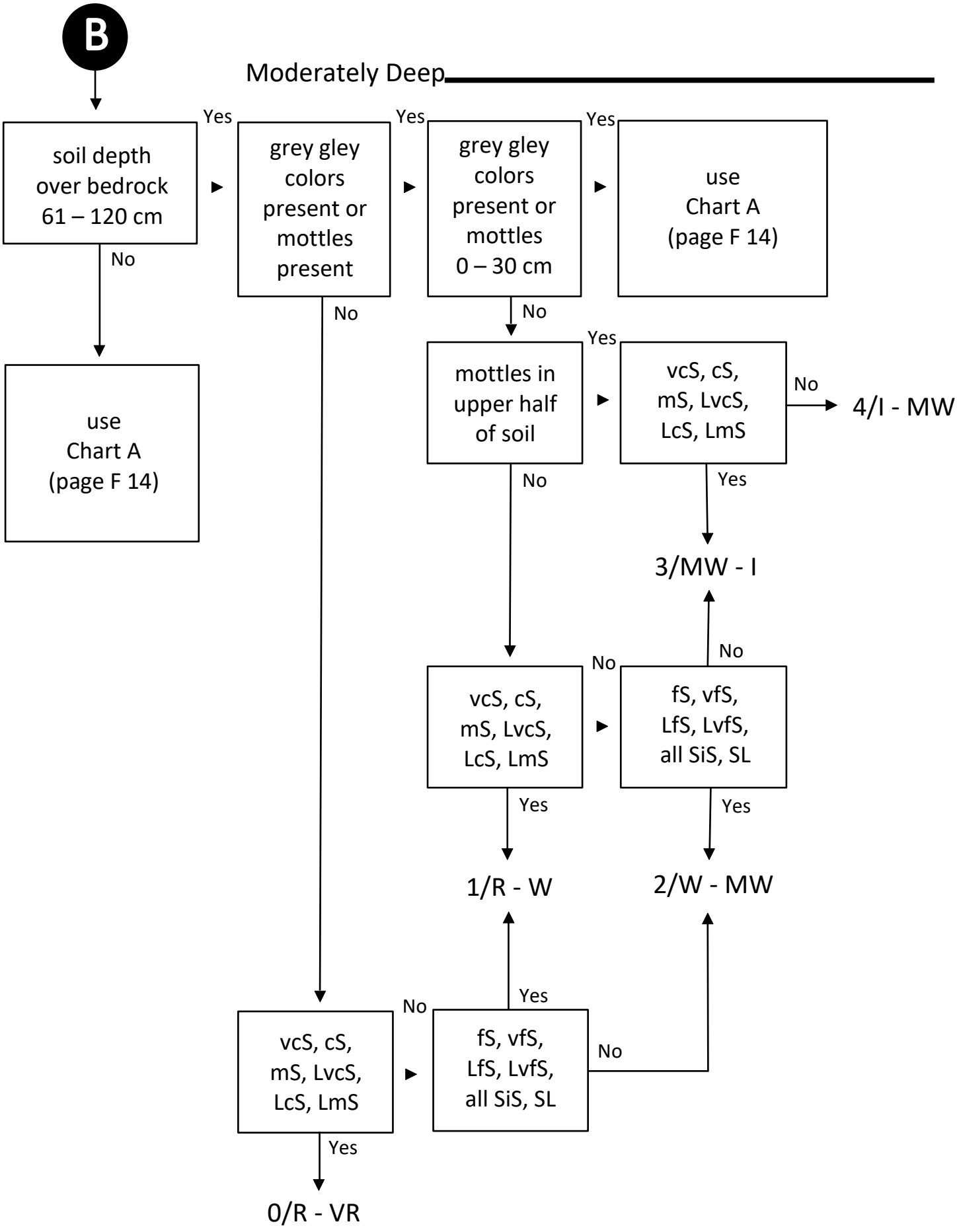
1. Exclude mottles that are few and faint

Soil Moisture Regime and Drainage for Shallow Soils (Chart D)

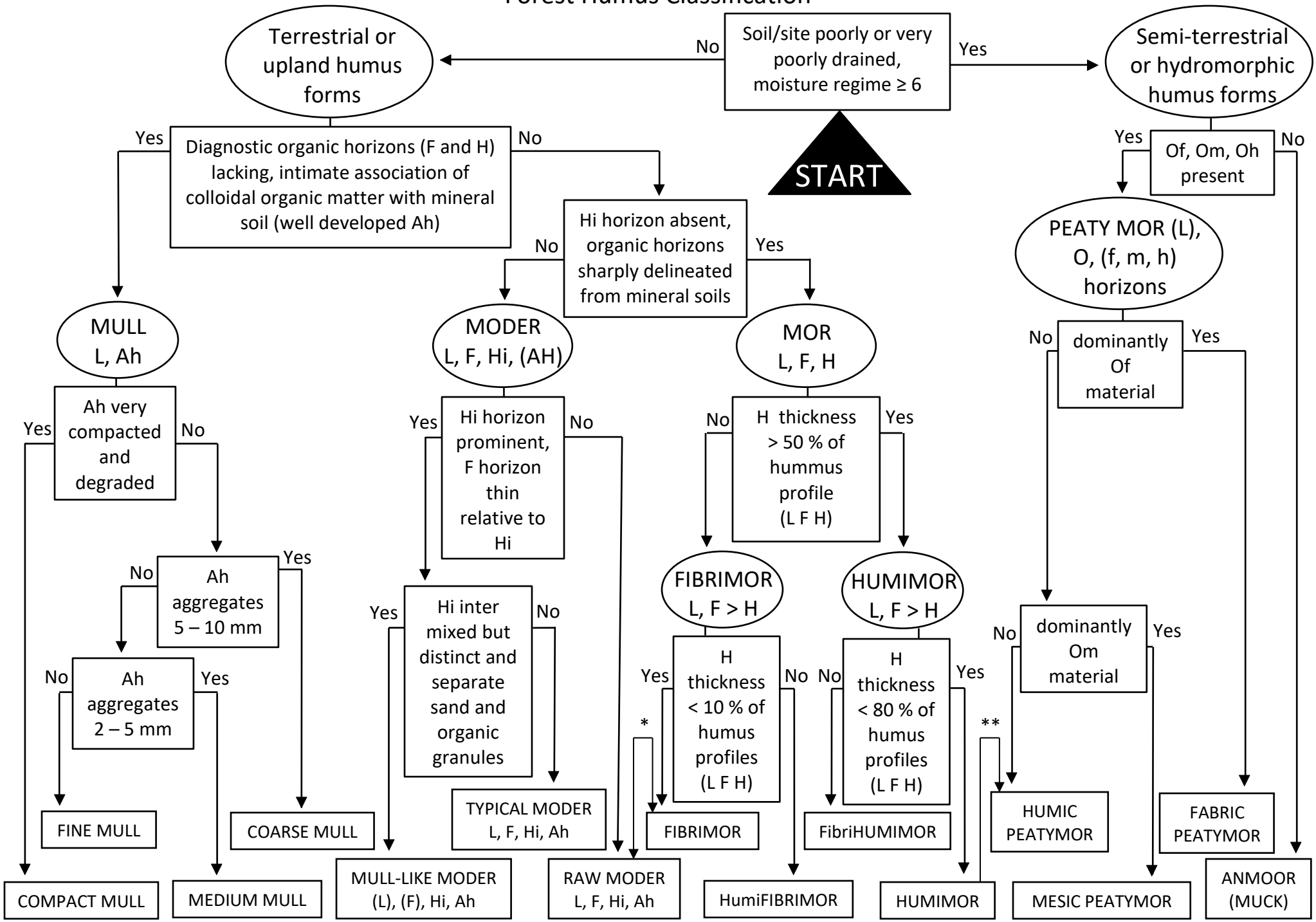


Note: It is difficult to differentiate between adjacent detailed (numbered) moisture regime/drainage classes because even a small difference in soil depth within the very shallow soils results in a large difference in the moisture retained for plant growth. Consequently, the broad moisture regime/drainage classes are indicated first. The numbered/lettered classes shown in the brackets merely indicate the centres of the broad classes.


A
Shallow
soil depth over bedrock 31 – 60 cm
Yes
grey gley colors present
Yes
grey gley colors 0 – 15 cm
No
vcS, cS, mS, fS, LvcS, LcS, LmS, LfS
Yes
5/I
No
No
Yes
6/P
mottles present (ignore mottles which occur only in the lowest 5 cm of soil immediately above bedrock)
Yes
mottles in upper half of soil
Yes
mottles 0 – 5 cm
Yes
vcS, cS, mS, fS, LvcS, LcS, LmS, LfS
No
No
No
Yes
vcS, cS, mS, fS, LvcS, LcS, LmS, LfS
No
4/I - MW
3/MW - I
No
mottles in lowest 15 cm only
vcS, cS, mS, fS, LvcS, LcS, LmS, LfS
No
2/W - MW
Yes
Yes
vcS, cS, mS, fS, LvcS, LcS, LmS, LfS
No
1/R
Yes
0/R - VR
Yes
ø/VR
vcS, cS, mS, LvcS, LcS, LmS, SivcS, SicS
No
fS, LfS, SimS, SifS
No
B

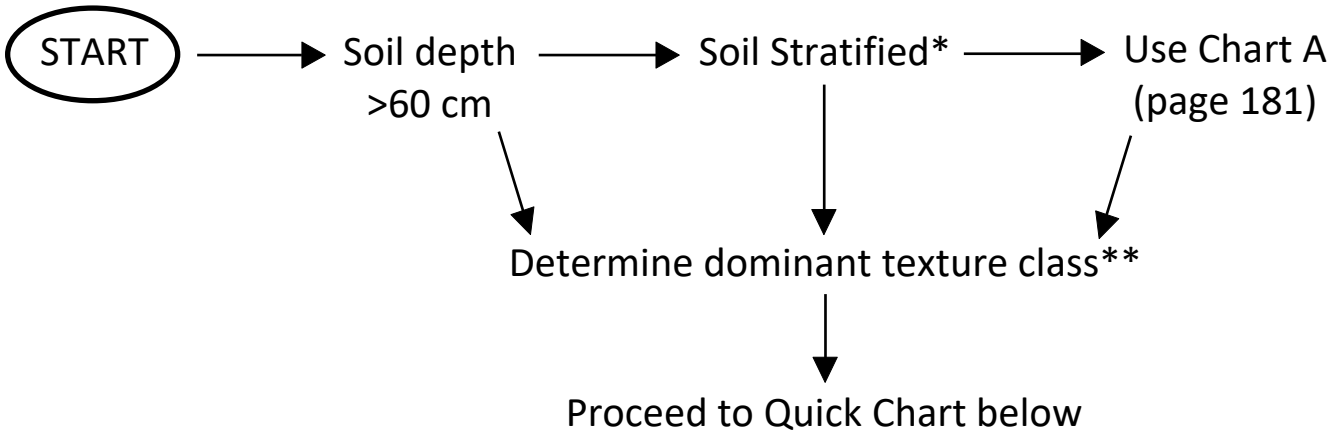

B
Moderately Deep
soil depth over bedrock 61 – 120 cm
Yes
No
use Chart A (page F 14)
grey gley colors present or mottles present
Yes
No
grey gley colors present or mottles 0 – 30 cm
Yes
No
use Chart A (page F 14)
mottles in upper half of soil
Yes
No
vcS, cS, mS, LvcS, LcS, LmS
No
4/I - MW
Yes
3/MW - I
vcS, cS, mS, LvcS, LcS, LmS
No
Yes
1/R - W
fS, vfS, LfS, LvfS, all SiS, SL
No
Yes
2/W - MW
vcS, cS, mS, LvcS, LcS, LmS
No
Yes
0/R - VR
fS, vfS, LfS, LvfS, all SiS, SL
Yes
No

Forest Humus Classification



Quick Chart for Determining Soil Moisture Class

To quickly determine soil moisture class, (for . 1 or. 2 designation), after determining soil depth, use the following key and chart:



*Horizons differing pore pattern by 1 or more (See Chart B – page 170)
**Soil Texture Classes – see page 28

MOISTURE CLASS	Soil Depth	Effective Texture	Mottles/Gley
DRY to MODERATELY FRESH (D-MF) θ, 0, 1 (.1 designation)	<5cm	Any	
	5-30 cm	Any	no mottles
	31-60 cm	Any	no mottles in top ½ of profile, or mottles in lowest 15 cm only
	61-120 cm	Csdy-Mlmy	no mottles
	>120 cm	Csdy	no mottles within 180 cm of soil surface, or no gleying within 150 cm of surface
	>120 cm	Fsdy	no mottles
VMOIST (VM) 6	31-60 cm	Any	gleying within 15 cm of surface
	31-60 cm	Not sandy	gleying present
	>60 cm	Csdy	mottles within 15 cm or gleying within 45 cm
	>60 cm	Fsdy	mottles within 20 cm or gleying within 45 cm
	>60 cm	Clmy-Mlmy	mottles within 20 cm or gleying within 60 cm
	>60 cm	Flmy-Cly	mottles within 30 cm
WET (W) 7, 8, 9	>40 cm O layers	Organic	mottles within 5 cm of mineral soil surface, if mineral soil present
FRESH to MOIST (F-M) 2-5 (.2 designation)	- none of the above conditions are true		

11. Case Study

Credit Valley Conservation – Natural Heritage Project

Watersheds continue to be used effectively as a natural boundary for an ecosystem approach to planning. The Credit Watershed Natural Heritage Project was developed by Credit Valley Conservation (CVC) and its watershed partners to document, in a comprehensive database, the natural heritage features and functions of the Credit watershed. A key principle of this initiative is to strengthen protection, restoration and management efforts in land-use planning and private-land stewardship (Credit Valley Conservation 1995).

All the stakeholders in the Project recognized a need to develop a methodology that would provide a standardized approach to mapping and the collection and management of field data on the watershed's natural heritage system components. The methods had to be suitable at watershed and subwatershed planning scales and provide a framework within which further site-level investigations could be nested. They also had to deliver a product within a reasonable time frame suitable for land-use and conservation planning applications.

A particular focus for the methodology was the development of standards for terrestrial and wetland systems. The ELC, while under development in 1996, appeared to be the best system available. Through practical trials carried out with Credit Valley Conservation in the spring and summer of 1997, the ELC was further developed and refined.

What follows is based on this experience. The steps that were taken are described and the supporting rationale for the application of the ELC is explained. This information is intended to provide a model approach to the application of the tools and techniques presented in this manual for subsequent practitioners in other jurisdictions, working at landscape or site scales.

Background

A team was assembled to carry out air-photo interpretation, mapping and field data collection of terrestrial and wetland communities within two Credit River subwatersheds during the spring and summer of 1997. Using the tools and techniques presented in this manual, natural communities were remotely sensed, described, classified and mapped to the Community Series level (Credit Valley Conservation, 1998). Following a standard field data collection approach, selected communities were further classified to the Ecosite and Vegetation Type levels.

Developing an understanding of the Site Region (Great Lakes–St. Lawrence Forest Region–6E), of its dominant forest types and the physiographic conditions of the area under investigation was necessary for orientation. Existing sources of information for the study area were also reviewed. This information included ANSI Reports, Environmental Impact Studies, Environmentally Significant Area Reports, existing Forest Resources Inventory Mapping, OMNR District Files, county soil reports, wetland evaluations, environmental assessments and physiography and surficial geology mapping.

Materials and Equipment

Ontario Basic Mapping (OBM) is available in hard copy and digital format for all of Southern Ontario at a scale of 1:10,000. It has become the standard for much of the natural area mapping being carried out.

Aerial photography can range considerably in scale, format, resolution, date and seasonal coverage. However, it will form the basis for most of the community mapping that is prepared. In this study, 1:8,000 scale spring photography has proven to be effective for community typing. Summer photography can be useful for the

Ecosite delineation of forested communities, if the expertise is available to differentiate species in the canopy of trees in full leaf. A pocket stereoscope (2 and 4X magnification) was used for air-photo interpretation. Community boundaries were transcribed directly onto the air-photo using a fine point technical pen. A 0.35 mm pen is suggested to minimize the potential for error.

Once the air-photos were interpreted, the polygon boundaries were transferred mechanically to the OBM using a Sketchmaster. A Sketchmaster is one of the more common reflection instruments used for manually transferring information from single vertical aerial photographs to base maps of a different scale (Avery and Berlin 1992). Alternatively, polygon boundaries could be transferred electronically through digitization directly from ortho-rectified aerial photographs. Increasingly, digital aerial photos on compact discs are being used, which has benefits in terms of changing scales, storing line files, etc. A dot grid and planimeter were used to calculate land cover area and percentage cover.

Table 21. Steps to Applying the ELC.

Step	Task	ELC Component Used	Products
1	Air-photo interpretation to identify and delimit ecological boundaries to form distinctive polygons	Polygon delineation process	Air-photos with polygon boundaries and unique polygon number
		Landscape Scale	
2	Description of polygon characteristics	ELC Description Framework	General community description of polygons
3	Ground truthing of polygons to confirm polygon boundaries and description	Community Description and Classification Data Card may be used for limited data collection	Confirmed polygon boundaries and description
4	Classification of polygons to ELC **Community Class** and **Community Series**	ELC Community Keys and Tables	Polygons classified to ELC **Community Class** and **Community Series**
5	Digitization of confirmed and classified polygons	ELC Database	Digital GIS polygon mapping of **Community Class**, **Community Series** and attribute data
		Site Scale	
6	Detailed in-field collection of vegetation and soils data within polygons	ELC Field Methods and Field Data Cards	Standardized vegetation and soil data sets for polygons
7	In-field description of polygons	ELC Description Framework	Complete description of the polygons' physical characteristics
8	In-field classification of polygons to ELC **Ecosite** and **Vegetation Type**	ELC Field Data Cards, Community Keys and Tables	Standardized ELC **Ecosite** and **Vegetation Type** classification of polygons
9	Digitization of community boundaries	ELC Database	Digital GIS **Ecosite** and **Vegetation Type** community polygons
10	Transfer of field data to database	ELC Database	Standardized community attribute data sets

Application

Table 21 outlines the steps that were taken for community typing and how they relate to components within the ELC. The process is set out in two distinct yet related phases, each containing several related steps. The first five steps provide a coarse or landscape-level classification of communities to the Community Series level. The next five steps provide a more detailed or site-level classification to Ecosite and Vegetation Type. Each phase generates a product that is appropriate for a particular scale of application.

Step One – Delineation

Polygon delineation can be done at one or two levels of detail, depending on the purpose of the study and the resources available. The initial delineation in Step 1 can be simplified to only map those boundaries necessary for Community Class and Community Series classification at a landscape scale. If a site-level application is planned, the interpreter should identify all ecological boundaries in Step 1 to ensure proper Ecosite and Vegetation Type delineation and classification in Step 8.

A minimum polygon size of 0.5 hectare is a feasible mapping unit for applying the ELC at a scale of 1:10,000. A first approximation of the distinct polygons was identified on the air-photo based on visible ecological boundaries. The boundaries were defined based on changes in the characteristics of the topography and vegetation. Distinguishing features such as texture and tone, which are visible on the air-photo, relate to physical characteristics such as landform, slope position, drainage pattern and vegetation structure and composition — all of which were used as guides for polygon typing.

The following sequence of priority for air-photo interpretation was adapted from Arnup and Racey (1996):

1. landscape pattern or landform (e.g., Topographic Feature: flat; hummocky or sloped, etc.);
2. position on slope (e.g., at base or top of slope, etc.);
3. drainage pattern (dark tones reflecting poor drainage, open water or wetland, etc.);
4. vegetation species cover (e.g., “forest” for Community Class; “deciduous” for Community Series);
5. vegetation canopy or understorey characteristics or physiognomy (e.g., amount and pattern of canopy closure, appearance or understorey in canopy openings).

The unique I.D. was then inscribed on or adjacent to the polygon.

Landscape Scale

Step Two – Landscape-Level Description

The physical environment within the polygons must be documented to support future classification and database queries. The polygon characteristics visible in the air-photo were described, using the Polygon Description portion of the ELC Community Description and Classification Data Card and its related Keys as a guide. The interpreter follows a standard approach to describing those characteristics of the polygon to be typed that are visible in the air-photo. It is recognized that some categories under certain fields on the Data Card cannot be determined without field work (e.g., Bryophyte under Floristic Type). The Vegetation Characteristics and Environmental Characteristics columns of the ELC Tables were used to identify other key features of the community and its environment.

Step Three – Ground Truthing
The photo interpreter noted initial interpretations of new communities and followed up with limited ground truthing to verify typing. This allowed a "photointerpretive key" to be constructed to use as a model for future interpretations. The interpreter, in effect, developed an appreciation of the differences between the air-photo image and communities on the ground.

Step Four – Classification
Based on general cover type, the polygons were assigned to the applicable Community Class unit, referring to the ELC Keys and Tables (e.g., tree cover > 60% = Forest). Then the boundaries of the Community Series unit were delineated or refined, based on general vegetation cover. The interpreter then referred to Vegetation Characteristics and Environmental Characteristics in the Keys and Tables to aid in classification (e.g., deciduous species cover > 75% = Deciduous Forest). Finally, the ELC Code from the table was inscribed on or adjacent to the polygon.

Step Five – Mapping
The polygon boundaries were then transferred into a hard copy OBM format from the aerial photographs using the Sketchmaster and then digitized into a Geographical Information System (GIS) with the unique I.D. and ELC Code attached.

At this point, a set of maps and air photos, delineating communities to the Community Series level of the ELC with some limited attribute data, could be produced. This was generated based primarily on existing information sources, with only limited field checking or reconnaissance. These products provide a framework for the collection of more detailed information required at the site scale.

Site Scale

The following steps summarize the process followed for the collection and mapping of additional ecological characteristics at the Ecosite and Vegetation Type levels. The ecological boundaries mapped in Step 1 above were used to provide a first approximation. (If the necessary level of detail to define boundaries had not been provided at Step 1, a further interpretation of the air-photo would have been required to provide a finer level of resolution.) While recognizing that an Ecosite is a reflection of three primary characteristics — geology, soils and vegetation — the interpreter focused on identifying recurring plant species patterns. In this regard, recognition of changes in vegetation structure, species composition and physiognomy was necessary. It should be noted that, in certain instances, especially with small, isolated and generally homogeneous forest patches, the Ecosite boundary corresponded with the previously determined Community Series boundary.

Step Six – Detailed Field Data Collection
The vegetative communities of Southern Ontario tend to be highly complex, often subject to anthropogenic influences. In addition, there is a predominant use of spring photography, which makes detailed community classification difficult. As a result, field data collection is necessary for final typing of Ecosite and Vegetation Type units. The ELC Field Data Cards, Keys and Tables were used for consistent description and classification.

The field technicians carried out a brief reconnaissance within the polygon to confirm the pre-typed boundaries and to familiarize themselves with the level of variation found within the community. While doing this, they began recording data according to the ELC Field Sampling Methods and Data Cards.

Step Seven – Polygon Description

Based on the reconnaissance survey carried out, as described above, the technicians were able to complete the Polygon Description fields on the Community Description and Classification Data Card. (In some cases much of this description had already been completed in Step 2 above.)

Step Eight – Classification

The technicians applied the vegetation and soils data to the Keys and to the Vegetation and Environmental Characteristics in the ELC Tables to classify the polygon to the Ecosite level. Vegetation Type units, which represent the finest level of detail and which are based solely on plant species composition, were assigned to polygons where appropriate.

Step Nine – Mapping

When the field work was finalized, the community boundaries were transferred from the air-photos to hard copy OBM format using the Sketchmaster and then digitized into the GIS with the unique I.D. and ELC Codes attached.

Step Ten – Database Assembly

The Field Data Cards are linked to the polygons through their unique I.D. The data was entered using the Microsoft ACCESS 95-based data system that has been structured to match the fields found on the data cards. The ELC Database linked to the GIS polygons provides a variety of opportunities for analysis and search and query.

Observations and Conclusions

A few observations and cautionary notes concerning air-photo interpretation are:

- there can be discrepancies in community typing between the landscape scale and the site scale due to the limitations of air-photo interpretation — e.g., what may appear to be a Deciduous Forest by air-photo interpretation may in fact be a Mixed Forest upon a site survey of the Canopy and Sub-canopy vegetation layers;

- some inclusions and complexing of communities may not be visible on air-photos;

- wetlands appear as dark tones in spring air-photos and the extent of coverage with coniferous trees may be over-estimated;

- spring photography may tend to under-value the extent of deciduous cover;

- old or over-mature plantations may appear as natural forest in 1:8,000 air-photos.

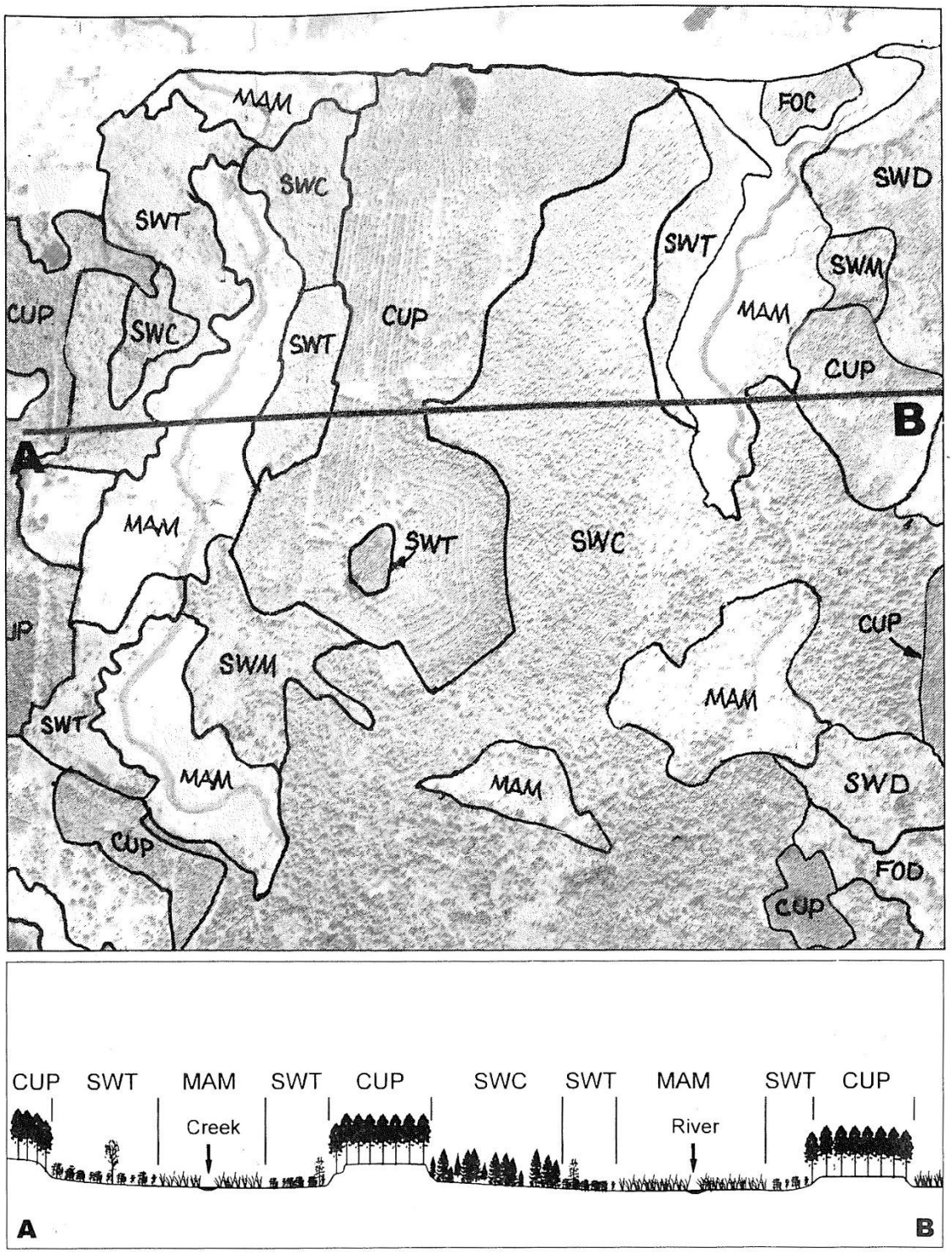
A certain level of expertise is required to apply the ELC. As a result, training or the employment of specialists will be necessary. Familiarity with air-photo interpretation techniques is essential, but requires time to develop. With the Credit Watershed Natural Heritage Project, once the expertise had been obtained, the interpreters were able to prepare a typical rural land-cover map for a complete OBM sheet (5 km. by 5 km.), from initial interpretation through to final digitization, within approximately four days. (If the mapping of all land cover is

required — for example, to include existing land use — then approximately two days could be added to the time required for completion.) Expertise in soils also required training, following the standard procedures within the OIP Manual (1985). In addition, a field botanist, who was part of a three-person field team, aided in the identification of ground flora, which assisted in Ecosite description and documentation of unique species.

In addition to providing the classification and mapping of communities, the ELC process provided standard ecological data sets and a formalized data entry framework. Such data sets include Polygon Description, Stand Description, Composition and Structure, Soil Analysis, Vegetation Data, Management and Disturbance information and Wildlife Data. These data sets form the basis for the evaluation of natural features and areas, and for future monitoring. Species Listings and Vegetation Types have also been referenced against provincial rankings available from the Natural Heritage Information Centre (e.g., for Vegetation Communities see Bakowsky 1996 and for Rare Vascular Plants see Oldham 1993). These rankings were used to determine the presence of nationally or provincially significant species or communities and to develop regional listings. Examples of regional rankings are Riley (1989), Cuddy (1991) and Oldham (1993). This information was then used in the analysis of the terrestrial communities within the subwatersheds under study, to assist in determining priorities for protection. In addition, for communities where the plant list was sufficiently detailed, an evaluation was carried out to compare their flora using the Floristic Quality Assessment System for Southern Ontario (Oldham et al. 1995).

Some applications of the mapping and data collection techniques promoted within this manual will likely be too complex for private-land stewardship. A Conservation Plan Training Manual, currently being developed by Credit Valley Conservation through the University of Guelph with support from the Ontario Heritage Foundation and others, will provide some assistance in using the ELC to classify and map communities at the property scale. At the present time, however, the mapping and inventory of communities through watershed studies and other inventories, with the support of landowners, continues to provide a very effective basis for future stewardship initiatives.

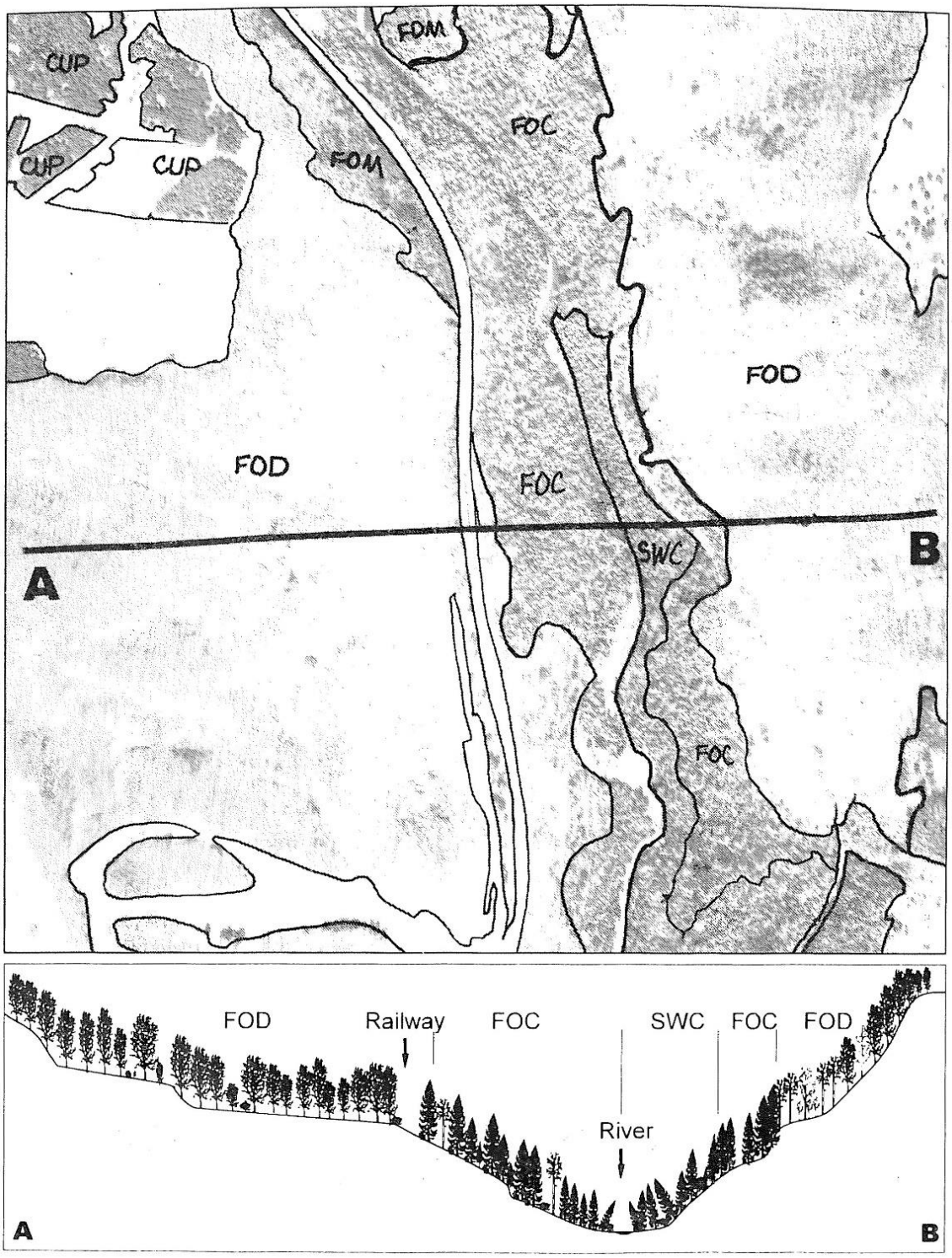
Two 1:8,000 scale air-photos have been reproduced below to illustrate community typing and its relationship to local topographic characteristics.



Description:

Uplands have been reforested to Coniferous Plantation. Lowlands support a Coniferous Swamp with transitions to Thicket Swamp, and then to Meadow Marsh on the floodplain of both the Credit River and Shaws Creek.

Figure 18. Credit River Valley, southwest of the Village of Alton, Peel Region.



Description:

Deciduous Forest in sandy loam dominates the upper slopes of the valley. Coniferous Forest grows in the organic soils on sand and gravel of the mid and lower slopes. A Coniferous Swamp that displays boreal characteristics, due to a cooler microclimate and the presence of groundwater seepage, is located at the toe of the eastern slope.

Figure 19. Forks of the Credit Provincial Park in the Town of Caledon, Peel Region.

The following example is located in the headwaters of Caledon Creek, a tributary to the Credit River. Seven Figures follow which illustrate a 1:8,000 scale air-photo interpreted to the Community Series level, with one area interpreted to the Ecosite and Vegetation Type levels, the resulting GIS product and a complete set of data cards for a site identified on the map.

Figure 20. Air photo example of pilot area.

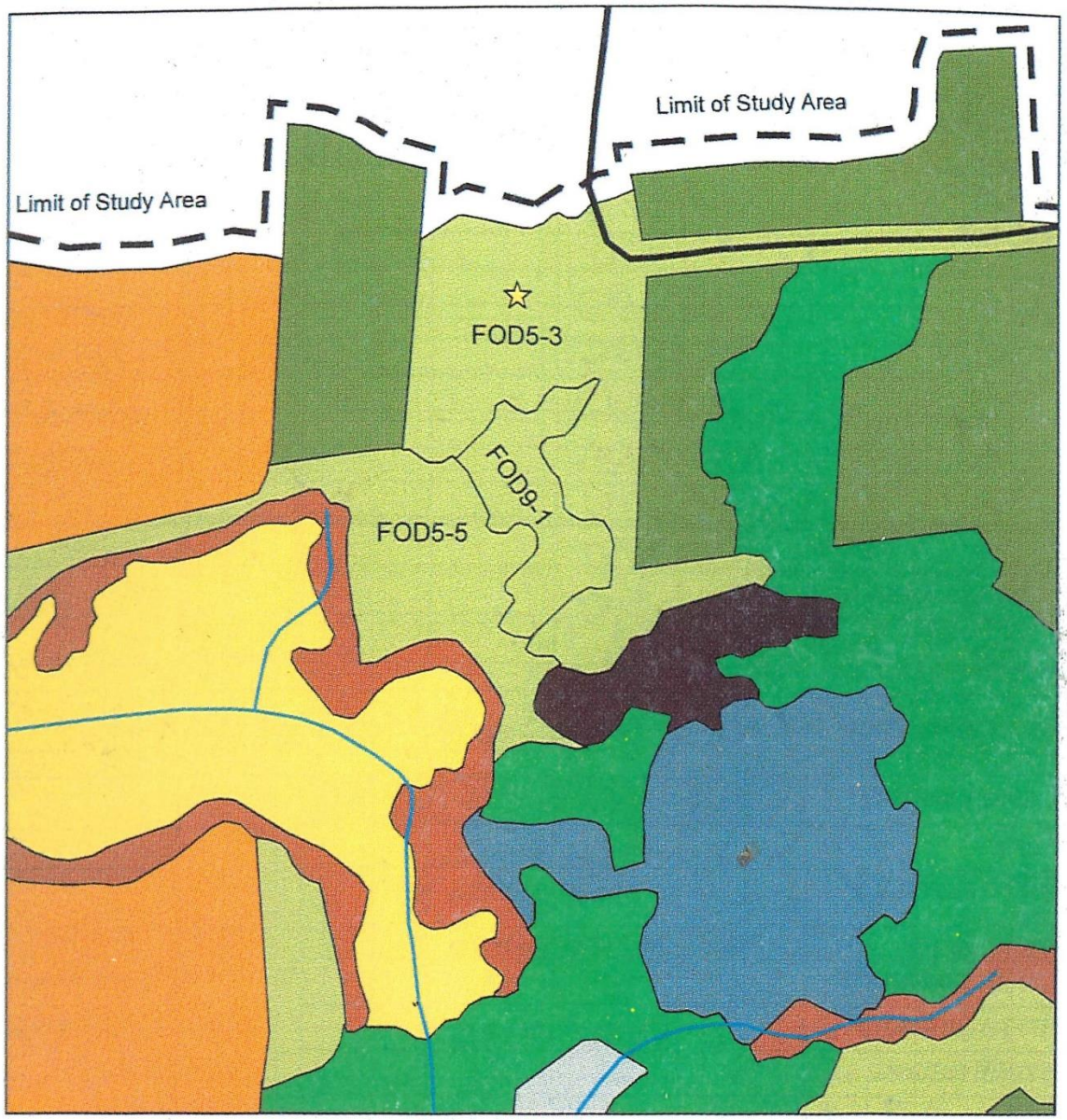


Figure 21. GIS version of pilot area.

ELC Community Series

- Coniferous Forest
- Coniferous Plantation
- Coniferous Swamp
- Deciduous Forest
- Deciduous Swamp
- Shallow Marsh
- Mixed Forest
- Thicket Swamp

Existing Land Use

- Intensive Agriculture
- Roads
- Rivers

ELC Ecosite and Vegetation Type

FOD5	Fresh Sugar Maple Deciduous Forest Ecosite
FOD5-3	Fresh Sugar Maple - White Ash Deciduous Forest Type
FOD5-5	Fresh Sugar Maple - White Birch - Poplar Deciduous Forest Type
FOD9	Fresh - Moist Poplar Sassafras Deciduous Forest Ecosite
FOD9-1	Fresh - Moist Poplar Deciduous Forest Type

☆ See Field Data Cards - Pages ** - **

ELC STAND & SOIL CHARACTERISTICS	SITE: CALEDON CREEK HEAD WATERS
	POLYGON: 980001
	DATE: 24 APRIL 98
	SURVEYOR(S): NS SS

TREE TALLY BY SPECIES:

PRISM FACTOR 2

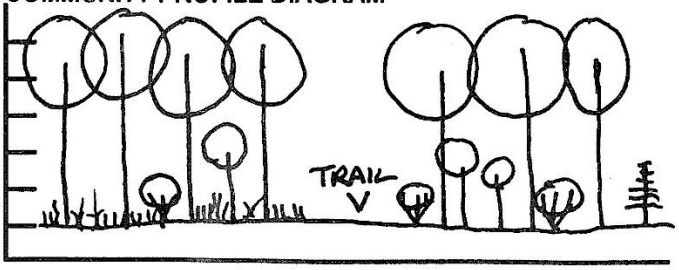
SPECIES	TALLY 1	TALLY 2	TALLY 3	TALLY 4	TOTAL	RELATIVE AVERAGE
ACESACU	9	10			19	60
FRAAMER	5	4			9	28
PRUSERO		2			2	6
FAGGRAN		2			2	6
TOTAL	14	18			32	100
BASAL AREA (BA)	28	36				MEAN: 32
DEAD	0	2				

STAND COMPOSITION: ACESACU 60 FRAAMER 28 PRUSERO 6 FAGGRAN 6

SOIL ASSESSMENT:	1	2	3	4
TEXTURE	SiL	vfSCL	vfSCL	
DEPTH TO MOTTLES:	g= 70	g= >120	g= >120	g=
DEPTH TO GLEY:	G= >120	G= >120	G= >120	G=
DEPTH OF ORGANICS	0	0	0	
DEPTH TO BEDROCK	>120	>120	>120	
MOISTURE REGIME	3	2	2	

SOIL PROFILE

COMMUNITY PROFILE DIAGRAM



NOTES:

Figure 22. Stand and Soil Characteristics Data Card.

ELC PLANT SPECIES LIST	SITE: CALEDON CREEK HEAD WATERS
	POLYGON: 980001
	DATE: 24 APRIL 98
	SURVEYOR(S): NS SS

LAYERS: 1 = CANOPY > 10m 2 = SUB-CANOPY 3 = UNDERSTOREY 4 = GROUND (GRD.) LAYER

ABUNDANCE CODES: R = RARE O = OCCASIONAL A = ABUNDANT D = DOMINANT

SPECIES CODE	LAYER 1	2	3	4	COLL.
PRUSERO	O	O			
ACESACU	D	O	O		
BETALLE	R				
BETPAPY	O	R			
FRAAMER	O		R		
FAGGRAN	O	O	O		
ABIBALS		R	R		
TSUCANA		R			
OSTVIRG		O	O		
PICGLAU			R		
THUOCCI			R		
POPTREM	R				
RUBOCCI			R		
RUBIDAE			O		
RIBCYNO			O		
PRUVIRG		O	O		

SPECIES CODE	LAYER 1	2	3	4	COLL.
ERYAMER				A	
VIOCANA				O	
CAUTHAL				O	
DENLACI				O	1
GLAVIRG				O	
ALLTRIC				A	
DENDIPH				R	
TRIEREC				R	
TAROFFI				O	
MAICANA				R	
DRY				O	2
CAR				O	3
VIO				O	4

Page 1 of 1

Figure 23. Plant Species List Data Card.

ELC COMMUNITY DESCRIPTION & CLASSIFICATION

SITE: CALEDON CREEK HEAD WATERS | POLYGON: 980001

SURVEYOR(S): NS SS | DATE: 24 APRIL 98 | UTME: 583600

START: 10:00 | END 10:50 | UTMZ: 17 | UTMN: 4862750

POLYGON DESCRIPTION

SYSTEM	SUBSTRATE	TOPOGRAPHIC FEATURE	HISTORY	PLANT FORM	COMMUNITY
[X] TERRESTRIAL	[ ] ORGANIC	[ ] LACUSTRINE	[X] NATURAL	[ ] PLANKTON	[ ] LAKE
[ ] WETLAND	[X] MINERAL SOIL	[ ] RIVERINE	[ ] CULTURAL	[ ] SUBMERGED	[ ] POND
[ ] AQUATIC	[ ] PARENT MIN.	[ ] BOTTOMLAND		[ ] FLOATING-LVD.	[ ] RIVER
	[ ] ACIDIC BEDRK.	[ ] TERRACE		[ ] GRAMINOID	[ ] STREAM
	[ ] BASIC BEDRK.	[ ] VALLEY SLOPE		[ ] FORB	[ ] MARSH
	[ ] CARB. BEDRK.	[X] TABLELAND		[ ] LICHEN	[ ] SWAMP
SITE		[ ] ROLL. UPLAND		[ ] BRYOPHYTE	[ ] FEN
[ ] OPEN WATER		[ ] CLIFF		[X] DECIDUOUS	[ ] BOG
[ ] SHALLOW WATER		[ ] TALUS	COVER	[ ] CONIFEROUS	[ ] BARREN
[X] SURFICIAL DEP.		[ ] CREVICE / CAVE		[ ] MIXED	[ ] MEADOW
[ ] BEDROCK		[ ] ALVAR	[ ] OPEN		[ ] PRAIRIE
		[ ] ROCKLAND	[ ] SHRUB		[ ] THICKET
		[ ] BEACH / BAR	[X] TREED		[ ] SAVANNAH
		[ ] SAND DUNE			[ ] WOODLAND
		[ ] BLUFF			[X] FOREST
					[ ] PLANTATION

STAND DESCRIPTION:

	LAYER	HT	CVR	SPECIES IN ORDER OF DECREASING DOMINANCE (>> MUCH GREATER THAN; > GREATER THAN; = ABOUT EQUAL TO)
1	CANOPY	2	4	ACESACH >> FRAAMER > PRUSERO > FAGGRAN
2	SUB-CANOPY	3	2	ACESACH > FAGGRAN
3	UNDERSTOREY	6	3	ACESACH > PRUVIRG
4	GRD. LAYER	7	4	ERYAMER >> ALLTRIC > CAUTHAL

HT CODES: 1 = >25 m 2 = 10<HT≤25 m 3 = 2<HT≤10 m 4 = 1<HT≤2 m 5 = 0.5<HT≤1 m 6 = 0.2<HT≤0.5 m 7 = HT<0.2 m

CVR CODES 0= NONE 1= 0% < CVR ≤ 10% 2= 10 < CVR ≤ 25% 3= 25 < CVR ≤ 60% 4= CVR > 60%

STAND COMPOSITION: ACESACH$_{60}$ FRAAMER$_{28}$ PRUSERO$_{6}$ FAGGRAN$_{6}$ | BA: 32

SIZE CLASS ANALYSIS:	O	< 10	A	10 - 24	R	25 - 50	R	> 50
STANDING SNAGS:	R	< 10	N	10 - 24	R	25 - 50	N	> 50
DEADFALL / LOGS:	O	< 10	A	10 - 24	O	25 - 50	R	> 50

ABUNDANCE CODES: N = NONE R = RARE O = OCCASIONAL A = ABUNDANT

COMM. AGE:		PIONEER		YOUNG	X	MID-AGE		MATURE		OLD GROWTH

SOIL ANALYSIS:

TEXTURE: vfSCL	DEPTH TO MOTTLES / GLEY	g = >120	G= >120
MOISTURE: 2	DEPTH OF ORGANICS: Ø		(cm)
HOMOGENEOUS / VARIABLE	DEPTH TO BEDROCK: >120		(cm)

COMMUNITYCLASSIFICATION:

COMMUNITY CLASS: FOREST	CODE: FO
COMMUNITY SERIES: DECIDUOUS FOREST	CODE: FOD
ECOSITE: DRY-FRESH S. MAPLE DECIDUOUS FOREST	CODE: FOD5
VEGETATION TYPE: DRY-FRESH SUGAR MAPLE - WHITE ASH DECIDUOUS FOREST TYPE	CODE: FOD5-8
[ ] INCLUSION	CODE:
[ ] COMPLEX	CODE:

Notes:

Figure 24. Community Description and Classification Data Card.

ELC
MANAGEMENT / DISTURBANCE

SITE: CALEDON CREEK HEAD WATERS
POLYGON: 98 0001
DATE: 24 APRIL 98
SURVEYOR(S): JS SS

DISTURBANCE / EXTENT	0	1	2	3	SCORE †
TIME SINCE LOGGING	> 30 YRS	15 - 30 YRS	5 - 15 YRS	0 - 5 YEARS	1
INTENSITY OF LOGGING	NONE	FUEL WOOD	SELECTIVE	DIAMETER LIMIT	4
EXTENT OF LOGGING	NONE	LOCAL	WIDESPREAD	EXTENSIVE	
SUGAR BUSH OPERATIONS	NONE	LIGHT	MODERATE	HEAVY	Ø
EXTENT OF OPERATIONS	NONE	LOCAL	WIDESPREAD	EXTENSIVE	
GAPS IN FOREST CANOPY	NONE	SMALL	INTERMEDIATE	LARGE	4
EXTENT OF GAPS	NONE	LOCAL	WIDESPREAD	EXTENSIVE	
LIVESTOCK (GRAZING)	NONE	LIGHT	MODERATE	HEAVY	Ø
EXTENT OF LIVESTOCK	NONE	LOCAL	WIDESPREAD	EXTENSIVE	
ALIEN SPECIES	NONE	OCCASIONAL	ABUNDANT	DOMINANT	1
EXTENT OF ALIEN SPECIES	NONE	LOCAL	WIDESPREAD	EXTENSIVE	
PLANTING (PLANTATION)	NONE	OCCASIONAL	ABUNDANT	DOMINANT	Ø
EXTENT OF PLANTING	NONE	LOCAL	WIDESPREAD	EXTENSIVE	
TRACKS AND TRAILS	NONE	FAINT TRAILS	WELL MARKED	TRACKS OR ROADS	3
EXTENT OF TRACKS/TRAILS	NONE	LOCAL	WIDESPREAD	EXTENSIVE	
DUMPING (RUBBISH)	NONE	LIGHT	MODERATE	HEAVY	1
EXTENT OF DUMPING	NONE	LOCAL	WIDESPREAD	EXTENSIVE	
EARTH DISPLACEMENT	NONE	LIGHT	MODERATE	HEAVY	Ø
EXTENT OF DISPLACEMENT	NONE	LOCAL	WIDESPREAD	EXTENSIVE	
RECREATIONAL USE	NONE	LIGHT	MODERATE	HEAVY	1
EXTENT OF RECR. USE	NONE	LOCAL	WIDESPREAD	EXTENSIVE	
NOISE	NONE	SLIGHT	MODERATE	INTENSE	2
EXTENT OF NOISE	NONE	LOCAL	WIDESPREAD	EXTENSIVE	
DISEASE/DEATH OF TREES	NONE	LIGHT	MODERATE	HEAVY	Ø
EXTENT OF DISEASE / DEATH	NONE	LOCAL	WIDESPREAD	EXTENSIVE	
WIND THROW (BLOW DOWN)	NONE	LIGHT	MODERATE	HEAVY	4
EXTENT OF WIND THROW	NONE	LOCAL	WIDESPREAD	EXTENSIVE	
BROWSE (e.g. DEER)	NONE	LIGHT	MODERATE	HEAVY	Ø
EXTENT OF BROWSE	NONE	LOCAL	WIDESPREAD	EXTENSIVE	
BEAVER ACTIVITY	NONE	LIGHT	MODERATE	HEAVY	Ø
EXTENT OF BEAVER ACTIVITY	NONE	LOCAL	WIDESPREAD	EXTENSIVE	
FLOODING (pools & puddling)	NONE	LIGHT	MODERATE	HEAVY	Ø
EXTENT OF FLOODING	NONE	LOCAL	WIDESPREAD	EXTENSIVE	
FIRE	NONE	LIGHT	MODERATE	HEAVY	Ø
EXTENT OF FIRE	NONE	LOCAL	WIDESPREAD	EXTENSIVE	
ICE DAMAGE	NONE	LIGHT	MODERATE	HEAVY	Ø
EXTENT OF ICE DAMAGE	NONE	LOCAL	WIDESPREAD	EXTENSIVE	
OTHER	NONE	LIGHT	MODERATE	HEAVY	
EXTENT	NONE	LOCAL	WIDESPREAD	EXTENSIVE	

† INTENSITY x EXTENT = SCORE

Figure 25. Management / Disturbance Data Card.

ELC WILDLIFE	SITE: CALEDON CREEK HEAD WATERS
	POLYGON: 980001
	DATE: 24 APRIL 98
	SURVEYOR(S): NS SS
	START TIME: 10:00 END TIME: 10:50

TEMP (°C): 15	CLOUD (10th): 8	WIND: 2	PRECIPITATION: NONE
CONDITIONS: GOOD			

POTENTIAL WILDLIFE HABITAT:

	VERNAL POOLS	X	SNAGS
	HIBERNACULA	X	FALLEN LOGS
	_____		_____

SPECIES LIST:

TY	SP. CODE	EV	NOTES	#
B	BCCH	SM		1
B	PIWO	VO		1
B	AMCR	VO		1
L	AZUR	OB		2
H	SPPS	VO	FEW	1
B	AMGO	VO		1
H	COGA	OB		1

TY	SP. CODE	EV	NOTES	#

FAUNAL TYPE CODES (TY):

B = BIRD **M** = MAMMAL **H** = HERPETOFAUNA **L** = LEPIDOPTERA **F** = FISH **O** = OTHER

EVIDENCE CODES (EV):

BREEDING BIRD - POSSIBLE:
- **SH** = SUITABLE HABITAT
- **SM** = SINGING MALE

BREEDING BIRD - PROBABLE:
- **T** = TERRITORY
- **A** = ANXIETY BEHAVIOUR
- **D** = DISPLAY
- **N** = NEST BUILDING
- **P** = PAIR
- **V** = VISITING NEST

BREEDING BIRD - CONFIRMED:
- **DD** = DISTRACTION
- **NE** = EGGS
- **AE** = NEST ENTRY
- **NU** = USED NEST
- **NY** = YOUNG
- **FY** = FLEDGED YOUNG
- **FS** = FOOD/FAECAL SACK

OTHER WILDLIFE EVIDENCE:
- **OB** = OBSERVED
- **DP** = DISTINCTIVE PARTS
- **TK** = TRACKS
- **SI** = OTHER SIGNS (specify)
- **VO** = VOCALIZATION
- **HO** = HOUSE/DEN
- **FE** = FEEDING EVIDENCE
- **CA** = CARCASS
- **FY** = EGGS OR YOUNG
- **SC** = SCAT

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Figure 26. Wildlife Data Card.

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Glossary[2]

abiotic Describing the non-living components of an ecosystem.

abundance-dominance An expression of the number of individuals of a plant species and their coverage in a phytosociological survey.

abundant Referring to a plant that is represented throughout the polygon or community by large numbers of individuals or clumps. Likely to be encountered anywhere in the polygon. Usually forming > 10% ground cover.

acidic, acid Having a pH value of < 7.0; *(soil)* pH values of < 6.5 within the surface horizons.

acidic bedrock Igneous rocks containing > 66% silica, have low pH and are not easily weathered.

aeolian (eolian) Referring to mineral particles moved and sorted by wind, usually fine sands and coarse silt. See **dune**.

aerobic Occurring in the presence of oxygen as applied to chemical and biochemical processes; opposite of anaerobic.

alkaline Having a pH value of > 7.0; *(soil)* in the Canadian System of Soil Classification, for soil taxonomy purposes: a pH value > 7.4. See **acidic**.

alluvium Mineral material deposited by flowing water, usually sands, silts and gravels.

alvar Bedrock-controlled sites on more or less level expanses of limestone. There is a patchy mosaic of exposed limestone “pavement” and scant soil which mainly accumulates in cracks or “grykes”. There is seasonal inundation of water alternating with extreme drought in summer.

anaerobic Occurring in the absence of oxygen as applied to chemical and biochemical processes.

angiosperm A flowering vascular plant bearing seeds enclosed in a carpel. The most advanced, most abundant and most widely distributed plants. Angiosperm trees are also called **hardwoods**.

anthropogenic Human-made or human-modified materials or communities, such that their initial properties or characteristics have been drastically altered.

aquatic Living or growing in water; referring to ecosites that are in water generally > 2 m deep and that have less than 25% emergent vegetation.

arable land Land cultivated or suitable for cultivation.

arid Soil, climate or region where vegetation may not grow due to a severe lack of water.

aspect The orientation of a slope face, expressed using a compass direction.

associate(s) One or more plant species that commonly occur together, typically under similar ecological conditions.

backshore The area immediately above the zone normally affected by wave action along a lake.

barren Usually open sites on bedrock or unconsolidated material, such as sand, where the major limiting factor is drought. Stunted trees and tall shrubs may be present but tallgrass prairie species are not.

basal area The area occupied by a plant near the ground surface; measured across the stem of a tree 1.3 to 1.5 m above the ground surface, or across a clump of graminoids, usually 2 to 3 cm above the ground surface.

basic bedrock Igneous rocks containing ≤ 66% silica, have circumneutral pH and are intermediate in weatherability.

beach / bar A shoreline area of a lake or river with high levels of disturbance from periodic high water levels and related physical effects such as ice scour, erosion and deposition.

bedrock The consolidated rock underlying very shallow soils and the regolith or exposed rock at the surface.

biodiversity Totality of the richness of biological variation, ranging from within-species genetic variation, through subspecies and species, to communities and the patterns and dynamics of these on the landscape.

biomass The mass of living organisms within a defined space, usually expressed in kg/ha or g/m^2 of dry matter.

biome Major biotic community composed of all the plants and animals and smaller biotic communities. The smaller communities in a biome possess similarities in gross external appearances (deciduous trees, grasslands, etc.) and gross climatic conditions (desert, tropical, etc.). A particular biome is defined in terms of the characteristic vegetation forms (or life forms).

biota The living component of an ecosystem.

biotic Pertaining to life.

bluff A shoreline area of a river or lake with steep to vertical slopes of unconsolidated surficial deposits which are subject to active erosion from slumping, mass wasting or toe erosion.

bog Ombrotrophic peatlands, generally unaffected by nutrient-rich groundwater, that are acidic and often dominated by heath shrubs and *Sphagnum* mosses and that may include open-growing, stunted trees.

bottomland The area in the bottom of a river valley. It includes the floodplain, but may extend beyond the limit of flooding to the base of the valley slopes.

boulder Rock fragment over 60 cm in diameter. In engineering, practice boulders are over 20 cm in diameter.

broad-leaved Plants with wide leaves (c.f. **graminoid**). Also a general term referring to angiosperm (hardwood) trees.

brown moss A non-taxonomic division of mosses including *Campylium stellatum, Scorpidium scorpioides* and *Tomenthypnum nitens*.

calcicole Species that demonstrate a preference for growth in calcium-rich soils with a neutral pH.

canopy The aerial branches of terrestrial plants, together with their complement of leaves. Said to be a complete canopy when the ground is completely hidden by leaves when viewed from above.

canopy closure The degree of canopy cover relative to openings.

carbonate bedrock Sedimentary rocks made up largely of carbonate minerals (release carbon dioxide upon heating), have high pH values and are easily weathered.

characteristic species Diagnostic species used to separate plant community types. Characteristic species may occur in more than one community, but are significant (much more abundant) in only one community. A species with high cover (abundance) and presence.

chronosequence A sequence through time. It often is used to refer to a secondary successional sequence within a set of plant communities.

classification The systematic grouping and organization of objects, usually in a hierarchical manner.

classification unit A synthetic unit resulting from the grouping of sample plots that share similar ecological characteristics.

clay Mineral particles < 0.002 mm in diameter. Soil texture class with approximately a 40 to 60% composition of clay-size particles.

cliff A steep, or near-vertical, exposure of bed rock > 3 m high. The vegetation community associated with a vertical rock face, including communities with shallow soils near the edge of the exposure.

climate The accumulated long-term effects of weather that involve a variety of heat and moisture exchange processes between the earth and the atmosphere.

climatic climax See **climax**.

climax Stable, self-perpetuating vegetation that represents the final stage of succession.

- **climatic climax** Stable, self-perpetuating vegetation developed through succession in response to long-term climatic conditions.
- **edaphic climax** Stable, self-perpetuating vegetation developed through succession on sites where soil factors are limiting.

cobble A rounded rock fragment between 80 and 250 mm in diameter.

co-dominant Two or more plant species of similar stature that share more or less equally the greatest importance in a vegetation layer.

community An assemblage of organisms that exist and interact with one another on the same site.

community type A group of similar vegetation stands that share common characteristics of vegetation, structure and soils.

competition The interaction among organisms resulting from common use of a limited resource. Intraspecific competition occurs within the same species, while interspecific competition arises among different species.

complex Pattern of two or more ecosites or vegetation types forming a mosaic that cannot be mapped at the level of resolution being employed.

conifer A cone-bearing plant belonging to the taxonomic group Gymnospermae.

coniferous Referring to a conifer. A plant community with a cover made up of 75% or more coniferous species.

cover The area of ground covered or the relative proportion of coverage a particular plant species, vegetation layer or plant form represents. Can be expressed as relative or absolute cover values.

cover scale A set of discrete classes defined by specific percentages that are used to estimate plant cover.

cover type A very general unit of vegetation classification and mapping based on existing plant cover (e.g., closed-canopied deciduous forest, pasture or native prairie).

cultural community A vegetation community originating from, or maintained by, anthropogenic influences and culturally based disturbances; often containing a large proportion of non-native species.

dbh (diameter at breast height) The diameter of a tree at breast height. Diameter is measured at 1.3 to 1.5 m above ground surface.

deciduous Referring to perennial plants from which the leaves abscise and fall off at the end of the growing season.

deciduous forest A plant community with a cover made up of 75% or more deciduous trees.

deposit See **surficial deposit**.

depression An area that is lower than the general surrounding landscape, usually less well drained than the surrounding terrain.

dicot A group of angiosperm plants containing all the flowering plants that have embryos with two cotyledons or seed leaves. Also distinguished from monocots in having broad leaves with branching veins.

diversity The richness of species within a given area. Diversity includes two distinct concepts: richness of species and evenness in the abundances of the species.

dominant A plant with the greatest cover or biomass within a plant community and represented throughout the community by large numbers of individuals. Visually more abundant than other species in the same layer and forming > 10% of the ground cover and > 35% of the vegetation cover in any one layer.

drainage The removal of excess water from soil as a result of gravitational flow. Drainage may not be possible if the water table occurs near the ground surface, or may be impeded if the soil is composed of fine-textured material.

drawdown Decrease in water level of lakes or streams, exposing a substrate that is usually submerged.

dune A low hill or ridge of sand that has been sorted and deposited by wind.

ecoclimatic region An area characterized by a distinctive regional climate as expressed by vegetation. Equivalent to a domain.

ecodistrict A subdivision of an ecoregion based on distinct assemblages of relief, geology, landform, soils, vegetation, water and fauna. Canadian ecological land classification (ELC) system unit. Scale 1:500 000 to 1:125 000. The subdivision is based on distinct physiographic or geological patterns. Originally referred to as a land or site district.

ecoelement The lowest classification level within the Canadian ecological land classification (ELC) system proposed by the Subcommittee on Biophysical Land Classification in 1969, but not included in the original hierarchy. A subdivision of an ecosite displaying uniform soil, topography, vegetation and hydrology. Scale 1:10 000 to 1:2 500.

ecological factor Any element of the site that can possibly influence living organisms (e.g., water available for plants). This term is also frequently used to refer to ecological descriptors.

Ecological Land Classification (ELC) The Canadian classification of lands from an ecological perspective; an approach that attempts to identify ecologically similar areas. The original system proposed by the Subcommittee on Biophysical Land Classification in 1969 included four hierarchical levels that are currently called ecoregion, ecodistrict, ecosection and ecosite. Ecoprovince and ecoelement were later added to the upper and lower levels of the hierarchy.

ecological unit A very general term used to refer to a mapping or classification unit of any rank and based on ecological criteria.

ecology The science that studies the living conditions of living beings and all types of interactions that take place among living beings and between living beings and their environment.

ecoprovince A subdivision of an ecozone (see Table 1) that is characterized by major assemblages of landforms, faunal realms and vegetation, hydrological, soil and climatic zones. Canadian ecological land classification (ELC) system unit.

ecoregion An area characterized by a distinctive regional climate as expressed by vegetation. Canadian ecological land classification (ELC) system unit. Scale 1:3 000 000 to 1:1 000 000. Originally referred to as a land or site region.

ecosection A subdivision of an ecodistrict based on distinctive assemblages of relief, geology, landforms, soils and vegetation. A Canadian ecological land classification (ELC) system mapping unit, usually mapped at a scale of 1:250 000 to 1:50 000.

Ecosite A subdivision of an ecosection that consists of an area of land having a hom ogeneous combination of soils and vegetation. A Canadian ecological land classification (ELC) system mapping unit, usually mapped at a scale of 1:50 000 to 1:10 000.

ecosystem A complex interacting system that includes all plants, animals, fungi and microorganisms and their environment within a particular area at whatever size segment of the world is chosen for study.

ecotone The transition zone between two adjacent but different types of vegetation.

ecozone An area of the earth's surface representing large and very generalized ecological units characterized by interacting abiotic and biotic factors. The most general level of the Canadian ecological land classification (ELC) system.

edaphic Having to do with the soil, particularly with respect to its influences on vegetation.

edaphic climax See **climax**.

emergent A plant that has a photosynthetic surface extending above the normal water level. Plants that are **floating-leaved** or **submergent** but have reproductive stems above the water surface are not emergent.

environment The summation of all living and non-living factors that surround and potentially influence an organism.

eolian See **aeolian**.

erosion The degradation of a surface by chemical and mechanical weathering, and the removal of materials by wind or water.

eutrophic Refers to the rich nutrient-rich status of a water body.

even-aged A forest, stand or forest type in which relatively small age differences exist among individual trees.

exposure Location of a site with respect to an environmental factor such as the sun, rain or wind.

fauna A general term for animals; a list of the animal species present in an area.

feathermoss A non-taxonomic division of mosses that includes *Hylocomium splendens*, *Pleurozium schreberi* and *Ptilium crista-castrensis*.

feature In the ELC data management system, a unit that describes the topographic, landform or cultural position of an ecosite.

fen Wetland with a peat substrate and nutrient-rich waters, and primarily vegetated by shrubs and graminoids.

field guide A reference document for use in the field, usually with keys to identify plants, animals, plant communities, forest types or sites from biological and physical criteria.

floating-leaved A wetland plant that has its major photosynthetic area floating on the surface of the water. Some floating-leaved plants are rooted in the substrate while the leaves float; in other species the whole plant is completely free-floating, with no attachments.

floodplain An area adjacent to a stream or river, consisting of alluvial sediments, that may be periodically inundated during times of high stream flow.

flora A general term for plants; the entire complement of the plant species growing spontaneously in a region.

floristics The use of plants as elements of flora.

forb Originally a pasture herb; a non-woody, broad-leaved herbaceous plant other than a graminoid. A forb may be either a monocot or a dicot (e.g., *Maianthemum* is a forb).

foreshore The zone between low and high water levels.

forest A terrestrial vegetation community with at least 60% tree cover.

forest region A major geographical zone characterized by a broadly uniform topography and the same dominant tree species. See **site region**.

gley A blue-grey colour in soil due to the reduction of iron. Formed in a process characterized by low oxygen conditions due to water logging. If the water logging is seasonal rather than permanent, the periodic oxidation will give rise to **mottles.**

graminoid Grass-like. Generic term for narrow-leaved monocot plants with a grass-like morphology, including grasses, sedges and rushes.

gravel Rock particles ranging in size from 2 mm to 8 cm in diameter; soil with a high proportion of gravel-sized particles.

ground cover The overall canopy cover of a plant community without reference to different strata.

ground layer The layer of vegetation closest to, and covering, the ground.

groundwater Water passing through, or standing in, soil and underlying strata and free to move by gravity.

habitat The place in which an animal or plant lives. The sum of environmental circumstances in the place inhabited by an organism, population or community .

hardwood An angiosperm tree with broad leaves, such as *Acer*, *Fraxinus*, *Populus* and *Quercus*. See **broad-leaved**.

herb (herbaceous) A non-woody, vascular plant.

herpetofauna Reptiles and amphibians.

horizon A layer of soil (e.g., Ah, B,C).

hydric A general term for soils that develop under conditions of poor drainage in marshes, swamps, seepage areas or flats.

hydrophyte, hydrophitic plant Any plant able to grow normally in water or on a substrate at least periodically deficient in oxygen as a result of excessive water content.

indicator species Species, usually plants, used to indicate an ecological condition such as soil moisture or nutrient regime that may not be directly measured.

inventory The systematic survey, sampling, classification and mapping of natural resources.

kettle A depression created by the melting of glacial ice that was buried in moraine.

key A taxonomic tool used to identify unknown objects (e.g., plants or plant communities) through the use of paired questions.

lacustrine Referring to fresh water lakes; sediments generally consisting of stratified fine sand, silt and clay deposits on a lake bed.

lake A standing water body > 2 ha in area.

landform A topographic feature. The various shapes of the land surface resulting from a variety of actions such as deposition or sedimentation, erosion and movements of the earth crust.

land type An area of land characterized by its drainage and deposits (nature, origin, thickness, texture and stoniness). See **soil type**.

landscape A land area composed of interacting ecosystems that are repeated in similar form throughout. Landscapes can vary in size, down to a few kilometers in diameter.

landscape ecology A study of the structure, function and change in a heterogeneous land area composed of interacting ecosystems.

landscape element The basic, relatively homogeneous ecological unit, whether of natural or human origin, on land at the scale of a landscape.

layer A component of structure; a distinct stratum within a plant community, soil or surficial deposit.

level Referring to land without slope.

level of resolution Scale of space perception. The ecological factors change according to the level perceived.

life form Morphological and biological organization of a plant in relation to the way it spends the unfavorable season for growing.

litter The uppermost portion of plant debris on the soil surface, usually not decomposed.

lowland Extended areas of land that occur below a significantly elevated area.

mapping unit See Polygon

marsh A wetland with a mineral or peat substrate inundated by nutrient-rich water and characterized by emergent vegetation.

mature A seral stage in which a community is dominated primarily by species that are replacing themselves and are likely to remain an important component of the community if it is not disturbed again. Significant remnants of early seral stages may still be present.

meadow Open terrestrial communities characterized by grasses or forbs; usually originating or maintained by cultural disturbances such as mowing, burning or grazing.

meadow marsh An area at the wetland-terrestrial interface, which is seasonally inundated with water and usually dominated by grasses or forbs.

mesic Describing the sites that are neither humid (hydric) nor very dry (xeric). The average moisture conditions for a given climate.

mesophyte Plants that grow in mesic soil moisture conditions.

microclimate Localized climatic conditions ranging down to conditions at the stand or even individual plant environment level.

microtopography Usually, small localized differences in elevation (e.g., < 1 m of relief).

mid-aged A seral stage of a community that has undergone natural thinning and replacement as a result of species interaction; the community often contains examples of both early successional and late successional species.

mineral soil A soil that is largely composed of unconsolidated mineral matter. If organic material occurs on the surface, the organic thickness must be < 40 cm.

minerotrophic Nourished by mineral water. It refers to wetlands that receive nutrients from mineral groundwater in addition to precipitation by flowing or percolating water.

mixed A plant community with a mixed composition of plants having a similar stature, each component with a cover of > 25% but < 75%.

moisture deficit A condition that occurs when evaporation or transpiration exceeds the available water supply.

moisture regime The available moisture supply for plant growth estimated in relative or absolute terms; classifications for moisture regimes come from the integration of several factors, including soil texture and drainage, and depth to mottles and gley.

monocot A group of angiosperms distinguished by having embryos with only one cotyledon. Very few of its members have a tree-growth form. The leaves are generally narrow with parallel veins and the root system is typically fibrous. Monocots include grasses, sedges, rushes and all members of the lily family.

moraine A mound, ridge or other distinct accumulation of generally unsorted, unstratified glacial drift, predominantly till, deposited chiefly by direct action of glacier ice.

mottle Spots or blotches of different colours or shades of colours interspersed with the dominant colour, usually the result of alternating aerobic and anaerobic soil conditions and indicative of poor drainage. The depth of mottles in soils of different types is a diagnostic indication of **moisture regime**.

neutral soil A soil having a pH value of approximately 7.0 in the surface horizons.

nutrient Usually refers to one of a specific set of primary elements found in soil that are required by plants for healthy growth, such as nitrogen, phosphorus, potassium, calcium, magnesium and sulphur.

nutrient regime The relative level of nutrient availability for plant growth.

occasional Referring to plants that are present as scattered individuals throughout a community or represented by one or more large clumps of many individuals. Most species will fall into this category.

old field A general term to describe early successional communities that have regenerated from abandoned agricultural land.

old growth A self-perpetuating community composed primarily of late successional species that usually show uneven age distribution, including large old trees without open-grown characteristics.

oligotrophic A condition of low nutrient status in a wetland or water body.

open Referring to wetland or terrestrial communities that have < 10% tree cover and < 25% shrub cover.

open-grown The form of a tree grown in an open area: a wide crown and low branching.

open water Aquatic communities in which the permanent water is generally > 2 m deep and the total vegetation cover is > 25%.

organic soil Soils of the Organic order in the Canadian System of Soil Classification, dominated by deep organic deposits, usually > 40 cm thick.

outcrop Exposure of bedrock at the ground surface.

overstorey The uppermost continuous layer of a vegetation cover (e.g., the tree canopy in a forest ecosystem or the uppermost layer of a shrub stand).

parent material The unconsolidated and more or less chemically unweathered material from which soil develops.

patch In a landscape, a non-linear surface area differing in appearance from its surroundings.

peat An accumulation, under saturated conditions, of partially decomposed plant matter.

peatland A general term for peat-covered terrain.

perturbation Disturbance in the natural evolution of vegetation, soil or another element in the ecosystem. A perturbation can be natural (fire, epidemic) or human-made (cutting, mowing).

pH A measure of acidity or alkalinity of a solution, based on the concentration of hydrogen ions.

physiognomy The general appearance, character, form and feature of vegetation.

physiographic region Topographically similar landscapes with similar relief, structural geology and elevation at a mapping scale of 1:1,000,000 to 1:3,000,000.

physiography The study of the genesis and evolution of landform.

phytosociological Referring to a recognizable and repeatable community of interacting plant species that occurs across a landscape under the same conditions.

pioneer community A community that has invaded disturbed or newly created sites and represents the early stages of either primary or secondary succession.

pioneer species Plant species that initially invade a newly exposed land surface.

plain A relatively large, level, featureless topographic surface.

plankton Microscopic organisms suspended in water. Some photosynthetic plankton, such as algae, occurs in such large numbers that they form visible "blooms" on the water surface.

plantation A deciduous or coniferous treed community in which the majority of trees have been planted.

plant community A concrete or real unit of vegetation or a stand of vegetation.

plot A vegetation sampling unit used to delineate a fixed area for the purpose of estimating plant cover, biomass or density. Plots can vary in their dimensions depending on the purpose of the study.

polygon A discrete and unique irregularly shaped area outlined on a map or air-photo that contains a more or less homogeneous site and differs from the adjacent and surrounding land.

pond A small body of standing water, < 2 ha in area.

prairie An area of native grassland controlled by a combination of moisture deficiency and fire. Usually containing a distinctive assemblage of species.

precipitation A collective term for snowfall and rainfall.

primary succession See **succession**.

pristine An undisturbed natural condition.

rare An assessment of cover or abundance of a plant species that is represented, in the area of interest, by only one to a few individuals.

ravine A relatively deep, steep-sided gully created by flowing water, usually a small intermittent creek.

regeneration The renewal of woody species by natural or artificial means.

relief The difference between extreme elevations within a given area.

remote sensing The gathering and interpretation of land-based information by indirect methods such as aerial photography or satellite imagery.

riparian Having to do with a river. In the ELC, refers to aquatic communities adjacent to, or associated with, a river or stream as opposed to a lake or pond (c.f. **lacustrine**).

river A large, permanent water course with at least some permanent tributary streams.

rock A consolidated mass of mineral matter; a general term for stones.

rockland An area where more or less horizontal or rolling surfaces of bedrock are exposed or covered by soil < 15 cm deep.

rolling Referring to topography that exhibits a complex or repeated pattern of ridges, slopes and hollows, but no abrupt peaks or cliffs.

sand Mineral particles with diameters ranging from 0.05 to 2.0 mm.

saturate(d) Describing a soil or a soil sample where all the voids between soil particles are filled with a liquid.

savannah A treed community with 11 to 35% cover of coniferous or deciduous trees.

scale A relative term that indicates a map reference fraction (i.e. ,1 cm = 10 m or 1:1,000).

- **large-scale map** Maps with scales between 1:10,000 and 1:1,000 or more are usually considered large-scale maps.
- **small-scale map** Maps with scales between 1:5,000,000 and 1:250,000 are usually considered small-scale maps.

scree See **talus**.

secondary succession See **succession**.

seepage The slow movement of water near the soil surface, often occurring above an impermeable subsoil layer or at the boundary between bedrock and unconsolidated material that is exposed at ground surface. Usually occurs downslope of the recharge area.

sere Any plant community in a succession leading to a climax condition. It is influenced by the preceding seres and itself influences the development of succeeding seres. See **successional stage**.

shade intolerant Plants not capable of growing successfully in shade.

shade tolerant Plants capable of growing and successfully reproducing beneath the shading canopy of other species.

shallow marsh Vegetation communities with a water table that rarely drops below the substrate surface and a vegetation composed primarily of broad-leaved or narrow-leaved emergent species.

shallow water Aquatic communities in which the permanent water is generally < 2 m deep and in which there is a vegetation cover of > 25% composed mainly of submerged or floating-leaved species.

shrub 1. A perennial plant usually with a woody stem, shorter than a tree, often with a multi-stemmed base; includes small trailing woody species such as *Rubus pubescens*. Native shrubs of Ontario are listed in Soper and Heimburger (1982). 2. Vegetation communities that have < 10% cover of trees and > 25% cover of shrubs.

silt Mineral particles with a diameter of 0.05 to 0.002 mm. Soil containing a high proportion of silt.

site The place or the category of places, considered from an environmental perspective, that determines the type and quality of plants that can grow there.

site district See **ecodistrict**.

site region A region with a relatively uniform climate. Equivalent to an ecoregion.

soil Unconsolidated mineral material or organic material > 15 cm thick that occurs at the earth's surface, has undergone soil formation processes, usually exhibits a distinct soil profile and is capable of supporting plant growth. It is the zone where the biological, physical and atmospheric components of the environment interact.

soil map Map of soil types, resulting from a soil survey.

soil profile A vertical section of the soil through all its horizons and extending into parent material.

soil survey The systematic classification, analysis and mapping of soils within an area.

soil type A general classification of soil, taking moisture regime, soil depth and texture into consideration.

species A group of organisms having a common ancestry, which are able to reproduce only among themselves. A general definition that does not account for hybridization.

stand A collection of plants having a relatively uniform composition and structure.

stand structure A quantitative measure of tree cover on an area, in terms of biomass, crown closure, number of trees, basal area, volume or weight. Expressed on a per-hectare basis.

stone Rock fragment with a diameter ranging from 25 to 60 cm.

storey A horizontal layer in a plant community; in the forest appearing as one or more canopies.

stratification The vertical differentiation or structure of a plant community, soil or surficial deposit.

stratum See **Layer**

stream A permanent or intermittent water course.

submergent Plants that normally lie entirely beneath water. Some species have flowering parts that break the water surface. Includes species of *Potomogeton*, which have both submerged and floating leaves.

substrate The medium on which a plant grows.

succession The progression within a community whereby one plant species is replaced by another over time.

- **Primary succession** occurs on newly created surfaces.
- **Secondary succession** involves the development or replacement of one stable successional species by another. Secondary succession occurs on a site after a disturbance (fire, cutting, etc.) in existing communities.

successional series All the plant communities that can be present on the same site through time, and that result from the combined action of climate, soil and perturbations. Depending on the type of perturbation, succession of plant communities (chronosequence) can differ.

successional stage The stage in a vegetation chronosequence at a given site. *Syn.* **sere**.

surficial deposit Unconsolidated material deposited on the earth's surface and that covers the underlying bedrock.

swamp A mineral-rich wetland characterized by a cover of deciduous or coniferous trees.

tableland An upland area that is essentially flat.

tallgrass prairie A mesic prairie maintained by fire; containing an assemblage of large grasses such as *Androgon gerardii, Sorgastrum nutans* and *Panicum virgatum*, as well as a variety or other species. Tallgrass prairie species are also found in some savannah and woodland habitats.

tall shrub A shrub species that has the potential to grow > 2 m tall, or that forms part of a community in which at least some of the individuals are > 2 m tall.

talus A collection of fallen, disintegrated rock material that has formed a pile at the foot of a steep slope.

taxon Any taxonomic unit within a classification system.

terrace A relatively level bench that is created, and occurs, within river valleys. Sometimes sharp or low breaks occur between individual terrace surfaces. These features are formed during a period of fluvial stability followed by a period of down-cutting by a stream.

terrain See **topography**.

terrestrial Pertaining to land as opposed to water. Specifically referring to the community where the water table is rarely or briefly above the substrate surface and there has not been the development of hydric soils.

texture The relative proportion of various particle sizes such as sand, silt, clay and coarser materials in a mineral soil sample. The Canadian System of Soil Classification describes the basic textural classes (clay, silty clay, sandy loam, etc.).

thicket A terrestrial vegetation type that is characterized by < 10% tree cover and > 25% tall shrub cover.

thicket swamp A wetland vegetation type that is characterized by < 10% tree cover and > 25% tall shrub cover.

till Unstratified drift, deposited directly by a glacier without being reworked by meltwater.

topsoil The rich, active, uppermost part of the soil profile that is used for agricultural purposes.

topography The physical features of an area such as a land shape and relief.

tree A woody plant usually with a single main stem and capable, under the right conditions, of reaching heights of several metres or more.

treed A community with a tree cover of > 10%.

undergrowth All the shrubs, herbaceous plants and bryophytes growing under a canopy.

understorey Vegetation growing beneath taller plants such as trees or tall shrubs.

uneven-aged Of a forest, stand or forest type in which intermingling trees differ markedly in age.

upland A general term for an area that is higher in elevation than the surrounding landscape.

UTM Grid: The Universal Transverse Mercator Grid System used by the USA for military map projections of the entire world between 80^{o}N and 80^{o}S. Grid lines are equidistant anywhere in the world and are divided into unique zones. Each zone is sub-divided into 100 km squares. Grid references can be used to describe any location to the desired degree of precision. Reference is given to the zone and square (UTMZ), and easting (UTME) and northing (UTMN) locates any point.

valley Hollow or low-lying area associated with a river or stream, bounded by distinct slopes rising to the surrounding tableland.

valley slope The sloping walls of a distinct valley associated with a river or stream.

vegetation The general cover of plants growing on the landscape. The total of the plant communities of a region.

vegetation structure The vertical stratification associated with a plant community.

vegetation type An abstract vegetation classification unit, based on the species present in a site. The most detailed level in the Southern Ontario ELC.

water table The upper surface of the water saturation zone.

wetland An area of land that is saturated with water long enough to promote hydric soils or aquatic processes as indicated by poorly drained soils, hydrophytic vegetation and various kinds of biological activity that are adapted to wet environments. This includes shallow waters generally < 2 m deep.

wildlife All wild mammals, birds, reptiles, amphibians, fishes, invertebrates, plants fungi, algae, bacteria and other wild organisms. Often used to refer specifically to fauna.

wildlife habitat Habitat providing food or shelter for wildlife for a significant part of their life cycle.

windfall A tree uprooted or broken off by wind; areas containing such trees.

woodland A treed community with 35 to 60% cover of coniferous or deciduous trees.

Xeric Describes a dry site.

xerophyte Plants that grow on dry sites.

young A seral stage of a plant community that has not yet undergone a series of natural thinnings and replacements. Plants are essentially growing as independent individuals rather than as members of a phytosociological community.

Appendices

Appendix A: Data Codes

There are standardized sets of codes available for **bird**, **butterfly**, **herpetofauna**, **mammal**, **fish**, and **plant** species. These codes are available at the following internet web site:

https://www.publicdocs.mnr.gov.on.ca/srb/Ontario_Species_list.xlsx

Appendix B: Plant Species List

List of plant species referred to in this manual. List alphabetized by common name.

COMMON NAME	SCIENTIFIC NAME
Alder	Alnus spp.
Alternate-leaved Dogwood	Cornus alternifolia L.f.
American Lotus	Nelumbo lutea (Willd.) Pers.
Aspen	Populus tremuloides Michaux
Balsam Fir	Abies balsamea L. Miller
Balsam Poplar	Populus balsamifera L.
Basswood	Tilia americana L.
Beachgrass	Ammophila breviligulata Fern.
Beaked Sedge	Carex utriculata F. Boott
Bedstraws	Galium spp.
Beech	Fagus grandifolia Ehrh.
Bellwort	Uvularia grandiflora Smith
Big Bluestem	Andropogon gerardii Vitman
Bitternut Hickory	Carya cordiformis (Wang.) K. Koch
Black Ash	Fraxinus nigra Marshall
Black Cherry	Prunus serotina Ehrh.
Black Maple	Acer saccharum Marhsall ssp. nigrum (Michaux f.) Desmarais
Black Oak	Quercus velutina Lam.
Black Spruce	Picea mariana (Miller) Britton, Sterns & Pogg
Black Walnut	Juglans nigra L.
Black Willow	Salix nigra Marshall
Bladderwort	Utricularia spp.
Blue Cohosh	Caulophyllum thalictroides (L.) Michaux
Bluebead Lily	Clintonia borealis (Aiton) Raf.
Blueberry	Vaccinium spp.
Bluejoint	Calamagrostis canadensis (Michaux) P. Beauv.
Bluets	Hedyotis longifolia (Gaertner) Hook. [=Houstonia longifolia]
Bog Buckbean	Menyanthes trifoliata L.
Bog Rosemary	Andromeda polifolia L.
Bracken Fern	Pteridium aquilinum (L.) Kuhn
Bristle-leaved Sedge	Carex eburnea Boott
Bristly Sarsaparilla	Aralia hispida Vent.
Buffalo Berry	Shepherdia canadensis (L.) Nutt.
Bugleweed	Lycopus spp.
Bulblet Fern	Cystopteris bulbifera (L.) Bernh.
Bullhead Lily	Nuphar spp.
Bulrush	Scirpus spp.
Bunchberry	Cornus canadensis L.
Bur Oak	Quercus macrocarpa Michaux

COMMON NAME	SCIENTIFIC NAME
Bur-reed	Sparganium spp.
Bush Honeysuckle	Diervilla lonicera Miller
Butternut	Juglans cinerea L.
Buttonbush	Cephalanthus occidentalis L.
Calla Lily	Calla palustris L.
Canada Bluegrass	Poa compressa L.
Canada Goldenrod	Solidago canadensis L.
Canada Mayflower	Maianthemum canadense Desf.
Cattail	Typha spp.
Chinquapin Oak	Quercus muehlenbergii Engelm.
Chokeberry	Aronia melanocarpa (Michaux) Elliott [= Pyrus melanocarpa]
Chokecherry	Prunus virginiana L.
Cinnamon Fern	Osmunda cinnamomea L.
Cliffbrake	Pellaea spp.
Clubrush	Scirpus hudsonianus (Michaux) Fern. and S. cespitosus L.
Coltsfoot	Tussilago farfara L.
Common Hair Grass	Deschampsia flexuousa (L.) Trin.
Common Juniper	Juniperus communis L.
Cotton-grass	Eriophorum spp.
Cottonwood	Populus deltoides Bartram ex Marshall
Cow-wheat	Melampyrum lineare Desr.
Creeping Juniper	Juniperus horizontalis Moench
Cylindric Anemone	Anemone cylindrica A. Gray
Dense Blazing-star	Liatris spicata (L.) Willd.
Dewdrop	Dalibarda repens L.
Downy Arrow-wood	Viburnum rafinesquianum Schultes
Duckweed	Lemna spp.
Dwarf Birch	Betula pumila L.
Dwarf Chinquapin Oak	Quercus prinoides Willd.
Dwarf Raspberry	Rubus pubescens Raf.
Early Saxifrage	Saxifraga virginiensis Michaux
European Larch	Larix decidua Miller
False Pennyroyal	Trichostema brachiatum L. [= Isanthus brachiatus]
Fen Birch	Betula pumila L.
Few-seeded Sedge	Carex oligosperma Michaux
Field Horsetail	Equisetum arvense L.
Fly Honeysuckle	Lonicera villosa (Michaux) Roemer & Schultes
Foam Flower	Tiarella cordifolia L.
Fowl Manna Grass	Glyceria spp.
Fragrant Sumac	Rhus aromatica Aiton
Fringed Buckwheat	Polygonum cilinode Michaux

COMMON NAME	SCIENTIFIC NAME
Garlic Mustard	Alliaria petiolata (Bieb.) Cavara and Grande
Gaywings	Polygala paucifolia Willd.
Goldthread	Coptis trifolia (L.) Salisb.
Gray Coneflower	Ratibida pinnata (Vent.) Barnhart
Gray Dogwood	Cornus foemina Miller ssp. racemosa (Lam.) J.S. Wilson [C. racemosa]
Great Lakes Wheat-grass	Elymys lanceolatus (Scribner & J.G. Smith) Gould ssp. psammophilus (J.M. Gillett & Senn) A. Löve [=Agropyron psammophilum]
Green Ash	Fraxinus pennsylvanica Marshall
Hackberry	Celtis occidentalis L.
Hairy Goldenrod	Solidago hispida Muhlenb.
Harebell	Campanula rotundifolia L.
Hawthorn	Crataegus spp.
Hay Sedge	Carex siccata Dewey [= C. foenea]
Hedwig's Moss	Hedwigia ciliata (Hedw.) P. Beauv.
Hemlock	Tsuga canadensis (L.) Carriere
Hepaticas	Hepatica spp.
Herb Robert	Geranium robertianum L.
Hickory	Carya spp.
Highbush Blueberry	Vaccinium corymbosum L.
Hop-tree	Ptelea trifoliata L.
Horsetail	Equisetum spp.
Huckleberry	Gaylussacia baccata (Wang.) K. Koch
Hybrid Poplar	Populus x
Indian Grass	Sorghastrum nutans (L.) Nash
Intermediate Wood Fern	Dryopteris intermedia (Muhlenb. ex Willd.) A. Gray
Ironweed	Vernonia missurica Raf.
Ironwood	Ostrya virginiana (Miller) K. Koch
Jack Pine	Pinus banksiana Lambert
Jack-in-the-pulpit	Arisaema triphyllum (L.) Schott
Japanese Larch	Larix leptolepis (Sieb. & Zucc.) Gord.
Jewelweed	Impatiens spp.
Jumpseed	Phryma leptostachya L.
Juniper	Juniperus communis L. and Juniperus horizontalis Moench
Kentucky Bluegrass	Poa pratensis L.
Lady Fern	Athyrium filix-femina (L.) Roth
Large-leaved Aster	Aster macrophyllus L.
Largetooth Aspen	Populus grandidentata Michaux
Leatherleaf	Chamaedaphne calyculata (L.) Moench

COMMON NAME	SCIENTIFIC NAME
Little Bluestem	Schizachyrium scoparium (Michaux) Nees [= Andropogon scoparius]
Long-leaved Reed Grass	Calamovilfa longifolia (Hook.) Scribner var. magna Scribner & Merr.
Long-styled Sweet Cicely	Osmorhiza longistylis (Torrey) DC.
Low Sedge	includes Carex chordorrhiza Ehrh., C. limosa L., C. livida (Wahlenb.) Willd.
Low Sweet Blueberry	Vaccinum angustifolium Aiton
Lowland Ash	Black Ash, Green Ash, Red Ash
Maidenhair Spleenwort	Asplenium trichomanes L.
Manitoba Maple	Acer negundo L.
Maple	Acer spp.
Marginal Wood Fern	Dryopteris marginalis (L.) A. Gray
Marsh Fern	Thelypteris palustris (Salisb.) Schott
Marsh Marigold	Caltha palustris L.
May Apple	Podophyllum peltatum L.
Meadowsweet	Spiraea spp.
Mountain Holly	Nemopanthus mucronatus (L.) Loes.
Mountain Maple	Acer spicatum Lam.
Naked Mitrewort	Mitella nuda L.
Nannyberry	Viburnum lentago L.
Narrow-leaf Goldenrod	Euthamia graminifolia (L.) Nutt. [=Solidago graminifolia]
Ninebark	Physocarpus opulifolius (L.) Maxim.
Nodding Onion	Allium cernuum Roth
Northern Dropseed	Sporobolus heterolepis (A. Gray) A. Gray
Norway Spruce	Picea abies (L.) Karsten
Oak	Quercus spp.
Oak Fern	Gymnocarpium dryopteris (L.) Newman
Ohio Goldenrod	Solidago ohioensis Riddell.
Ohio Spiderwort	Tradescantia ohiensis Raf.
Ostrich Fern	Matteucia struthiopteris (L.) Tod.
Pale Corydalis	Corydalis sempervirens (L.) Pers.
Panic Grass	Panicum spp.
Partridgeberry	Mitchella repens L.
Paw-paw	Asimina triloba (L.) Dunal
Pennsylvania Sedge	Carex pensylvanica Lam.
Philadelphia Panic Grass	Panicum philadelphicum Bernh. ex Trin.
Pickerel-weed	Pontederia cordata L.
Pin Oak	Quercus palustris Muenchh.
Pine	Pinus spp.
Pinweed	Lechea intermedia Legg.

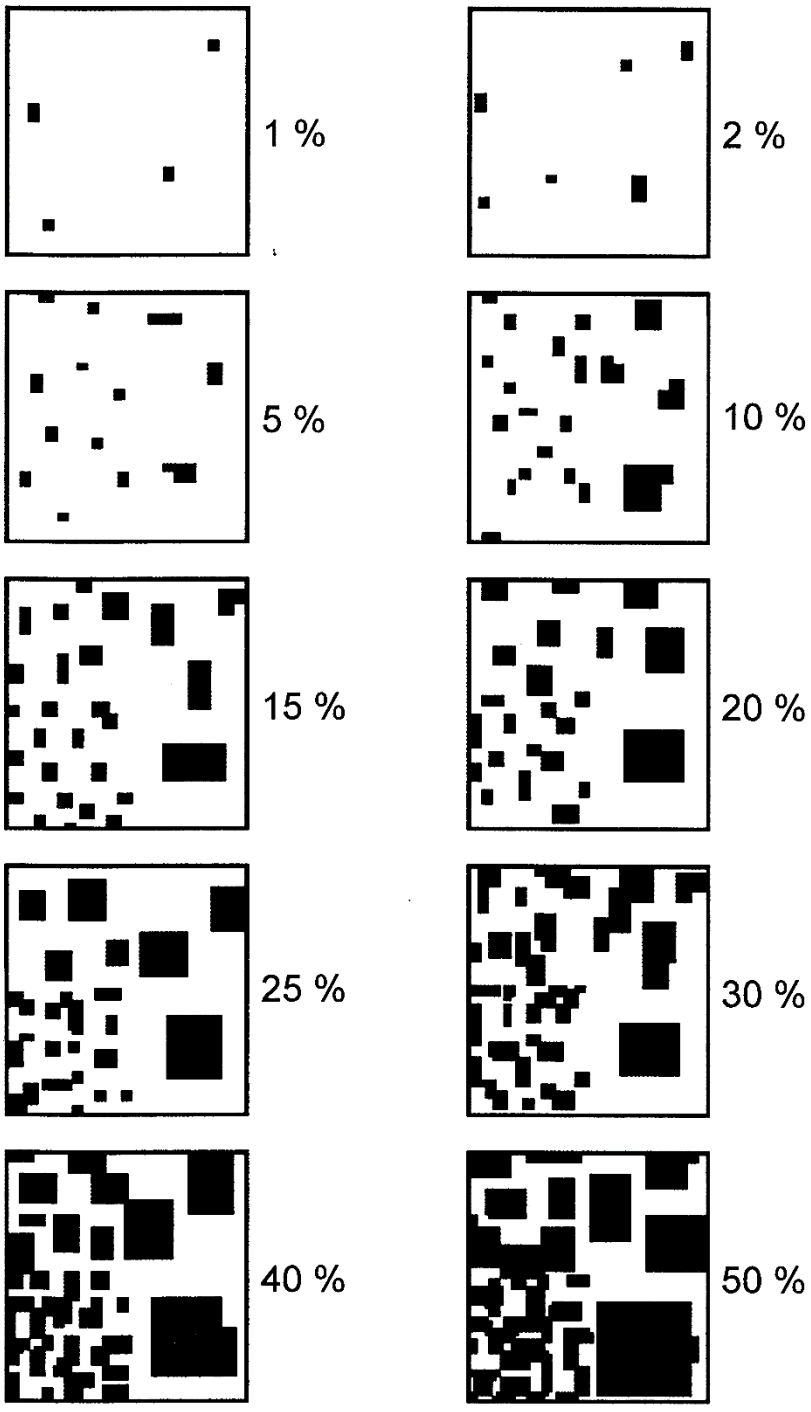
COMMON NAME	SCIENTIFIC NAME
Pitch Pine	Pinus rigida P. Mill.
Pitcher Plant	Sarracenia purpurea L.
Poison Ivy	Rhus radicans L.
Poison Sumac	Rhus vernix L.
Pondweed	Potamogeton spp.
Poplar	Populus balsamifera L. and Populus grandidentata Michaux
Poverty Grass	Danthonia spicata (L.) P. Beauv. ex. Roemer & Schultes
Prairie Dock	Silphium terebinthinaceum Jacq.
Prairie Slough Grass	Spartina pectinata Link
Prickly Ash	Zanthoxylum americanum Miller [= Xanthoxylum americanum]
Prickly Gooseberry	Ribes cynosbati L.
Raspberry	Rubus spp.
Raspberry	Rubus idaeus L.
Red Ash	Fraxinus pennsylvanica Marshall
Red Cedar	Juniperus virginiana L.
Red Elderberry	Sambucus pubens (Michaux) House
Red Maple	Acer rubrum L.
Red Oak	Quercus rubra L. [= Q. borealis]
Red Pine	Pinus resinosa Sol. ex Aiton
Red Spruce	Picea rubens Sarg.
Red-osier	Cornus stolonifera Michaux
Red-top	Agrostis gigantea Roth
Reed-canary Grass	Phalaris arundinacea L.
Rice Cut-grass	Leersia spp.
Richardson’s Muhly Grass	Muhlenbergia richardsonis (Trin.) Rydb.
Rock Sandwort	Minuartia michauxii (Fenzl) Farw. [=Arenaria stricta]
Rough-leaved Mountain-Rice	Oryzopsis racemosa (Smith) Ricker ex A. Hitchc.
Round-leaved Dogwood	Cornus rugosa Lam.
Royal Fern	Osmunda regalis L.
Running Strawberry Bush	Euonymus obobata Nutt.
Rush Grass	Phragmites australis (Cav.) Trin ex Steudel [= P. communis]
Rusty Woodsia	Woodsia ilvensis (L.) R. Br.
Sand Cherry	Prunus pumila L.
Sassafras	Sassafras albidum (Nutt.) Nees
Scotch Pine	Pinus sylvestris L.
Scribner’s Panic Grass	Panicum oligosanthes Schultes
Sea Rocket	Cakile edentula (Bigelow) Hook.
Sedge	Carex spp.
Sedges	Carex spp.
Sensitive Fern	Onoclea sensibilis L.
Serviceberry	Amelanchier spp.

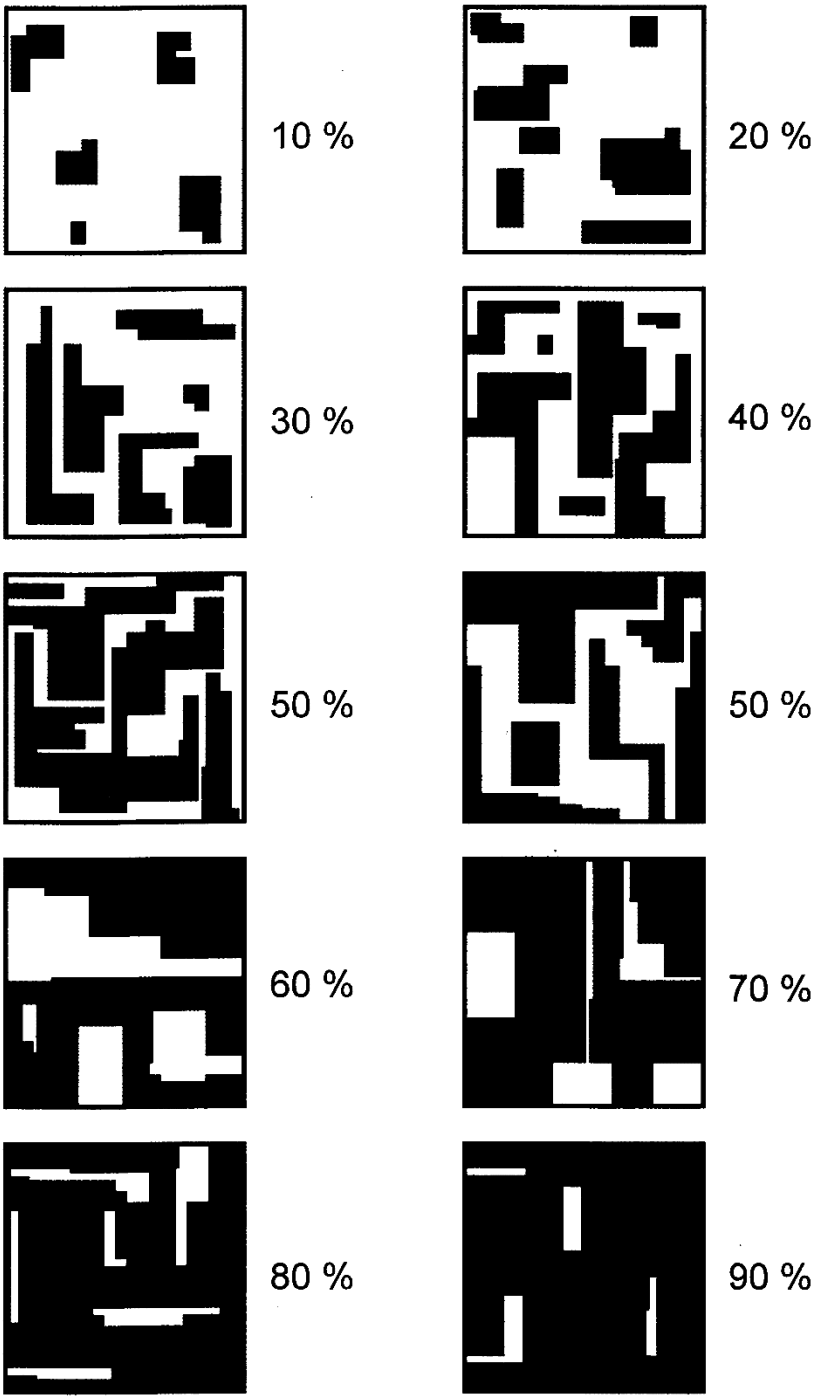
COMMON NAME	SCIENTIFIC NAME
Shagbark Hickory	Carya ovata (Miller) K. Koch
Showy Tick-trefoil	Desmodium glutinosum (Muhlenb. ex Willd.) DC. ex Loudon
Shrubby Cinquefoil	Potentilla fruticosa L.
Shumard's Oak	Quercus shumardii Buckley
Silky Dogwood	Cornus amomum Miller ssp. obliqua (Raf.) J.S. Wilson [= C. obliqua]
Silver Maple	Acer saccharinum L.
Slender Sedge	Carex lasiocarpa Ehrh.
Slender Wheat-grass	Elymus trachycaulus (Link) Gould in Shinn. [Agropyron trachycaulum]
Small Cranberry	Vaccinium oxycoccus L.
Southern Arrow-wood	Viburnum dentatum L. var. lucidum Ait [= V. recognitum]
Spicebush	Lindera benzoin (L.) Blume
Spike Rush	Eleocharis spp.
Spinulose Wood Fern	Dryopteris carthusiana (Villars) H.P. Fuchs
Spotted Touch-me-not	Impatiens capensis Meerb.
Starflower	Trientalis borealis Raf.
Sterile Sedge	Carex sterilis (Carey) Gl.
Stinging Nettle	Urtica dioica ssp. Procera Muhlenb. ex. Willd.
Stonewort	Chara spp.
Sugar Maple	Acer saccharum Marshall. ssp. saccharum
Sumac	Rhus typhina L. and R. glabra L.
Sundews	Drosera spp.
Swamp Maple	Acer x freemanii E. Murr. [rubrum x saccharinum]
Swamp Red Currant	Ribes triste Pall.
Swamp White Oak	Quercus bicolor Willd.
Sweet Fern	Comptonia peregrina (L.) Coulter
Sweet Gale	Myrica gale L.
Sweet White Clover	Melilotus alba Medikus
Switchgrass	Panicum virgatum L.
Sycamore	Platanus occidentalis L.
Tamarack	Larix laricina (DuRoi) K. Koch
Threesquare	Scirpus pungens M. Vahl [= S. americanus]
Trilliums	Trillium spp.
Tufted Hairgrass	Deschampsia cespitosa (L.) P. Beauv.
Tulip Tree	Liriodendron tulipifera L.
Twig-rush	Cladium mariscoides (Muhlenb.) Torrey
Velvet-leaf Blueberry	Vaccinium myrtilloides Michaux
Violets	Viola spp.
Virginia Creeper	Parthenocissus spp.
Water Lily	Nymphaea spp.

COMMON NAME	SCIENTIFIC NAME
Water Marigold	Megalodonta beckii (Torrey ex Sprengel) E. Greene [= Bidens beckii]
Water Milfoil	Myriophyllum spp.
Water Star-grass	Heteranthera dubia (Jacq.) MacMillan
Water Willow	Decodon verticillatus (L.) Elliott
Watercress	Nasturtium officinale R. Br. Ex Aiton and N. microphyllum (Boenn.) Reichb.
Waterweed	Elodea spp.
White Ash	Fraxinus americana L.
White Avens	Geum canadense Jacq.
White Birch	Betula papyrifera Marshall
White Cedar	Thuja occidentalis L.
White Elm	Ulmus americana L.
White Oak	Quercus alba L.
White Pine	Pinus strobus L.
White Poplar	Populus alba L.
White Snakeroot	Eupatorium rugosum Houtt.
White Spruce	Picea glauca (Moench) Voss
White Trillium	Trillium grandiflorum (Michaux) Salisb.
Wild Blue Flag	Iris versicolor L.
Wild Celery	Vallisneria americana Michaux
Wild Geranium	Geranium maculatum L.
Wild Ginger	Asarum canadense L.
Wild Grape	Vitis riparia Michaux
Wild Leek	Allium tricoccum Aiton
Wild Sarsaparilla	Aralia nudicaulis L.
Wild-rice	Zizania spp.
Willow	Salix spp.
Winterberry	Ilex verticillata (L.) A. Gray
Wintergreen	Gaultheria procumbens L.
Wood Ferns	Dryopteris spp.
Wormwood	Artemisia campestris L. ssp. caudata (Michaux) H.M. Hall & Clements
Yellow Birch	Betula allegheniensis Britton
Zig-zag Goldenrod	Solidago flexicaulis L.

Appendix C: Area Percentage Charts

The following charts represent a tool to assist practitioners in estimating area percentages. These charts are an excerpt from OIP (1985).




10 %
20 %
30 %
40 %
50 %
50 %
60 %
70 %
80 %
90 %

Appendix D: Using a Wedge Prism

Wedge prisms are sighting tools traditionally used to estimate basal area and volume of wood. Here the wedge prism is also used to give an objective estimate of the relative dominance of tree species within a polygon (i.e., stand composition).

The wedge prism is a wedge of glass which bends, or deflects, light by a given critical angle (Figure 27). When sighting trees with a wedge prism, the image of the trunk of a tree appears offset from the natural image (Figure 28). The tool is used by counting trees, by species, whose diameters are equal to, or greater than, the fixed critical angle (i.e., the **Prism Factor**) of the prism (Figure 29).

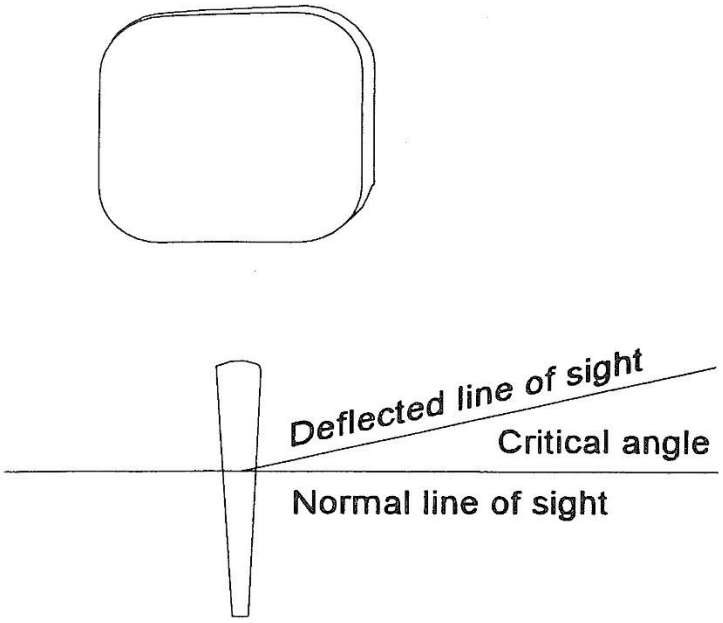


Figure 27. Diagram showing the wedge prism and how it deflects light by a critical angle.

Using the Wedge Prism

Select a location in the polygon where tree composition will be measured. This is the sample point. The location of the sample point should be selected in a random or stratified random manner, so that the tree composition is representative of the polygon. The prism is maintained at eye height and is kept directly over the sample point while doing a 360̊ sweep. Look through the wedge prism at each tree within eye sight around the sample point, aimed at breast height (1.3 m). If the diameter at breast height (DBH) of the tree is equal to or larger than the critical angle, the tree is counted in the sample, by species (see Figures 28 and 29). When viewing the tree through the wedge prism, the tree stem will appear to be offset or displaced (Figure 28). If the displacement is within the tree stem the tree is counted in the sample, otherwise it is omitted. A general rule for borderline trees is to consider every second borderline tree, for a particular species, as being counted within the sample.

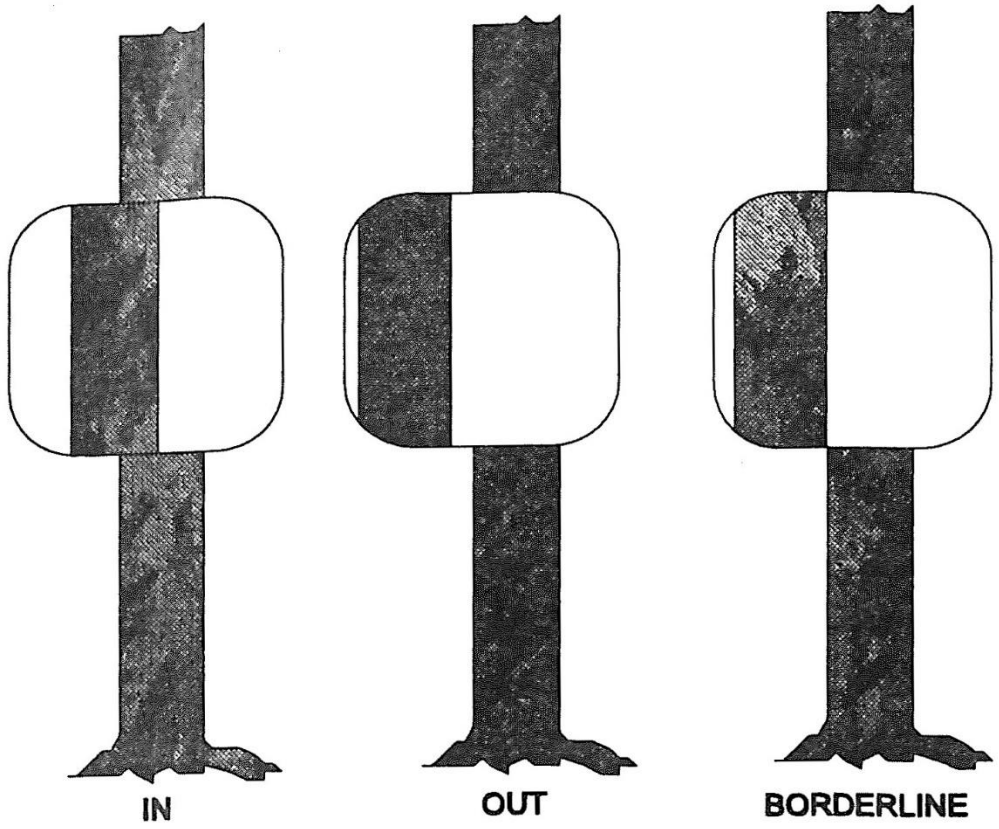


Figure 28. Diagram showing how to determine whether a tree is IN, OUT or BORDERLINE.

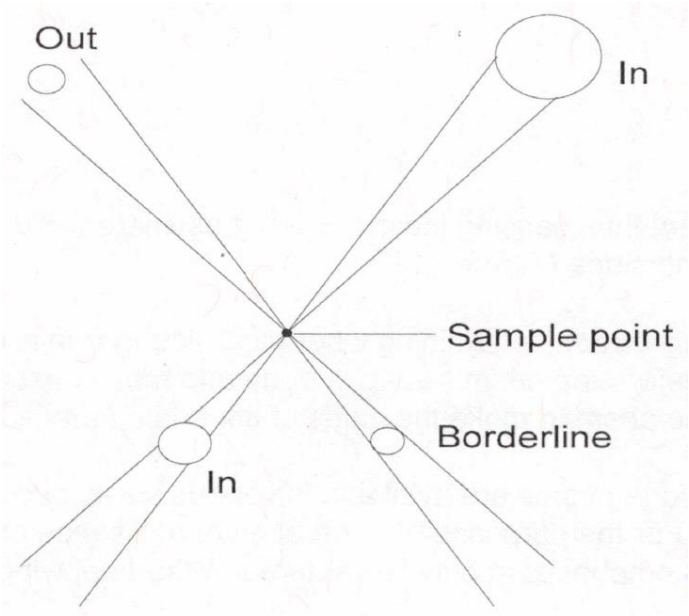


Figure 29. Diagram showing how the critical angle of the wedge prism is used to judge whether a particular tree is counted an IN, BORDERLINE or OUT when doing a sweep around a sample point.

Important things to consider:

1. **Positioning:** It is important to maintain the prism over the sample point through the entire 360̊ sweep. That is, the prism remains stationary, the pivot point by which the body of the practitioner rotates around. The prism also has to be maintained at a 90̊ angle (perpendicular) to the line of sight, on level ground (Figure 30). Failure to maintain the prism directly over the sample point at 90̊ will result in an incorrect tree count.

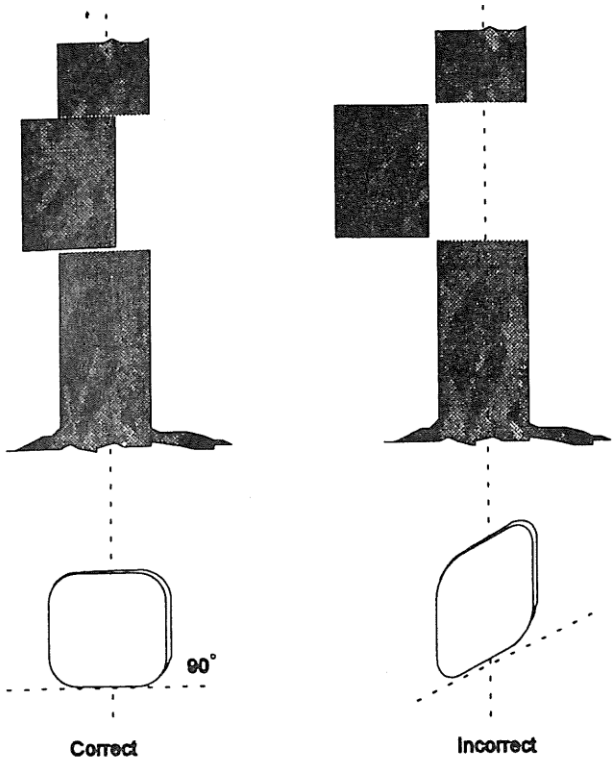


Figure 30**.** Figure 30. Diagram showing why the prism needs to be maintained at a 90° angle (perpendicular) to the line of sight.

2. **Correcting for slope:** A tree may appear to be out when viewed on a steep slope. When on a steep slope, the slope distance exceeds the horizontal distance to the tree, thus causing incorrect count estimates. To correct for the longer slope distance, rotate the prism through an angle equal to the angle of the ground slope (Figure 31).

3. **Hidden or leaning trees:** Determining whether a hidden tree is in or out should be avoided. The best way to solve this problem is to anticipate; check for hidden trees before the prism sweep is done and move the sample point to avoid hidden trees if necessary. To determine whether a leaning tree is counted, rotate the prism to make the sides of the prism parallel to the tree stem.

4. **Prism factor:** Wedge prisms are available in various sizes, according to different prism factors. As the prism factor gets larger the critical angle of the prism increases. For the purposes of general reconnaissance and determining stand composition, the critical angle of the prism should be kept at a minimum to avoid emphasizing only larger trees. When applying the ELC, a wedge prism with a **2x prism factor** is recommended.

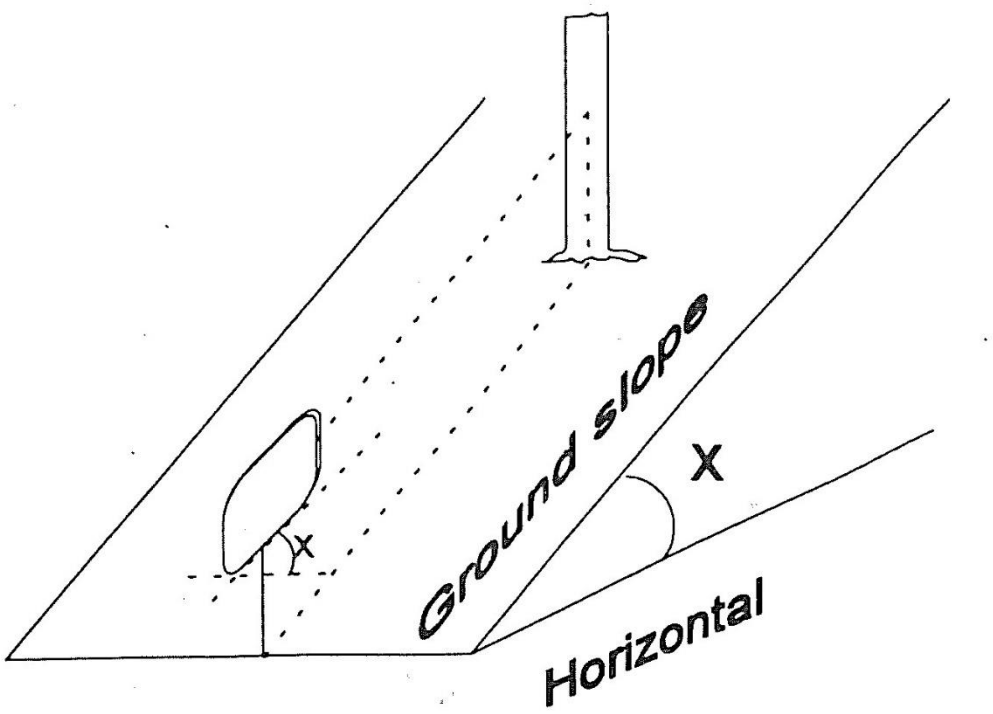


Figure 31. Diagram showing how to compensate for slopes when counting trees using the wedge prism. Rotate the prism to match the angle (i.e., x) between the ground slope and the horizontal.

Appendix E: New Ecosite and Vegetation Type Report Card

Copies of this New Ecosite and Vegetation Type Report Card should be filled in and submitted when the community does not fit any of the documented community types for Southern Ontario listed in the ELC Community Tables.

A completed set of field cards **must** be attached.

Submit the card to:

Harold Lee
The Southern Region ELC Working Group
Ministry of Natural Resources
Southern Region Science and Technology Transfer Unit
659 Exeter Road
London, Ontario
N6E 1L3

Site Region:		Site District:	
Name:			
Affiliation:			
Address: Email: Telephone:			
Project:			
Project Polygon or Reference Number:			
UTMZ:	UTME:	UTMN:	
Air-photo Information:	Year:	Season:	
	#:		
	Year:	Season:	
	#:		
ELC System:			
Community Class:			
Community Series:			New Y : N
Ecosite:			New Y : N
Vegetation Type:			New Y : N

See Over

Other Similar Ecosites:
Explain Differences:
Other Similar Vegetation Types:
Explain Differences:
Other Comments:
Completed Field Cards Enclosed: Stand and Soil Characteristics Community Description and Classification Plant Species List Management / Disturbance Wildlife