THE PRESERVATION OF URBAN WOODLANDS: A CASE STUDY OF THE UNIVERSITY ENDOWMENT LANDS, VANCOUVER, B.C.

By

CARMEN RIINA RIDA

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Department of Community and Regional Planning

The University of British Columbia
1956 Main Mall
Vancouver, Canada
V6T 1Y3

Date May 2, 1988.

ABSTRACT

The goal of this thesis was to show how urban woodlands play an important function in meeting the recreational, educational and other needs of urban populations, enhancing the quality of life in the city. This was achieved in four steps: (1) by describing the historical evolution of the establishment of trees and woodlands in cities, which occurred as urban populations, particularly in Europe, came to perceive trees and woodlands as a necessary and integral component of urban landscapes; (2) by establishing a comprehensive rationale for the preservation of urban woodlands, based on their important function in providing contact with nature and associated benefits that may otherwise be unavailable to urban populations, yet necessary for an enhanced quality of life in built-up urban environments; (3) by looking at various examples of urban woodlands and forest parks that have been established in various cities but especially in Europe, showing how these cities have recognized the value of integrating woodlands into urban environments and ensuring that urban residents are able to take advantage of the many opportunities they provide; and (4) by undertaking a case study of a local example of an urban woodland, the University Endowment Lands (UEL) woodland in Vancouver, British Columbia, and examining its natural attributes and opportunities to users which make it valuable as a recreational and educational resource, and therefore, worthy of preservation. The UEL woodland is a potential future urban forest park, pending the settlement

of current discussions and negotiations over the status and allocation of this vacant Crown land.

It was concluded that as an urban forest park, the UEL would not only complement the present urban woodland system of the Greater Vancouver area but also stand out as a unique urban natural area with few parallels elsewhere in urbanized North America, perhaps even the world. Its size and location within a completely urbanized area, combined with its extensive forest cover on primarily level or gently undulating topography, are enough to make the UEL woodland unique, but it also features canyons and cliffs, meadows, water courses, and a diversity of vegetation and habitat types growing in a relatively undisturbed state, with development limited only to a network of well-maintained trails in the forest, and access roads through the forest to the university. Thus, the UEL woodland provides a contrasting experience to the other urban forests and forest parks of Greater Vancouver, and if it is preserved, the opportunity exists to create an urban woodland park unparalleled in scenic and natural values, social benefits, and educational and recreational opportunities.

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Chapter 1

INTRODUCTION

A. Problem

The University Endowment Lands (UEL), situated between the University of British Columbia (UBC) and the City of Vancouver, is presently a large parcel of Crown land consisting mostly of unallocated forested property which has remained undeveloped within an urbanizing environs. There have been many proposals for land allocation and use of the UEL over the years, including preservation of the majority of the undeveloped land as an urban forest park. Proponents of the park proposal argue that the UEL provides excellent opportunities for recreation, education and research within easy access for city residents, and thus should be preserved so that present and future urban residents may take advantage of these opportunities. For many years they have attempted to secure official park status for the entire woodland to ensure its preservation, and have bordered on success, but decisive action on the issue by the landowner--the provincial government--has been continually stalled.

This thesis examines the viewpoint that the UEL woodland should be preserved as a park for its value to urban society. The first step in exploring this viewpoint is to identify why woodlands are perceived as a necessary component of urban open space. In this context, the problem

then consists of determining the attributes of the UEL woodland which make its preservation desirable, providing reasons for defending its preservation.

B. Purpose (Goals and Objectives)

The broad purpose of this thesis is to contribute to the literature that deals with planning for urban open space needs, and more particularly, urban open space preservation. In this context, the specific goal of this research is to show how a particular kind of open space--woodland--plays an important function in meeting the recreational, educational and other needs of urban populations, enhancing the quality of life in built-up urban areas. At the very least, it is hoped that this research will provide some insights for urban planners, developers, decision-makers and others on the unique and complementary role of large-scale woodlands in meeting urban open space needs, and, thus, the importance of ensuring that woodland areas, either existing or re-created, are sufficiently integrated into a system of urban open space.

Implicit in this goal are several questions which the research is designed to address: what are urban woodlands and urban woodland (forest) parks, and what is the history of their establishment? What are the reasons for preserving woodlands as parks, that is, what function do they perform for society? Where are some examples of existing urban woodlands and/or urban forest parks; how/why were they established/ preserved; and what kinds of opportunities do they provide for their users? Five objectives establish the framework for answering such questions and conducting the research:

(1) to examine the evolution of urban woodlands and woodland parks, in order to provide a historical background for understanding the significance of the presence of trees, forests, and natural areas to people throughout history, and how this has led to their inclusion within cities, so that the importance of a large tract of woodland, such as the UEL, within a built-up urban area, and the development of a viewpoint which promotes its preservation, may become clearer;

(2) to develop a rationale for the preservation of urban woodlands based on the benefits that their natural attributes can provide for residents of urban areas, that is, their function in urban society, and thus, their contribution to quality of life in the city;

(3) to look at examples of urban woodlands and forest parks--their attributes, the opportunities they provide for users, and, where information is available, how they are managed and/or designed to supply various benefits to the urban population--in order to provide an awareness of what has been achieved in the preservation or establishment of urban woodlands in various cities; and the kinds of opportunities they can provide to users;

(4) to undertake a case study of the local example of the UEL (which, although it is an existing urban woodland, has not been formally preserved or established as a park), and in this case study look at: the history of the woodland's land status, to understand why it still exists in a major urban area as unallocated, undeveloped land; the land use history of the area, to understand how historical uses and events have influenced the natural character and features of the woodland as they exist today, which are very important to the users

of the woodland; to examine the study area's natural resources and attributes, to understand the area's significance in providing various recreational and educational opportunities to users as well as its unique environmental/ecological values; the efforts to preserve the UEL, to understand the nature of other demands on the land, and to look at the arguments of preservation advocates who defend their preservation viewpoint against other demands; and to briefly assess the value of preserving the UEL woodland in light of the rationale for urban woodlands established in Chapter 3 and the knowledge gained from this case study, in order to show how the UEL as a forest park could contribute to the system of urban open space in Vancouver by meeting various recreational, educational and other needs in a unique setting, and to better understand the viewpoint of those calling for the UEL's preservation.

C. Context of this Study--Relation to Existing Literature

The literature on urban open space preservation does not deal as extensively with woodlands in urban areas as it does with other types of urban open space. There is much more information on the need to preserve open spaces such as manicured, landscaped parks; municipal parks developed with extensive recreational facilities; gardens; open squares and plazas; floodplains; beaches; and school yards and playing fields. This may be because undeveloped woodlands are generally rare within large cities and thus not often thought of as potential urban open space; parks with small stands of trees may be labeled "forest parks," but are lacking the natural, "wilderness" character of substantial woodland areas with which

this thesis is concerned. Thus, this thesis relates to the existing literature on urban open space by contributing to an increased awareness of the potential for sizeable woodland areas, where they still exist or can be re-created, to provide unique opportunities for recreation and education that cannot be supplied by the smaller, unforested urban open spaces. The thesis will also complement existing literature which discusses the merits of preserving and managing forests in rural towns.[1]

D. Rationale for Preservation of Urban Woodland

Preservation of forested land in urban areas is based upon a growing concern that, with continued urban sprawl and densification, city dwellers are increasingly isolated from contact with nature. Even urban open space, ornamentally landscaped to provide some aesthetic satisfaction, often lacks "the enrichment of an ecological base to provide habitat diversity or a rich variety of species and biological life within its separate habitats" (I. Laurie, 1979b:xvi). Maintaining forested areas within cities which are "diverse and varied in their biological and aesthetic interest" (I. Laurie, 1979b:xviii) enriches the experience of city living, offering an easily accessible supply of amenity and variety, and contrast and change from the relative monotony and biological sterility of concrete surfaces and structures.

This justification for preserving urban woodland in or near a city, when such land may be at a premium for other urban uses, derives from an understanding that urban woodlands provide a host of intangible benefits and opportunities to meet social, physical and psychological needs of restricted urban populations. They are a place where urbanites can seek

enjoyment and self-fulfillment by relating to their natural environment; cultivating an appreciation for nature and an understanding of the value of natural resources; studying ecology and learning about natural processes and human impacts; pursuing recreational activities for social interaction, relaxation or exercise; or escaping from the pressures and busyness of city life and seeking psychological respite. In addition, forested areas in cities may be of value as heritage sites, as living, life-size examples of a landscape which preceded the city, or in bearing the scars of past events that weave a palpable story of local history.

E. Significance of this Study

Where woodlands still occur within or near urban areas, many people are unaware of the variety of opportunities they provide. With its background research and case study of the large urban woodland that is called the University Endowment Lands (UEL) in Vancouver, this research is an attempt to heighten the awareness of the nature of an urban forest resource and the opportunities it can provide, so that such resources are not unduly reduced or lost without a balanced consideration of their potential to serve the urban public.

F. Scope and Limitations

The focus of this thesis is on the qualitative role of urban woodlands in meeting urban open space needs, with a specific overview of the supply of opportunities for recreation and education and other benefits on the UEL in Vancouver. It is beyond the scope of this thesis to conduct any quantitative analyses of these resources and opportunities,

or of the demand for them and existing use. (Some quantitative research into uses of the UEL has been done by Klassen (1976, 1983).)

Once an urban woodland is preserved as a park, its management and/or development policies should be articulated, including management of the biophysical (e.g., vegetation, wildlife) resources and park design (e.g., facilities and services development). It is beyond the scope of this thesis to address the formulation of such policies for the UEL; instead, the thesis describes certain provisions, developments and/or management practices undertaken in selected examples of urban woodlands elsewhere, which may or may not be applicable to the UEL if it is made a regional park. A few ideas on the enhancement of recreational and educational opportunities are discussed in Chapter 5, Section C, and possible vegetation management techniques are outlined in a general sense for potential application in urban woodlands in Appendix 3.

G. Methodology

A survey of bibliographic material dealing with urban and suburban forests and forestry, forest parks and woodland management provided a substantial information base from which relevant information was extracted for the background study and literature review. Some material was located through means of a library computer search of the CAB (Commonwealth Agricultural Bureaux Abstracts) data base. Most bibliographic sources were located through a manual search in libraries using catalogues, abstracts, bibliographies and references. The key words considered important in locating relevant literature were: urban/suburban/town/city parks/parkland/forests/greenspace/woodland/natural area/forestry, and

woodland/forest park management/development/improvement, and recreation and education. (Not all information obtained was relevant.) The Laurentian Forest Research Center supplied information on the concept of urban forests on request.

The case study method was used to investigate the local area, the University Endowment Lands (UEL). The sources of background information on the UEL, its history and its biophysical resource were the UBC library, newspapers, Greater Vancouver Regional District (GVRD) Parks Department files and publications and communications with staff, the UEL Administration Office, and the Endowment Regional Parks Committee. Of this background material, the discussion of the vegetation and soils of the UEL benefits from a personal knowledge of the resource, as I was involved in the field work (1983/84) for collecting the data for the vegetation analysis of the UEL for the GVRD Parks Department. Public meetings on the debate over the UEL were attended personally.

Photographs of the UEL were obtained from the UEL Trail Riders club, and maps and photographs from the GVRD Parks Department.

To present the example of the Morgan Arboretum, information was solicited by correspondence with the director of the Arboretum, in addition to that located in two journals and two graduate theses.

H. Definitions

Preservation in this thesis refers to the setting aside or saving, by means of land use ordinances for example, of a woodland area in its natural state, to prevent its conversion to non-woodland uses (e.g., urban development) and, thus, to keep the area available for future use. Often,

preservation and conservation are used interchangeably. However, in this thesis preservation is distinguished from conservation, which here is meant to denote action within the woodland--management of the woodland's resources in order to protect them from loss or destruction and to maintain their viability. Thus, a woodland may be preserved if it is saved from being converted to any other state than natural woodland, but once the area is preserved, conservation measures may be necessary to ensure the long-term maintenance and perpetuation of certain features (such as certain vegetation types and wildlife habitats, which will change over time, naturally, if not managed). Thus, "conservation" in this thesis is used to refer to management action or decisions.

Urban woodland in this thesis refers to a tract of forested land located within or on the edge of a built-up urban or suburban area. It is an aggregation of trees and associated soils, plants and wildlife, and is within easy access of a surrounding or peripheral urban or suburban population. Urban forest is synonymous with urban woodland in this thesis, but is not used as often, since it is commonly used by arboriculturalists ("urban foresters") as a collective term to refer to all the trees which are found in a city, along its streets and boulevads, in parks and yards, and so on. Thus, an urban forest in this thesis is an urban woodland, not a collection of a city's individual ornamental trees. Urban forest park refers to urban woodlands in terms of function--"park" is an anthropocentric or man-centred concept which denotes the area's function for human use, such as recreation or education (Wilkinson, 1983:3). Thus, if an urban woodland is being used by the public for recreation, it is essentially an urban forest park in this functional

sense, even if it is not officially called a park, or developed to any degree with facilities for organized recreational use. However, "urban forest park" is used more commonly in this thesis to refer to those urban woodlands which are developed to some degree with facilities and areas for active, organized recreation, such as playfields, ornamentally landscaped areas and lakes, zoos, etcetera, but still retain large areas of natural woodland. Urban woodlands which are not so developed may also be recognized as 'urban forest parks' if they are designated as such, with "park" in their name. However, more importantly, "urban forest park" is distinguished here from typical "city (or urban) parks" in terms of form--city parks are characterized by their lack of any natural, relatively, wild forest areas and their manicured appearance. City parks may or may not contain trees, but when they do these are usually ornamental and strategically placed individual trees, without any appearance of a natural forest.

Urban open space in its broadest sense includes "all land and water in an urban area which is not covered by buildings" (Gold, 1973). This definition of urban open space recognizes form, but if function is also considered, any spacious publicly used area in the man-made environment, such as shopping malls, could also be considered open space. In this thesis "urban open space" is limited (in both form and function) to the natural areas, gardens and parks which are available for recreational, and/or educational use in a city. Natural areas are areas with any combination of natural elements--vegetation, water, soils, wildlife, etcetera--where biotic and physical processes predominate over human influence (Gill and Bonnett, 1973:166), such as ocean shores, floodplains,

greenbelts (belts of vegetation), greenspace (any area with a vegetative cover) and woodlands (a type of greenspace); any of these may be either developed or undeveloped for recreational use.

In discussing the UEL vegetation, the concept of natural succession may be unfamiliar to some. Natural (ecological) succession, in simple terms, is the process of natural change in the vegetation and animal life of an ecosystem that occurs as the plant community evolves from a simpler, shorter-lived state to a more complex, longer-lived state, such as from a grassland to a shrub community, to a mixed deciduous- coniferous forest, to a long-lasting coniferous forest. Thus, if this process is allowed to continue without disturbance, a sequence of recognizably different plant communities ("successional stages") replace each other over time. The first successional stage on a bare or recently disturbed site is the pioneer stage, characterized by species which are good at colonizing such sites, (e.g., grasses, red alder), but they are soon replaced by later successional stages (e.g., mixed coniferous-deciduous) as they change the site conditions so that other species can take over. This continues, if disturbance does not set the process back to earlier stages, until a long-lived community is reached, called climax (e.g., closed coniferous forests) which, if undisturbed, can last hundreds of years.

I. Organization of Thesis

The first chapter has been an introduction to the thesis research, outlining: the problem to be addressed; the purpose, goal and objectives; the context or relation of the thesis to existing knowledge of the rationale for preserving urban woodlands; the significance, scope and

limitations of the research; the methodology used; and the definition of key words as they are to be understood in this paper. The remainer of this thesis is divided into four chapters.

Chapter 2 presents the historical overview of the evolution of urban forest parks and woodlands, which meets the first objective of this thesis.

Chapter 3 expands on the brief rationale for preserving urban woodlands given in this chapter, meeting the second objective of the researh. The third objective of the research is met by Chapter 4, which describes modern examples of urban woodlands and forest parks. Chapter 5 contains a summary of the thesis and concludes with final comments on the validity of the viewpoint that the UEL in particular, and urban woodlands in general, should be preserved as urban open space. Suggestions for further research are also made.

Chapter 2

HISTORICAL OVERVIEW: THE EVOLUTION OF URBAN FOREST PARKS AND WOODLANDS

This discussion of the evolution of urban woodlands and forest parks traces the history of the establishment of trees and woodlands within or around cities through time, in order to provide an understanding of how (and why) trees and forests have been established in cities over time, and is intended as a background for understanding the present significance of a large tract of woodland within modern urban surroundings, such as the UEL, and the viewpoint which encourages its preservation.

A. Pre-eighteenth Century

Trees and forests have always been a part of the human environment, providing food, shelter, fuel and enjoyment (Cliff, 1970:17). However, little has been written about the establishment of public forest parks in or near cities before the eighteenth century (Zube, 1970:145). Most of the literature dealing with the history of urban woodlands describes the eighteenth century as the period where noticeable, deliberate efforts were made to establish trees and forest parks in or near cities for public use. Ervin Zube notes,

> Trees have been around for about 300 million years. Cities are thought to have started about seven to eight thousand years ago. Trees and cities, however, do not appear to have been brought together by the conscious act of design until the Eighteenth Century, roughly two hundred years ago.

> The literature dealing with the history of cities, their design and morphology--the conscious efforts to influence their physical structure and form--contains very few references to the presence of, or to the use of, trees in a public sense (1970:145).

What has been written in the literature about pre-eighteenth-century woodlands suggests that the forerunners of contemporary urban woodlands and forest parks were most likely the private, formal gardens and municipal or royal forests of medieval times (or, as some writers propose, even earlier). According to Don Gill and Penelope Bonnett (1973:75), the principal central parks of London, England, have their origins in the medieval period, when they were set aside as royal hunting preserves or as sites for country palaces; they refer to these places as "noble playgrounds." Lars Kardell (1985:140), in presenting a historical background for Sweden's recreation forests, similarly writes that kings and noblemen devoted time to hunting in specially reserved areas, and he also suggests that historical roots for today's recreation areas include the monastery gardens of the Middle Ages. Dr. Rolf Zundell (1978:1) mentions books written in 1580 in Strasbourg, which tell about "welfare and 'entertainment' by trees and forests," and he also writes that "the citizens of the medieval tradetown of NÜrnberg set aside recreation plots within forests near the town."

Some writers suggest even earlier antecedents. John W. Andresen (1978:1211) writes that urban gardens and parks "have been manipulated for thousands of years," mainly under elitist influence, with primary emphasis on "sensual and visual amenity," and municipally or royally controlled forests were primarily used for recreational hunting. He notes that there was ornamental use of trees by the ancient privileged classes: "Urbane

rulers of established (or declining) empires . . . added cosmetic attractions to their gardens" (Andresen, 1976:109).

Ancient beginnings and elitist influence are confirmed by other writers. Zube, citing M.L. Gothein, mentions that there is evidence in Egypt "of the use of trees in private gardens to provide a more salubrious environment for the wealthy or the ruling class, as early as the Third and Fourth Dynasties or 2800-2100 B.C." (1970:145). Paul F. Wilkinson (1983:46) traces the concept of a park to ancient Mesopotamia, "where open spaces were designed with interspersed woodlands, vineyards, and ponds; a well-designed trail system; and an emphasis on maintaining natural aesthetics." He suggests that the first apparent planning of parklike landscapes was initiated by Sumerian King Gudea around 2340 B.C. In addition, he points out that access to ancient parks, the primary purpose of which was strictly aesthetic enjoyment, was restricted to the ruling, land-holding aristocrats (Wilkinson, 1983:46). Anne Whiston Spirn (1984:29) notes that philosophers in ancient Athens gathered their students in gardens with groves of trees.

Zube (1970:145) contends that there is no mention or evidence of the use of trees in the public landscape, such as parks, of cities in early history, but that "the example of Egypt" holds through the Middle Ages and the Renaissance, with the only "intrusion of trees or woodland" into the medieval walled cities being "the chance view through the open town gate or over the walls to the landscape beyond." Spirn (1984:31), however, disagrees that this lasted throughout the entire Renaissance, citing the example of sixteenth century Cologne in Europe, where "the new market was a large square filled with trees, as were the six streets that marked the

sites of former city walls. . . . A wall, a moat, and a tree-lined path encircled the city." Spirn continues:

> The wall and moat, rather than presenting a barrier to the countryside, created a pleasant place for strolling and recreation: "Outside the city," reads an inscription in a contemporary atlas, "there are two hills and a broad moat, shaded by green trees, which serve as playing grounds in summer, and are used for the recreation of the students and all other kinds of sport and pastimes" (1984:31).

Spirn also points out that trees and gardens were not always an amenity restricted to the elite. She notes that, in sixteenth-century Cologne, most houses had a large back garden. It was not until the seventeenth century, when cities had grown larger and more congested, that a garden of one's own and easy access to the countryside became privileges more and more out of reach of the common citizen, as houses were being built where peoples' backyard orchards and gardens had once stood. Spirn also argues that this had already happened in the large urban centers of London and Paris as early as 1516, implying that common citizens in those cities, too, had once enjoyed private gardens of their own. By the eighteenth century, Cologne's many private gardens had disappeared, as had those of most other European cities (1984:31). Spirn (1984:29) acknowledges that it was not until the nineteenth century that cities began setting aside huge tracts of woods and meadows "for the edification, health, and enjoyment of their residents."

Edward P. Cliff (1970:17) agrees with Spirn that trees were planted in towns and cities of our early civilizations, for both shade and beauty, and he also concurs with the other writers who note the prevalent elitist influence in the establishment of parks and gardens, observing that many of the gardens and parks which tourists visit in Europe today are the

result of nobility and aristocracy becoming interested in establishing gardens, parks and forests for their enjoyment in the seventeenth and eighteenth centuries. Andresen (1976:109) supports this observation, writing that the post-Renaissance ruling classes managed their forests to enhance their hunting and forest recreation pleasures.

These examples demonstrate that early town gardens, parks and forests, whether private, elitist, or public, were important as places for amenity and recreation, as they still are today. Likewise, the contemporary goals of education and research seem to have been significant factors in the establishment of gardens in medieval times. Michael Laurie gives examples of botanic gardens in medieval Europe which were located in relation to medical schools, due to an interest in the natural world arising from the pursuit of knowledge and the search for useful minerals and medicinal plants (M. Laurie, 1979:38).

B. Eighteenth Century to Present

1. Influence of the French Baroque Garden

The next stage in the evolution of urban forest parks and woodlands can be identified as a conscious move to include trees in the public landscape of the city, starting in Europe in the eighteenth century and soon spreading to America (Zube, 1970:146). Eighteenth-century town design was strongly influenced by the tree-lined, radiating-pathways styles of the Baroque Gardens of France, especially that of Versailles designed between 1661 and 1674 (Pitt et al., 1979:206). This formal, geometric style of French and Italian garden design permeated all of Europe in the seventeenth century, and provided the inspiration for

eighteenth-century gardens and cities, in which spaces and streets were sharply delineated either by the forest or by the planting of trees along the edges (Zube, 1970:146; M. Laurie, 1979:40). For example, in America, Major Pierre Charles L'Enfant adopted the Baroque, tree-lined boulevard as the design concept for his 1791 plan for Washington, D.C., the radial pattern of planted avenues being reminiscent of Versailles (M.Laurie, 1979:49; Pitt et al., 1979:208). L'Enfant's plan had an impact on the design of other American cities, such as Detroit (M. Laurie, 1979:49). According to an act passed in 1807 in the Territory of Michigan, the 120-foot avenues of Detroit were to be planted on both sides with a double line of trees, while both sides of 200-foot avenues were to be planted with trees in clumps or groves in an elliptical shape, and residential squares were also to contain trees (Zube, 1970:146).

Another example of the trend in the eighteenth century toward establishing trees in cities occurred in the city of Philadelphia. Philadelphia had been planned by William Penn in 1682, with five open squares of eight to ten acres each which were to have only trees (Zube, 1970:146). True to pre-eighteenth century practice, there was little regard for providing open space or trees for public enjoyment, since only the centre square was open to the general public, and the city streets lacked trees. However, near the end of the eighteenth century, Lombardy poplars were imported from Europe for planting in the city (Zube, 1970:146; M. Laurie, 1979:49). Similarly, by 1800, trees had begun to appear as significant elements of the London landscape. Many of these were found in the city's residential squares, where freely planted trees and lawns provided landscape gardens for those who lived in the

surrounding rows of townhouses (Zube, 1970:146; M. Laurie, 1979:46; Pitt et al., 1979:207).

2. Royal Parks in London and Paris

By the turn of the century, then, trees had begun to appear in cities, but parklike natural areas for public use within cities were still rather scarce. In European cities these were often limited to old cemeteries adjacent to churches and perhaps a common near the centre of town (M. Laurie, 1979:46). However, the royal parks of London and Paris, well-established by the eighteenth century, would eventually make these two cities exceptional in the provision of urban public greenspace (M. Laurie, 1979:46). Wilkinson writes that the royal reserves, with their great hunting parks and wooded retreats, "would become the great public parks of the 19th century. The expansion of the cities eventually brought them into the urban picture, and the advent of broadly-based democratic institutions made them at last available to public use" (1983:59). London's Hyde Park had actually been open to the public since 1635, and eventually others, such as Green Park and St. James Park, were also opened, with their use increasing as the city grew around them, demonstrating the value of such areas to "contemporary, less fortunately endowed industrial cities" (Wilkinson, 1983:59). In Paris, the pattern of royal open space included the Champs Elysees, the Tuilleries, the Royal Botanic Garden and the Parc de Monceau, all open for public use by the early 1800s (Wilkinson, 1983:59).

3. Eighteenth-Century Canada

There was no parallel movement in Canada in the eighteenth century to enhance urban environments with trees or greenspace. According to Jaakson and Diamond (1981:5), in most Canadian eighteenth-century settlements, there was relatively little land specifically set aside for outdoor recreational use, and cemeteries, churchyards, or town commons were used as public outdoor spaces, with little consideration given to siting, seasonal activities, natural attributes or upkeep of these areas. They contend that this eighteenth-century attitude in Canada toward open space "can be attributed to a perception of the seemingly limitless wildlands which surrounded settlements, to a realistic need to place survival before aesthetics, and to a land ethic which stressed human dominance over nature and the exploitation of resources" (1981:5).

4. Influence of the Romantic Landscape Movement and the Establishment of Public Parks in the Nineteenth Century

Two developments in the nineteenth century can be identified as significant landmarks in the evolution of modern urban forest parks and woodlands. It was in the early nineteenth century that the provision of natural areas in cities for public use (not just tree-lined streets) became an important practice, developing into a city-park movement by mid-century. Furthermore, the eighteenth-century interest in the formal French Baroque garden and tree-lined boulevards matured into a nineteenth-century preference for natural, or natural-appearing, landscapes, in response to a growing naturalist (or "Romantic landscape") movement, which had started in England as a reaction to growing industrialism (Zube,

1970:147). M. Laurie (1979:58-59) notes that "the virtue and beauty of nature was thought of as an antidote to the social and physical ugliness of the industrial city." The movement was characterized by the development of an aesthetic appreciation and new philosophical interest in nature to accompany the well-established scientific interest.

The influence of this Romantic landscape movement was already evident in 1800 in the freely planted landscape gardens of the residential squares of London, and in 1810 in Regents Park, laid out "in flowing patterns of trees and lawns" (Pitt et al., 1979:207). Regents Park, in contrast to the royal parks of London, was, according to M. Laurie (1979:46), actually custom designed as a public park by John Nash, and eventually included a zoo at its northern edge, founded in 1826 by the London Zoological Society, and a botanic garden in the middle of the park, established in 1839 by the Royal Botanic Society. This garden was designed on the scale and in the manner of a large landscape garden, reflecting the influence of the Romantic landscape movement. Botanic gardens were actually laid out in many large cities because of the continuing scientific interest in nature that had started centuries before, and, prior to the parks movement, they also inadvertently provided the experience of natural scenery in the midst of the city for people's enjoyment, proving to be sources of recreation as well as education (M. Laurie, 1979:47).

In the 1840s another park, Victoria Park, was established in London, designed by James Pennithorne in 1841. M. Laurie (1979:47) notes that by this time, although exceptional, London and Paris had a "fortuitous supply of public gardens and parks" and their "enthusiastic use by the people

helped to establish the idea that such open spaces were a desireable and necessary part of a city." Public walks and open spaces came to be thought of as necessary for the health and morality of the townspeople, and consequently, acts of the British parliament were passed that permitted the use of public funds for building parks in cities. Such funding was used by the City of Birkenhead in 1843 to employ Joseph Paxton to design a park and surrounding associated housing. According to M. Laurie, the park was designed "to look like a piece of natural scenery in which the public could picnic, play games, and generally enjoy their leisure time in fresh air and in contact with a semblance of nature. Such an environment was deemed one conducive to spiritual and physical well-being" (1979:48). Thus began an intense period of park building in Britain, stimulated by the success of Birkenhead Park, which, both M. Laurie (1979:48) and Wilkinson (1983:63) contend, also initiated the public park movement in Europe. Jaakson and Diamond (1981:5) also establish Birkenhead Park (1843) (as well as Regents Park (1841)) as an important precedent in park planning in both Canada and the United States, contributing to less formality in the design of public open space in favor of establishing and enhancing natural areas within major population centres. This desire for nature and less formality was evident in the acquisition, in the late nineteenth century, of many British "commons" (previously not available for public use) (Wilkinson, 1983:61) for urban parkland. Some, like Hampstead Heath in London, were, according to Wilkinson,

> apparently indigenous and wild, affording the common citizen a brief contact with nature that may be either active or contemplative, or both. This return to nature as a retreat

> from Victorian sophistication was initiated by the growing middle classes and expressed itself in the search for English rural scene (1983:63).

Other writers also place the growth of a widespread public park movement around the mid-1800s. Gill and Bonnett, citing several sources, write about the Greater London area in Britain:

> In the mid-nineteenth century a "parks movement" blossomed and resulted in local governments acquiring large private estates and derelict land within their administrative areas for conversion to public parks or institutional use (1973:75).

Kardell (1985:140) writes in an article that public parks in Sweden are not much more than a hundred years old. Zube (1970:147) notes that the influence of the Romantic landscape movement in America included the growth of the city-park movement in the mid-nineteenth century.

5. Elitist Influence

It is interesting to note that there seems to have been an elitist influence in the setting aside of many European public gardens and parks in the nineteenth century as there had been in earlier times, although this time the elite were providing for the lower class, not just themselves. The Romantic landscape movement, as mentioned earlier, had started in England as a reaction to growing industrialism, and, as Pitt et al. (1979:207) note, by mid-nineteenth century "the adulation of nature was so strong in England at that time that people felt almost a moral obligation to plant every free area." M. Laurie (1979:47) describes how, in this mid-nineteenth century "nature-oriented society," a home with a

landscape garden was regarded as a "status symbol of the merchant and professional middle-class." This led to the middle-class believing that public gardens and parks should also be set aside for the lower classes. M. Laurie writes that

> the development of a middle-class snobbery seems to have been a major step in the process whereby the same segment of society supported, or at least approved of the concept of public gardens for the less fortunate. In addition, enthusiasm for urban improvement in the form of parks provided the middle and upper classes an opportunity to identify with intellectual, social, and fashionable movements. These were linked together in the theory that the moral and physical well-being of the lower class could be increased by contact with natural beauty which in turn improved the visual quality of the city. In addition, the approval of city owned parks by society provided opportunities for personal fulfillment and conceit in the form of trusteeships, board and community memberships.
>
> A programme of action was generated by a nature-oriented society wanting an agreeable environment. In addition, it became increasingly clear that there was an associated need for open space for recreational use by the expanding working population whose living conditions left much to be desired (1979:47-48).

6. The City Park Movement in America

As mentioned earlier, American cities soon followed the lead of European cities in the eighteenth century in establishing trees in cities in the manner of tree-lined streets or formal planting of open spaces. There is mention of a town forest prior to the eighteenth century by authors C.D. McBane and J.P. Barrett (1986:1), who contend that the first town forest in America "was designated in 1710 by the town selectmen from Newington, New Hampshire with the intent of preserving some of the town's

valuable natural resources from development and overuse." However, other than this example, it appears that trees had not been an integral part of colonial American towns, as one may instinctively assume. While trees were planted for shade around many colonial homes (Cliff, 1970:17), open space in seventeenth-century New England towns consisted of a common,--an open rectangular area used for "mustering the militia and herding the cattle in the event of an Indian attack," where trees would have hindered detection of the enemy (Zube, 1970:146). These commons were also used for grazing stock and military parades (M. Laurie, 1979:48). It was not until the late eighteenth and early nineteenth centuries that these commons were planted with trees and grass (Zube, 1970:146), and, eventually, they began to assume the role of public parks in place of their historic use (M. Laurie, 1979:49). However, it has been suggested that trees planted in the common, usually Lombardy poplars, were planted more as symbols of civic-mindedness than for a desire to establish nature in the town. M. Laurie notes that

> the gardens in urban squares were more symbols of nature. Avenues of poplars recalled ancient Roman practice in marking roads and were regarded as urban ornaments and symbols of civic pride (1979:49).

Indeed, up until the early 1800s nature was still close at hand in the countryside surrounding the small towns, and most houses in the larger cities had gardens (M. Laurie, 1979:49). The establishment of landscape parks, along with the attitude that trees would improve environmental quality, came about in the mid-1800s as towns and cities expanded and the

influence of the Romantic landscape movement spread from Europe to America. The impact of the naturalist movement in nineteenth-century America was manifest not only in the provision of open space for the congested urban areas but also, more importantly, in the design of these spaces to look like "natural" or "country" scenery (M. Laurie, 1979:58).

At first, the Romantic landscape movement influenced the design of cemeteries being established in the 1830s, and these cemeteries, in turn, played a role in initiating the establishment of urban public parks. In the 1830s, new burial grounds had to be found as alternative sites to central churchyards which could no longer serve the older and expanding American cities. Thus began the establishment of rural or scenic cemeteries situated on the edge of town, designed with winding roads and paths and landscaped to provide "a piece of romantic scenery" (M. Laurie, 1979:50). According to M. Laurie (1979:49), "it was a romantic idea to make these parks for the deceased into naturalistic settings and one in keeping with and inspired by the growing public interest in nature".

These rural cemeteries were soon used by hundreds of urban people for pleasure outings and picnics due to a lack of attractive public open space in the large cities. Between April and December of 1848, estimates of thirty thousand visitors to Laurel Hill Cemetery (est. 1836), Philadelphia, and twice that number to Greenwood Cemetery (est. 1838), Brooklyn, New York, revealed the popularity of these romantic, rural settings and indicated the desire of urban people for "natural settings in which to socialize and relax" (M. Laurie, 1979:50). The idea was born that public parks laid out in similar fashion would fulfill a significant function for the urban population. In fact, the apparent value of parks

was demonstrated not only by the popularity of cemeteries, but also by the public's use of other areas which, like cemeteries, were not specifically designed for that purpose: commons, botanic gardens, and the royal parks in Europe (M. Laurie, 1979:59).

Andrew Jackson Downing, landscape gardener, noted in 1849 the great attraction of cemeteries and concluded that public parks would be equally popular, and educational. He was already an advocate of nature "as a source of pleasure and benefit for society and the individual," believing that contact with nature would provide "repose for body and soul--new life" (M. Laurie, 1979:51). M. Laurie (1979:51-52) notes that while this was clearly in line with the thinking of the day, Downing's contribution was that he applied this popular philosophy by translating it into a definite plan of action for public parks which would transform cities and benefit their population. Visiting England and Europe in 1850 to experience their public parks, gardens and open space, he was impressed by the five hundred acres (202.5 hectares) of public gardens at Munich and concluded that five hundred acres (202.5 hectares) was a suitable size for a public park in a major city (M. Laurie, 1979:52). In 1851, he proposed a park of five hundred acres (202.5 hectares) for New York City, stating:

> In that area there would be space enough to have broad reaches of park and pleasure grounds with a real feeling of the breadth and beauty of green fields, the perfume, and freshness of nature (M. Laurie, 1979:54).

Although he died in 1852, Downing may well be considered one of the first pioneers of the urban public park movement in America, for it was as

editor from 1846 to 1852, of a paper called the Horticulturalist, that he "incessanty preached the gospel of public parks as they were being established in England" (Bugslag, 1963:67).

Other advocates of public parks carried on Downing's vision. William Cullen Bryant, a poet and newspaper editor influenced by Wordsworth and Coleridge and the naturalist philosophy, argued for the establishment of parks, and Central Park in New York in particular. He called for a large area of woodland to be set aside so that city people could "find respite from the urban landscape and enjoy the pastoral life" (Wilkinson, 1983:67). Another advocate was Frederick Law Olmsted, a firm believer in Downing's ideas, who also argued for the beauty of nature and its inspirational effect to be provided by public parks in the city (M. Laurie, 1979:53). Like Downing, Olmsted had also travelled in England and Europe, and he was particularly impressed by Paxton's work on Birkenhead Park in Liverpool, England, which he had visited in 1850 (Bugslag, 1963:68). In 1856, the seven hundred acres (283.5 hectares) of land finally purchased for Central Park in New York attested to the persuasiveness of these park advocates and influential citizens who supported their ideas (M. Laurie, 1979:54). Olmstead was appointed Superintendent of the Park.[8]

Olmsted, working with Calvert Vaux, an English architect, won the right to design the landscape of Central Park in a design competition, and created a natural quality and scale such that the park looked like the countryside (M. Laurie, 1979:55). He was strongly motivated by both visual and social concerns, and, thus, according to Zube (1970:147), tried to introduce "an element of contrast" into what he saw as "an otherwise

monotonous or homegeneous matrix of streets and buildings." Zube cites Olmsted, disclosing his intention for Central Park:

> . . . to supply to the hundreds of thousands of tired workers, who have no opportunity to spend their summers in the country, a specimen of God's handiwork that shall be to them, inexpensively, what a month or two in the White Mountains or the Adirondacks is at great cost, to those in easier circumstances (1970:147).

M. Laurie (1979:56) writes that Olmstead's design of Central Park persuaded the American people that parks laid out as pieces of natural scenery produced economic, social and aesthetic improvements for any city. (Economically, land values became higher adjacent to parks, meaning higher taxes for the city purse.) Thus, Central Park became the standard or prototype for the city-park movement, and an intense period of building similar landscaped, natural-appearing parks began in all major American cities, reaching a climax at the end of the nineteenth century (M. Laurie, 1979:56, 59)). Spirn (1984:26) describes the resulting parks as "pastoral parks, designed as an idealized form of nature derived from British country estates."

7. The City Park Movement in Canada

The mid-nineteenth-century park movement also spread to Canadian cities. As populations in Canadian settlements grew in the nineteenth century, and the towns expanded and became cities, a conscious attempt to establish and preserve open space became evident, and the notion of rugged, scenic gardens as places for people to enjoy and observe nature

spread from England to Canada (Jaakson and Diamond, 1981:5). The Halifax Gardens, established in 1860, imitated the less formal, natural aspects of Birkenhead Park in Liverpool and Regents Park in London (Jaakson and Diamond, 1981:5). Frederick Law Olmsted was commissioned to design Mount Royal Park in Montreal in 1876, no doubt due to his success with Central Park in New York and parks in other American cities. He laced Mount Royal Park with scenic drives and pathways, defined and sheltered recreation areas with trees and shrubs, and created wildlife habitats, bringing the Romantic landscape influence to Canada. Olmsted designed several other projects in the country, including the preparation of a master plan for the scenic lands around Niagara Falls in 1879 (Jaakson and diamond, 1981:5-6).

The introduction and enhancement of natural areas within cities thus began. In the last part of the nineteenth century, high densities and increased congestion in Canadian industrial cities precipitated plans to maintain or create natural environments within or near the urban centres, influenced by Olmsted and Ebenezer Howard, who advocated trees and natural open spaces in order to assure the maintenance of human health (Jaakson and Diamond, 1981:6). Thus, as immigration proceeded to the west coast, the residents of the new cities recognized this need and set aside outdoor areas for city people to enjoy (Jaakson and Diamond, 1981:6). This city-park movement occurred early enough in Canadian settlements that several tracts of woodland escaped development to become the earliest examples of Canadian urban forest parks. For example, Stanley Park in Vancouver, British Columbia, originally established in 1859 as a Naval Reserve, was dedicated as a park in 1886 "in order to preserve an example of the native

forest" for "the education and enjoyment of future generations" (Bakewell, 1980:1 and Appendix VII). Central Park in Burnaby, British Columbia, also originally a Military Reserve, was established as a park in 1891 (Gardner, Peepre and Associates Limited, 1981:1), and still retains forested land along with developed parkland.

8. Urban Forest Parks and Woodlands

The final stage in the evolution of urban forest parks and woodlands can be identified with the setting aside of sizeable forested areas in or near cities or suburbs. This stage developed largely in the twentieth century in North America, when conditions of increasing urbanization and urban sprawl, and increasing deforestation, instigated a move to complement the simulated natural landscape of urban parks with forests or forest parks that comprise substantially larger, naturally wooded areas reminiscent of the pre-urban wilderness. However, many urban forests in Europe, in addition to royal parks or hunting preserves, were already well established in the late nineteenth century due to historical circumstances that differ from the early North American situation.

Clark Holscher (1970, 1973) describes how most of the forests in Europe today are under the jurisdiction of cities because of a long, pre-railway history of each settlement satisfying its own needs for wood from the forests in the immediate vicinity. The historic situation was one of extremely high demands on a rather limited forest resource, making it imperative that the communities discover and apply forest management practices which would maintain these adjacent forests, ensuring a perpetual harvest. Managed forests were thus already well established

around many European cities by the late nineteenth century. In addition, in many European countries there developed a tradition of "every man's right" of free access to the forest, regardless of ownership, so that these urban forests began to be used for recreation and relaxation by anyone, regardless of economic status, wanting to escape from the urban environment. Thus, these municipal forests eventually acquired a parklike role, while also serving as a source of wood supplies, even though they were not formally designated as parks. For example, the urban forests of Frankfurt, owned by the city since 1732 and professionally managed since that time for lumber, fuel, game and water supply, have seen recreation become the dominant use since 1927 (Holscher, 1970:136; 1973:53). Not only has this tradition of free access to the forests become a right considered to be of the highest social value, but also, it has generated a respect and awareness of the environment enabling these forests to survive under heavy use for over a hundred years (Jones, MacArthur and Thompson, 1976:8).

In recent decades, the recreational uses of Europe's urban forests have assumed a new importance as people favor visiting the nearby forests over driving the crowded highways to more distant recreation sites (Holscher, 1970:134; 1973:52). This is facilitated by the fact that the forests surrounding the cities are often accessible by foot, even from the centre of the city, within half an hour, or by public transportation (Holscher, 1970:134; 1973:52). While many of these forests are still not officially dedicated as parks, because they continue to be preserved and maintained for traditional uses such as timber production, local and national governments have planned the use of urban forest areas to meet

the growing demand for recreation resources and facilities by managing multiple use areas or providing forest park zones or recreation units (Holscher, 1970:134; 1973:52). Thus, Europeans acknowledge that an urban forest can provide for several of society's physical, mental and social needs (Jones et al., 1976:9).

Jones et al. (1976:8-12) provide an explanation for the relative lack of similar urban forests in North America, at least until the recent twentieth century. In the comparatively recent history of North America, people did not face the same circumstances which led European communities to preserve and manage their surrounding forests, leading to a different attitude towards the forest resource. The vast woodlands encountered by the first North Americans seemed so abundant that there developed an attitude that forests not only were unlimited but also stood in the way of settlement and needed to be cleared. This was in contrast to the European respect and appreciation for nature and the out-of-doors that took generations to develop. The notion of endless, readily accessible forests became so much a part of the North American culture and heritage that it continues to affect the thinking of many people today. Thus, the majority of North Americans have never felt the need for forested areas near urban centres that are common in Europe, believing that there would always be "wilderness" tracts of forest land for those who desired to visit them. As a result, there was no pressure to preserve forested areas for recreational and social purposes near population centres.

Spirn (1984) offers another viewpoint. She contends that most North Americans today still prefer the man-made, "pastoral-landscape" parks that originated with the city-park movement in the mid-nineteenth century: "To

most North Americans, a manicured lawn with mature shade trees is the ideal park" (1984:180). While these parks are intended to incorporate the naturalness of trees and other vegetation into the artificial urban environment, Spirn notes that they nevertheless have "the look of domesticated land, of a grazed wooded pasture, rather than a forest. . . . a highly artificial plant community" (1984:180). She provides what is perhaps the most enlightening statement as to why North Americans have lagged behind the Europeans in establishing urban forest parks and woodlands in a discussion on "urban wastelands" (parcels of vacant, unallocated, or neglected land where plants grow in a wild, uncultivated state), arguing that "most city dwellers are blinded to their beauty by a more domesticated aesthetic" (1984:183). (The label of "urban wastelands" itself connotes the general attitude of society towards such natural areas in cities.)

In any case, the "domesticated" landscape of city parks continues to fulfill a useful function for urban society. In fact, the twentieth-century interest in physical recreation and sports has produced recreation patterns and needs which are different from those of the nineteenth century, resulting in a corresponding "refinement" of the landscape of "pastoral" parks to accommodate open space and facilities related to specific sports and active recreation uses (M. Laurie, 1979:59). However, those who seek the functions of the nineteenth-century city park--contact with nature, nature study, and the aesthetic satisfaction of scenic landscape--are in need of more unadulterated natural areas, such as those found at the urban/rural fringe. M. Laurie has observed that

> regional parks beyond the urban area are increasing in popularity and use. . . . as population increases, people have

> to go greater and greater distances for the truly romantic and education experience of nature in a one to one relationship. Thus the wilderness areas are being more widely used (1979:59).

As European experience has shown, urban forest parks and woodlands have the potential to fulfill this need for city residents within relatively easy access. In recent decades, some North American cities have recognized this need by setting aside forested areas in or near cities for recreational and educational purposes. Indeed, a few urban forest areas were set aside even earlier (Stanley Park, Vancouver, B.C., 1886; Cook County Forest Preserves, Chicago, 1916) by people with foresight, anticipating the value of such areas to future generations. Thus, it is evident that the concept of urban woodlands/forest parks, like the Romantic landscape and city-park movements from which it evolved, has spread to North America from Europe, largely in the recent twentieth century. Widespread public acceptance, support and commitment will be needed to promote and develop the concept further in North American cities, where forest land is still available, to a level comparable with the well-established urban forests of Europe.

C. Conclusion

This historical background has shown that trees and natural areas have been important to people throughout history, although they have not always been a part of the public landscape of cities. Early town gardens, parks and forests were important for recreation and amenity but largely reserved for the wealthy and elite. By the eighteenth century, however, a movement to include trees and natural areas in cities for public use

began, influenced by a growing philosophical and naturalist movement which was a reaction to growing industrialism and urbanization.

A movement to provide pastoral, manicured city parks began in Europe and spread to North America, where they are still important today. However, the city park movement has evolved into a twentieth-century movement to include more natural landscapes, such as woodlands, in the city, to restore the direct contact with nature that has grown distant from urban population, and which ornamental parklands cannot adequately provide. This movement appears strong and well-established in Europe, and is evident in an early stage in North America, where a few cities have established woodlands to meet recreational and educational needs of urban populations. Like the city park movement which preceded it, it is likely that the movement to include forests in cities wll also gain momentum in North America as urbanization continues to isolate urban populations from their natural heritage.

Chapter 3

RATIONALE FOR PRESERVATION OF URBAN WOODLANDS

A rationale for preservation of urban forests was established in Chapter 1. The following discussion expands on this rationale with a literature review of several writers' viewpoints on the value of urban forests, in order to provide a more comprehensive basis for understanding the function that woodlands can perform for urban society. A historical background is given first for a look at how a rationale has evolved.

A. Historical Development of a Rationale for Nature in Cities

The preservation of natural amenity and development of parks in cities in the nineteenth century was built on a rationale which obviously convinced decision-makers and much of the public that natural areas and parks were of value to city residents. M. Laurie describes this rationale in terms of five basic concepts:

> First, that natural or natural-looking parks, street trees and public gardens would improve the health of the people by providing space for exercise and relaxation in pure air. Secondly, it was believed that the opportunity to contemplate nature which public parks provided would contribute to a much needed improvement in morals. Thirdly, a fascination with the aesthetics of natural landscape in the second half of the nineteenth century led to the notion that parks and gardens would improve the appearance of a city. Fourthly, and in association with this, the value of property would be increased due to its association with parks. Fifthly, an increasing public interest in natural processes and the elements of nature, both plants and animals, fostered the introduction of educational arboreta and zoological gardens

> and contributed to the desire for natural areas with indigenous plants as habitat for wild life [sic] (1979:37-38).

M. Laurie (1979) traces the origins of this rationale to artistic and literary influences with philosophical and religious underpinnings. The landscape paintings of Claude Lorraine, Nicholas Poussin and Salvator Rosa in the seventeenth century inspired a landscape aesthetic amongst Europeans that fostered a visual appreciation of nature. In the eighteenth century, Jacques Rousseau, the French philosopher, inspired a romantic, emotional component to this appreciation with his suggestions that nature had the power to heal and restore the spirit of man, and poets such as Wordsworth and Coleridge also stimulated a romantic reverence for nature with their works. Wordsworth espoused Rousseau's philosophy that total absorption in nature could heal and restore the spirit. Indeed, much of the poetry and paintings of these times reflected a philosophy that nature was a clear revelation of God's will, a symbol of God and self, and, if contemplated with sufficient devotion, would reveal spiritual and moral qualities.

By the nineteenth century, American poets, painters and philosophers were producing similar influential work in fostering the perception amongst many Americans that nature and natural landscapes were inspirational rather than merely exploitable. M. Laurie (1979:43) notes that Thomas Cole, an English painter who founded a school of romantic American painting, regarded nature "not so much as an escape from the evils of urban life but rather as a positive vital force in itself." Ralph Waldo Emerson wrote: "A nobler want of man is served by nature,

namely the love of Beauty" (M. Laurie, 1979:42). Emerson's disciple, Henry David Thoreau, carried on this belief in the value of nature for man in his writings, confirmed for him by his experience of intimate contact with nature during two years of living alone in the woods. He also proposed wilderness areas of five hundred to one thousand acres for every city, his conviction in the value of nature was so strong (M. Laurie, 1979:45). William Cullen Bryant also wrote about the soul-healing qualities of nature. By the mid-nineteenth century a major change in attitude had occurred in both Europe and America, with the long-standing scientific and quantitative interest in nature being supplemented with romantic and religious overtones and an emotional appreciation of nature, and the development of a corresponding rationale to support what became a strong and persuasive naturalist movement (M. Laurie, 1979).

B. The Values of Urban Woodlands--A Modern Rationale

Today's proponents of restoring or maintaining natural areas and woodlands in cities argue as their predecessors did that these areas serve a useful and valuable function in society and, therefore, must be preserved. Indeed, many of the arguments are the same. While romantic and philosophical, but no less valid, undertones still permeate the rationale put forth today, the reasons are couched in more pragmatic terms than the romantic philanthropism of the nineteenth century (M. Laurie, 1979:63). A review of the literature suggests a rationale that is essentially fivefold, relating to the functional values of urban woodlands in urban society: ecological (biophysical)/environmental values; recreational/human health values; educational (including historical,

cultural, scientific and research) values; urban form and amenity values (including civic pride); and economic values. The implications are that urban forests merit consideration in many issues and aspects of planning, such as ecological and environmental planning, social planning and quality of life issues, provision of amenities, or urban design.

1. Ecological (Biophysical)/Environmental Values

The ecological (biophysical)/environmental rationale for urban woodlands is based on the important "protective" role that the natural environment plays in maintaining life and life-supporting processes, and also its potential for mitigating the undesirable effects of human activities. Conserving the biophysical resources in or around a built-up urban area provides natural elements that perform functions ranging from the protection of wildlife, plantlife, water supply and water quality to the prevention of floods and the reduction of air and noise pollution in the city.[1]

Urban woodlands provide habitat for wildlife (Andrews and Cranmer-Byng, 1981b:2; Jaakson and Diamond, 1981:8; Spirn, 1984:216; Wilkinson, 1983:17). Many wildlife species, especially birds, have adapted to urban surroundings, but woodlands provide an alternative environment, or at least, greater habitat diversity. However, for some wildlife species still living in existing urban woodlands (e.g., in British Columbia: the Great Blue Heron, the Bald Eagle, cavity-nesting birds, the Short-Tailed Weasel) a forest habitat is essential and must be retained if urbanites wish to continue enjoying their presence. It has also been suggested that

the provision of a forest habitat for wildlife in the city aids in the control of noxious insects and rodents (Jorgensen, 1976:28).

There are hydrological benefits in retaining urban woodlands with respect to their watershed properties. On non-urbanized land, soil and vegetation can absorb about 75 percent of annual precipitation (Wilkinson, 1983:18), so the preservation of woodland can benefit the surrounding or adjacent urban area in at least three ways:

(a) ensuring conservation and recharge of groundwater supplies;

(b) preventing flooding (the woodland, and, if present, its streams and marshland, act as a natural "safety-valve" for the storage of run-off); and

(c) protecting water quality (soil and vegetation filter out and absorb the elements suspended or dissolved in precipitation, such as particulate matter from air pollution) (Deneke, 1983:99-100; Spirn, 1984:144; Wilkinson, 1983:18).

The water quality of streams in urban woodlands can also serve as a comparative gauge of the water quality of other watersheds serving the surrounding urban area, thereby providing a means of monitoring regional urban water quality.

Many writers argue that urban forests can also improve air quality. McBane and Barrett (1986:2) contend that town forests "provide clean air" while Wilkinson (1983:19) suggests that urban woodlands and other open space in the city can reduce to some degree the effects of urban air pollution. Brown (1970:14) maintains that trees in cities and suburbs help in reducing air pollution since trees absorb polluted air and emit air richer in oxygen and freer of pollutants. Jorgensen (1976:28) also notes the "outstanding function in the sanitation of air and water" provided by

a forest ecosystem of fifty hectares or larger in or adjacent to a city. These claims are based on studies that have shown that shrubs and trees in sufficient quantity do act as a filter for many pollutants, and dust, in the air (Wilkinson, 1983:19), "intercepting 27 to 38 percent of particulate material and removing 9 to 13 percent of gas-like suspended particles from the air" (Dwyer et al., 1983:502). Spirn (1984:60) notes that even a landscaped park has cleaner air than the surrounding city "in part because the park is not emitting air contaminants, but also because the leaves and twigs of trees and shrubs filter out dust from the air." Spirn (1984:60) also notes that "nineteenth-century urbanists created large landscaped parks in the inner city as 'lungs for the city.'"

Reduction of noise pollution and provision of a pleasant microclimate are additional benefits afforded by the biophysical resources of the urban forest. The reduction of noise benefits both those living adjacent to the woodland and those venturing into the forest who desire an escape from the noise of the city (e.g., traffic). Biophysical attributes such as forest density and forest depth contribute to the attenuation of noise (through scattering of noise by foliage, trunks and branches, and absorption of acoustic energy by the forest floor) (Wilkinson, 1983:20). In addition, some researchers suggest that simply the visual shielding of a noise source by a vegetation barrier may have a beneficial effect by psychologically reducing the annoyance of noise (Baird, 1977:63; Wilkinson, 1983:20). Also, the microclimate of a woodland offers a contrast to that of the built-up urban area. According to Jorgensen: "The forest ameliorates the climate to a higher degree than other urban vegetation by minimizing temperature and humidity fluctuations and by

lowering windspeed" (1976:28). The moderating effect of forest trees on temperature and humidity thus provides the amenity of a cool, shady retreat from extreme summer temperatures for forest visitors and nearby residents, as well as for wildlife. In winter, the urban woodland's moderating effect on temperature and the elements provides thermal cover for wildlife.

Finally, there are ecological values provided by urban woodlands that merit consideration for their contribution to ecological stability and/or environmental significance. Urbanization disrupts the ecological food web (Spirn, 1984:216), but preserving woodlands and other natural areas in cities ensures some degree of maintenance of ecological linkages (e.g., food chains) amongst and between the organisms living in both non-urban and urban ecosystems. An urban woodland may also have other ecological functions that serve to maintain the health of other natural systems that exist beyond its boundaries; for example, where an urban woodland serves as an important migratory stopover or concentration point, or where it provides a linkage of suitable habitat between natural biological communities, or where it serves as a water storage or recharge area. Cranmer-Byng (1981:31) lists such ecological functions along with several other criteria for determining the environmental significance of an urban natural area. Other criteria include: whether the biological (plant and/or animal) communities of the area are unusual or of high quality within the municipality, province or country; whether the area is an unusual habitat with limited representation in the municipality, province or country, or a small remnant of particular habitats which have virtually disappeared within the municipality; whether the area has an

unusually high diversity of biological communities; whether the area provides habitat for rare or endangered species; whether the area is suitable for ecological education or research; whether the area is relatively large; and whether the area has high aesthetic value in the context of surrounding landscape.

Cranmer-Byng (1981) contends that all natural areas in cities can actually be considered to be environmentally sensitive because of their isolation and scarcity. Even if an urban natural area is found to be not large enough to qualify as an environmentally significant area, it may still be very important in its local setting both ecologically--"smaller remnants of natural systems within an urban situation may be of outstanding value as 'reservoirs' of mammals and plants, and corridors for bird migration"--and for use by people for "contemplative recreation" (Cranmer-Byng (1981:31). There may also be ecological roles of urban woodlands that may become more important, or even, necessary, in future urban societies, such as a forest's "high capacity for recycling human wastes and for the control of pathogenic organisms" (Jorgensen, 1976:28). In short, the ecological/environmental rationale may best be described as a warning that there could be ecological <u>costs</u> in <u>not</u> preserving urban woodlands (Wilkinson, 1983:18).

2. Recreational/Human Health Values

The recreational/human health rationale for urban woodlands recognizes that urban woodlands provide a special setting for the pursuit of outdoor activities which benefit, or may even be necessary for, the physical and mental well-being of urban residents, thus enhancing the

quality of life in the city. Both active and passive recreational activities are recognized as being important, if not essential, ingredients in the maintenance of human health and welfare:

> Leisure and recreation can be seen as being among those positive forces which act as a counter-balance to the stresses of regulated work, the highly-structured urban environment, and the problems involved in social situations (Wilkinson, 1983:22).

Although there are leisure programs and recreational facilities available for residents of the city and suburban neighborhoods, an urban woodland can provide a readily accessible, suitable environment to meet many of the recreation needs of urbanites interested in an alternative experience. Furthermore, it is the contact with nature, the pursuit of activities in natural surroundings such as an urban woodland, that is thought by many to provide the most beneficial effects on human health; for example:

- Trees and greenery and recreation are almost synonymous with life and health (Maguire, 1978:21).
- Urban greenspace is essential to the psychological and physiological well-being of humans who inhabit the world's cities, towns, and villages (Andresen, 1978:1209).
- As both a force and a resource within world urban ecosystems, urban forest communities (as biotic sub-systems) including individual trees and associated woody species seem to be essential to human welfare (Andresen, 1978:1211).
- Without the forest many people would be emotionally or physically dead (Sinton, 1970:75).
- Trees provide members of urban communities with physical and mental contentment. Awareness of trees through sensory perception, and the individual's receptivity to sensory images from his surroundings are the keys to enrichment of body and soul by trees (Poole, 1970:78).

- According to some psychiatrists, trees and parks are highly important in reducing human stress, [because they] can relieve frustrations of city surroundings, and supply man's need for open space (Brown, 1970:14).

Whether the focus of recreational activity is the forest itself, or whether activities which are not necessarily forest-related are pursued in a forest setting, the human health benefits that recreation in an urban woodland can provide are: physical/physiological, psychological, spiritual, and sociological.

a. Physical/Physiological Benefits

Physical and physiological benefits are derived from physical activities that provide exercise to keep physically fit, or simply from relaxing to replenish energy and relieve physical tensions brought about by daily stresses of city life. Physical activities which bring healthful benefits and can be pursued in an urban woodland include walking, hiking, jogging, bicycling, orienteering, horseback riding or cross-country skiing. The forest setting provides the added enjoyment of scenic surroundings in which such outdoor activities may be pursued for fun, adventure, fitness or inspiration (Jensen, 1985:20), or the development and practice of basic outdoor skills and abilities (Driver and Rosenthal, 1978:101). For activities requiring a woodland setting (orienteering, forest hiking) or for activities typically not permitted (horseback riding) or undertaken (skiing) in the city, an urban woodland provides the necessary environment close to home.

Passive recreational activities are similarly conducive to physical and physiological benefits through the positive "renewal" or "re-creation"

effects that diversion from daily routines or hectic lifestyles and relaxation and enjoyment in a natural forested landscape can bring. Woodlands interspersed with trails and open areas, or glades, provide unique opportunities for birdwatching, observation of other forest wildlife and forest plants, photography, painting, picnicking, or merely for resting in the soothing atmosphere of natural and scenic surroundings.

b. Psychological Benefits

Inasmuch as a healthy body can influence mental health, any positive effects of recreational activities on physical health should benefit the psyche accordingly. However, there are additional benefits for mental health, not necessarily influenced by the physical condition, that recreation in a forest setting can provide.

Aesthetically pleasing natural areas are beneficial for the enjoyment and satisfaction that natural scenery can provide--an urban forest with a variety of terrain and vegetation can provide a pleasing environment which enhances the recreation experience (Jones, 1978:1414). Many recreation activities are often more pleasant when undertaken in ravines and woodlots than along crowded, polluted, noisy urban streets (Wilkinson, 1983:27). However, the aesthetic and natural qualities of urban woodlands may do more than simply enhance the recreational activity. According to landscape architect Rob Tregay (1979:268-269), they fulfill a subconscious need in a growing number of people that appears to be very important to psychological well-being: a need to experience some greater degree of contact with nature in daily life than is possible in the

typical cityscape or its manicured parks. Clayne Jensen shares this view that contact with nature is a human need:

> A great comforting influence comes from our being in contact with nature . . . a feeling of security and contentment. The awareness of interactions and relationships in the balance of nature is essential to all of us (1985:17).

It is possible that this perceived human need for contact with nature is an instinct to rediscover or maintain contact with one's natural roots, perhaps stronger in some than in others. It has been argued that natural areas are necessary in cities "for man to retain a sense of perspective and a relationship with his non-urban origins"; that a psychological imperative links man with nature; and that involvement with nature fulfills a biological and cultural need to remain aware of one's relatedness to nature (Wilkinson, 1983:25). A similar hypothesis suggests that the desire for contact with nature and the satisfaction this contact brings signify an inherent psychological need that is biologically rooted in man's phylogenetic history as a creature of the forest and savanna (Napier, 1978:13-14). Man's evolutionary heritage may be such that the level of sensory stimuli which man evolved to cope with in natural environments became the most satisfying to the human mind, both emotionally and aesthetically, so that sharp deviations from the levels of diversity found in nature could have negative effects for mental health (Watt, 1978:168-169). If so, the diversity found in nature may not be merely a luxury, but something people need.

Alternatively, contact with nature may be perceived as a basic human need because it satisfies recreational needs, which, when met, contribute

to mental health through helping to lift the spirit and temporarily alleviating the anxieties and frustrations often induced by the hectic pace and materialistic goals of modern society. For example, psychological benefits that an urban forest can provide include: replenishing adaptive energies and abilities; feeling free, independent, and more in control than is possible in a more structured environment; resting mentally; reflecting on personal and social values; developing, applying, and testing (mental, physical and social) skills and abilities for a better sense of self-fulfillment and self-worth; and exploring and being stimulated, especially as a means of coping with boring, undemanding jobs, and also to satisfy curiosity and the "need for exploration" (Driver and Rosenthal, 1978:103, 104). Exploration has been linked with human needs by other writers as well. Stephen Carr (1978:157) suggests that exploration can satisfy what may be a basic human need for new experience. If one considers that some environmental psychologists regard preferences as an expression of human needs (Kaplan and Kaplan, 1978b:147), then the observation by Sima Eliovson (1978:170) that "people seem to prefer landscapes that facilitate and encourage both entry and exploration" implies that natural environments such as urban woodlands, ideal for exploration, play an important role in fulfilling these needs. Still another important psychological aspect of the fulfillment of recreation needs of urban society by urban woodlands is their role in helping to "lessen and alleviate the feeling of being closed-in and cooped up that city living now appears to engender in most urban-based citizens" (Jones, 1978:1417). In effect, recreation in a natural environment can provide a range of psychologically therapeutic effects to counteract the negative or

undesirable elements that can arise in a highly structured social environment. At the very least, recreation in an urban forest provides a break from daily routine and from a variety of adverse social and physical conditions experienced in home, neighborhood and work environments, something that many might perceive as a basic need for mental health. Gary Moll notes that

> we instinctively turn to the open space in our urban and suburban lands for our occasional respites, for the reflection and solace we sometimes desperately need in our often crowded and hectic lives(1983:485).

Even psychiatric hospitals recognize and have taken advantage of the therapeutic value of trees--many, such as the Douglas Hospital in Verdun, Quebec, and the Brandon Mental Health Centre in Manitoba, are set "in impressive wooded grounds where patients can wander, relax, and gradually renew their links with the natural world" Baird, 1977:63).

It should be noted that opinions vary on whether or not contact with nature is an inherent human need. Wilkinson (1983:25, 26) does not believe in such a basic need, noting that people can survive where natural elements are lacking (e.g., prisons), while many other people do not take advantage of interacting with nature even where the opportunity exists. (Then again, Stephen and Rachel Kaplan (1978b:148) argue that people are not necessarily aware of their needs.) Instead, Wilkinson argues:

> It is not the contact with nature qua nature that is important, but rather that nature provides a contrast and a change from the built environment that is the city . . . changes in colour, texture, scale and shape . . . a contrast to the sameness and never-changing nature of buildings and act as a source of enjoyment and as an educational resource (1983:26).

Certainly the built environment is not without its own diversity and contrasts, but Wilkinson explicitly acknowledges the importance of the contrast and change provided by natural elements in promoting a satisfying recreational experience. At the same time, he advocates the idea that recreational settings which help to make leisure satisfying are necessary for mental health, since satisfying leisure behavior is a constituent part of mental health (Wilkinson, 1983:27). Still, he hesitates to conclude that recreation in natural environments, or the contrast and change from built environments, are human needs.

It could be argued, however, that environmental change and contrast are not only desirable for mental well-being but are also necessary. First of all, they can revive the senses and prevent an impoverishment of the mental and physical aspects of life (Walker, 1971:45). An atrophy of sense perceptions is common in modern urban life as people attempt to simplify and control their environments and increase efficiency, while those who live closer to nature have keener senses and enjoy richer perceptual experiences (Walker, 1971:45). According to Kenneth Watt,

> diversity in an environment may have a much deeper significance than is generally recognized. We know that human beings tend to hallucinate when kept in confined quarters and deprived of sensory stimuli. This could be interpreted as a protective device by the mind to provide an otherwise unavailable need. Reports have been published indicating that extremely refractory mental patients, who had not spoken to anyone in years, showed an almost miraculous response when taken to wilderness areas (1978:168).

Furthermore, the change and contrast encountered in a natural environment such as a woodland landscape also provide a reprieve, an escape, for the senses from the urban milieu: visual relief from the artificiality and glare or drabness of urban surroundings is provided by the variety of natural forms, shapes, curves, patterns, textures and colors of the forest (Andrews and Cranmer-Byng 1981b:2); natural fragrances provide olfactory refreshment; loud noise is subdued in exchange for the relative tranquility in a forest stand, for the "music" of birds singing and of rustling leaves (Appleyard, 1978:140); tactile sensors are stimulated by natural elements such as bark, leaves, rocks or soil which provide a contrast in textures and shapes to modern synthetic materials; the monotony of non-living fabricated structures and concrete surfaces is relieved by a special quality of "aliveness" where wild plants grow in natural profusion and change with the seasons; the stress of constant movement is relieved by "the slower pace of the natural order . . . a sensation of restfulness in an otherwise distracting way of life" (Andrews and Cranmer-Byng, 1981b:2). This diversity and range in sensory stimuli, the richness and intricacies of the natural environment, and the pleasurable sensations they evoke provide a contrast and complement to the man-made, human-centred culture of city life that may well be vital for the psychological well-being of city residents (Andrews and Cranmer-Byng, 1981b:2).

c. Spiritual Values

Urban woodlands can play an important role in providing urban residents with a nearby and easily accessible wildernesslike setting for

the realization of spiritual values. Philosophers, poets and painters have long believed in the inspirational and soul-healing qualities of wilderness and other natural landscapes. Jacques Rousseau believed that contemplation of nature had the power to heal and restore the spirit of man (M. Laurie, 1979:41). William Cullen Bryant wrote of the soul-healing qualities of nature:

> . . . enter this wild wood
> And view the haunts of nature. The calm shade
> shall bring a kindred calm, and the sweet breeze
> That makes the green leaf dance, shall waft a balm
> To thy sick heart. Thou wilt find nothing here
> of all that pained thee in the haunts of man (M. Laurie, 1979:42).

Wordsworth described nature as a means of self-discovery:

> . . . therefore am I still
> A lover of the meadows and the woods,
> And mountains; . . . well pleased to recognize
> In nature and the language of the sense,
> The anchor of my purest thoughts, the nurse,
> The guide, the guardian of my heart, and soul
> Of all my moral being (M. Laurie, 1979:41).

Modern literature, too, contains references to the spiritual values of nature. Driver and Rosenthal (1978:104) mention spiritual growth as one possible psychological benefit provided by urban forests and related green space. Jensen writes of the spiritual values of outdoor opportunities, observing that

> everybody needs beauty as well as bread, places where nature may heal and cheer and give strength to body and soul . . . feel freedom, serenity, humility, inner warmth, and a sense of security. . . . Experiences in outdoor settings are renewing (1985:21).

Jensen (1985:20) also remarks that outdoor recreation fortifies people's "most precious possession--the spirit that gives life its meaning." Thus, the relative "naturalness" of an urban woodland, like a "piece of wilderness" in the city, ensures the retention of opportunities for spiritual enrichment for urban residents who cannot always access natural areas beyond city limits.

d. Sociological Benefits

Urban forests are socially valuable in providing opportunities for social interaction and the development of social skills, the pursuit of socially acceptable activities, and the learning of socially desirable behavior. Social interaction among the users of an urban forest can draw together people of like interests and strengthen existing friendships or promote the development of new ones (Driver and Rosenthal, 1978:10-3; (Jensen, 1985:19). Likewise, families may benefit from an enhanced feeling of family kinship or solidarity from recreational outings to an urban forest (Driver and Rosenthal, 1978:103). Urban woodlands also provide a nearby, stimulating environment for city residents to satisfy any innate drive for adventure, excitement and challenge through socially acceptable activities such as hiking or orienteering; without such opportunities it is possible that the need for challenging experiences will be satisfied through socially undesirable, or even unlawful, activities instead (Jensen, 1985:18-19; Wilkinson, 1983:34).

Urban woodlands are also valuable settings within which to learn and practice desirable social conduct. Learning to keep recreational areas clean, to avoid or minimize damage to the landscape, and to be considerate of the rights of other users of the forest can play an important role in the overall development of responsible social behavior. Courtesy, consideration, and sincere interest in each other are attitudes which should be fostered through outdoor recreation (Jensen, 1985:18-19).

Another social value of urban woodlands which should not be overlooked is the vicarious pleasure that many members of society may derive from the establishment of an urban woodland. That is, there may be non-users of urban woodlands who get satisfaction from knowing that the area is there nevertheless, whether for ecological or aesthetic purposes, for the pleasure of others, or if they themselves should desire to use it in the future.

3. Educational Values

The educational rationale for conserving urban woodlands, which stresses the importance of these natural areas as an educational resource, is twofold. First, a natural woodland within or adjacent to the city ensures the convenience of day or half-day field trips for studies in natural history, forest ecology, plant identification and the like, for both students and the public at large. Without this opportunity, the valuable educational experience obtained from direct contact with the subject matter under study may be forgone by those unwilling or unable to travel to more distant natural areas outside the city. This educational experience may be especially important for students who, uninterested or

bored in the classroom are stimulated to learn through outdoor experiences. Jensen (1985:11) argues that "the observation of wildlife, for example, can instill a desire to learn more about biology and ecology." Wilkinson (1983:40) similarly contends that woodlands and other open space used as outdoor classrooms "add a dimension of life and dynamism to a curriculum to make studies more meaningful."

Second, the educational opportunities available in urban woodlands are numerous and valuable, and include scientific/research, historical and cultural values. As an "outdoor classroom" urban forests provide direct contact with facts about the natural sciences--biology, botany, soils, wildlife, insects, forest ecology, et cetera--and help to increase the urbanite's awareness and understanding of life's natural processes and the intricate laws of nature. Many bird species that have adapted to the urban environment can be observed in their natural habitat. Urban woodlands can also be valuable for the demonstration of forest conservation and/or management practices. Further, they provide a setting for the practice of outdoor skills, and, in fields of study such as forestry, wildlife management, or soil science, are ideal for the learning and practice of certain field measurements/techniques.

Urban woodlands can also serve as a "living laboratory" for scientific/research purposes, providing a source of data for students or scientists conducting research in various fields of the natural sciences, or where the focus of study is the urban woodland itself.

An urban forest may also have educational value as a "historical monument." Conserving urban woodlands provides an excellent opportunity for the preservation and enjoyment of significant historic sites and

artifacts, where the woodlands per se are the historical feature, or they may be the means by which historical features are preserved (Wilkinson, 1983:39). Present and future generations can enjoy a "glimpse" of the kind of landscape that preceded urbanization, see the vestiges of past land uses (e.g., large stumps from logging of first-growth trees), or observe the effects of past or ongoing natural processes (e.g., fire, ecological succession).

A cultural education can also be found in urban woodlands which stand as a reminder of the landsape once inhabited by native cultures and of the forest resources which helped shape the cultural development of the country. Jensen (1985:16) believes that well-preserved natural areas also contribute to a cultural education by promoting "love of country." He further notes that

> Aldo Leopold added meaning to the cultural dimension of nature when he made a plea for the preservation of some tag ends of wilderness as museum pieces for the edification of those who may one day wish to see, feel, or study the origins of their cultural inheritance (Jensen, 1985:17).

Finally, many writers have recognized the educational value of urban woodlands in the cultivation of a land ethic and an appreciation of nature and awareness of man's relationship to, and impact on, the natural environment. Andresen notes that as an inhabitant of the city man has become out of phase with his natural surroundings, and shows a general lack of sensitivy to his biological nature and his relationship to his environment:

> Technological changes have placed man increasingly at odds with his life support systems. Further, in his recent cultural evolution, man has created (and is creating) urban complexes at odds with his behavioral and perceptual patterns (1978:1210).

Kardell (1985:147) also has observed that urbanized man is becoming increasingly unfamiliar with nature. Baird similarly blames the trend to urbanization in the last fifty years for isolating many people from a natural environment: "Some have lost contact with nature; others have never had this contact" (1977:61). Urban woodlands, however, can play an important role in helping urban man to regain an understanding of the natural environment and its relationshp to man and technology (Conservation Council of Ontario, 1971:15). According to Baird, "Forests and other greenspace easily accessible from our cities could do much to develop an appreciation for and an understanding of the true value of our renewable natural resources" (1977:61). They provide a site and focus for outdoor education programs which aim to increase awareness of man's dependence on natural processes, of how to live in greater harmony with nature (Driver and Rosenthal, 1978:104; M. Laurie, 1979:61-62); and of the importance of conservation and preservation practices (Jensen, 1985:10); people may acquire a greater awareness of their responsibility to the environment (Baird, 1977:64), promoting a conservation ethic (Deneke, 1983:100). The Conservation Council of Ontario (1971:15) suggests that such an education is critical for today's young people if a new attitude toward nature and land is to be instilled in future generations who would consciously promote the wise use of natural resources. Likewise, Jensen (1985:11) contends that a keen perception of nature's processes is essential in order to experience a sense of stewardship, a "feeling of

husbandry," which will be necessary and "will increase in importance with the continued growth of our nation." According to Jensen,

> The development and perpetuation of such a sense among the resource-users could be a boon to the protection and care of all aspects of the natural environment (1985:11).

Jones et al. express a similar view:

> We see urban forests as an excellent facility in which to teach the basic fundamentals of nature and ecosystems which are so vitally important in a time when the public is called on more and more to make decisions concerning environmental matters and resource management. . . . People must be informed so they will be in a position to make rational decisions after being presented with the facts and hopefully fully understanding the issues in question (1976:14).

In addition, the urban public needs more knowledge about care and use of natural environments to minimize the impact of increasing outdoor recreation use of parks and wildlands (Jones et al., 1976:14).

Jorgensen (1976:28) similarly argues that an ecological understanding is necessary for the future establishment of a "proper forest management policy for Canada," and that the "ready and regular access" to the forest environment provided by forests within settlement areas is important in supplying this ecological input in educational programs. Sven Hultman (1978:1348) agrees that urban woodlands can play an important role in raising consciousness "about the interrelationships between beings and their environments," promoting a change in orientation towards the man-nature relationships from the prevalent one "where nature

is seen as a source of production of goods for the single ruler, Homo sapiens, towards one where human beings are seen as one of many species, all needed and with equal rights to exist . . . an 'ecological approach.'"

4. Urban Form and Amenity Values/Civic Pride

A further rationale for conserving urban woodlands is based on the value of woodlands in urban design, helping to shape urban form, provide urban amenities, and promote civic pride. As an element in urban form, woodlands, like other areas of open space, are helpful in shaping the development pattern of a settlement area--they can give definition to urban form by providing space between communities, limiting the physical size or shape of a city or its neighborhoods, buffering an area from less acceptable land uses (Wilkinson, 1983:14, 15, 30), or separating different functional areas within the city (e.g., work and transport areas from residential areas) (Jorgensen, 1976:28).

Urban woodlands are also highly desirable for their urban amenity values. "Amenity" is defined as "pleasantness" or "an attractive feature or convenience" (Webster's New World Dictionary). One attractive feature provided by urban woodlands is the aesthetic appeal of natural scenery and diversity in urban vegetation, an important consideration in urban design. Aesthetically, urban forests complement the design of buildings and provide a contrast to developed areas (Wilkinson, 1983:14). Thus, the urban landscape is enhanced by the diversity in individual plants and groups of vegetation provided by woodlands (Wilkinson, 1983:14), with wooded areas helping to absorb the visual impact of man's development (Zube, 1970:148), adding to the character of the local landscape (Dwyer et

al., 1983:500), and, in effect, providing the psychological benefit of aesthetic satisfaction (discussed earlier in this section).

Another amenity provided by urban woodlands is the convenience of easy access to a forest recreation experience and, thus, to the many associated benefits--recreational, psychological, educational, et cetera--discussed at length earlier in this section. Furthermore, urbanites often require places where they can spend relatively short periods of available leisure time, such as during evenings after work or during weekends, where they can quickly escape the daily routine pressures of city life. With urbanization depleting nearby forested lands, longer distances must be travelled in order to enjoy a forested environment, depriving many people, especially those with lower incomes or without cars, of this experience (McBane and Barrett, 1986:1, 2; Baird, 1977:63). By including woodlands and other urban greenspace in the physical form of the city, planners can express a view of life which sees the city not only as a place to work but also as a setting for leisure and amenity for everyone (Wilkinson, 1983:32). Thus, highly accessible urban forests which favor day outings and greatly reduce recreation travel time should be an important consideration in the provision of amenities for major population centres; according to Kardell, this also fulfills a democratic goal:

> We have underprivileged groups such as old people and children, who do not have access to cars or other suitable means of communication. To allow these people daily contact with nature it is important that there be forests and parks within easy reach. This is basic justice (1985:147).

Certainly such underprivileged people would gain the most from urban forests that are reasonably accessible (Baird, 1977:63).

Finally, urban woodlands can be a source of civic or community pride (Baird, 1977:65; Deneke, 1983:100)--an "urban status symbol" (Wilkinson, 1983:28). The many benefits and amenity values of urban woodlands can do much to make cities and suburbs attractive places to live and interesting places to visit, instilling a sense of pride in the local citizenry. It is no coincidence that prestigious residential areas are often located within or on the fringe of wooded areas, for trees are usually equated with a quality living environment (Zube, 1970:148). In addition, the relative scarcity of substantial woodlands within major urban centres is reason enough to inspire pride in a city that establishes an urban woodland for the benefit and enjoyment of its people. Jorgensen writes that

> one should not underestimate the value of vegetation as a source for local pride. It is this type of pride and the feeling of belonging it creates that, in turn, forms the basis for community existence and is at the root of nationhood (1977:269).

5. Economic Benefits

There is also an economic rationale for the conservation of urban woodlands. However, it must be remembered that most of the benefits that urban woodlands provide lack commercial value and cannot, therefore, be measured easily in the market place--it is difficult to define the monetary worth of a pleasant urban landscape or microclimate, a diverse population of songbirgs, direct contact with forest flora and fauna without leaving the urban setting, for example. Such evaluation would be subjective and arbitrary at best. As a result, there is no economic

rationale that can objectively or indubitably quantify the value of urban woodlands for a comparison with other urban land uses. Rather, this economic rationale is intended to complement a comprehensive analysis of all the potential benefits provided by woodlands by describing some benefits that can be identified as having some general economic value.

First, the amenity values of woodlands generally (though perhaps not universally) tend to have a positive effect on nearby property values. Driver and Rosenthal note that many studies have shown a positive relationship between proximity to natural areas and property values (Driver and Rosenthal, 1978:99). Moll (1983:485) writes that urban and suburban parks and greenbelts "increase the values of our homes." Similary, Wilkinson (1983:34) cites a study in which it was concluded that open space has a positive effect on the capital and rental values of nearby properties, and that this effect holds true for both high- and low-income areas. Even in the nineteenth century, the movement to develop parks and preserve natural amenity was based in part on the concept that the value of property would be increased due to its association with parks (M. Laurie, 1979:37-38). This effect may be due in part to the mere presence of trees--studies have shown that trees enhance the economic value of residential property. A study in Amherst, Massachusetts found that trees increased the value of the average residential property by seven percent and some properties by as much as fifteen percent (Pitt et al., 1979:210). Dwyer et al. (1983:201) claim that trees "can increase housing values as much as 20 percent." Appleyard (1978:149) also agrees that "trees do tend to increase property values in residential areas." These increases may be a reflection of the perception that trees

contribute positively to scenic quality and enhance the quality of the physical residential environment (Pitt et al., 1979:209).

Wilkinson (1983:34) attributes the increases in property values to "locational benefits"--benefits enjoyed because of residential proximity to an open space (Wilkinson's definition of open space includes urban woodlands). One obvious locational benefit is savings in recreation travel time. Dwyer et al. (1983:506) note that "urban forests are highly prized sites for homes because much recreation takes place near the home." Nearby residents are able to enjoy the many potential benefits and amenities of woodlands, discussed earlier, as easily as if the woodlands were their own backyard. Other important locational benefits, which surrounding property owners can enjoy regardless of whether or not they use the forest itself, include pleasant views, reduced population density, flora and fauna, clean air and improved land drainage (Wilkinson, 1983:34). Accordingly, increments in land values surrounding woodlands appear to reflect a perceived value in the "exclusive" enjoyment of such locational benefits and amenities. However, the economic benefits of increased property values adjacent to or nearby woodlands are not limited to the property owners--higher land values generate higher tax revenues for the city and higher profits for developers, arguments effectively put forth by proponents of nineteenth- century parks to persuade the practical businessman that land be set aside for public parks (M. Laurie, 1979:53-54).

Another economic benefit that urban woodlands can provide, on a limited scale, is the generation of income through the sale of forest products which may help to defray some of the management/maintenance costs

of the forest and also, therefore, indirectly benefit the public through lower (or non-existant) taxes and/or user fees otherwise necessary to subsidize such costs. McBane and Barrett (1986:2) suggest that the sale of timber from some town forests can totally cover the cost of managing the forest, but it is unlikely that urban woodlands managed primarily for conservation, recreation or nature education purposes would be suitable for any significant commercial production. Some urban woodlands may be large enough to sustain the implementation of a multiple-use policy that includes some timber production as a subordinate goal to meet both forest management and revenue needs, or for the demonstration of forestry practices for educational purposes, but otherwise production will be limited to routine woodland management. In any case, full advantage should be taken in utilizing the products (Joneset al., 1976:16), for economic benefits can accrue to both the woodland manager and the general public. Many trees removed for educational, recreational or management purposes may have commercial value as sawlogs or pulpwood, while unsuitable, small, or dead or fallen trees and remnants have high salvage values--they can be used in the woodland itself as a free source of material for fenceposts, tree stakes, or the construction of steps or wooden walkways (Tregay, 1979:288, 290), or they can be sold to the public as material for similar small wood products, or for firewood, woodchips, shingles, mulch, etc. At prices below retail, economic benefits are passed on to the public.

Finally, a discussion of economic benefits due to urban woodlands would not be complete without the mention of two other potential sources of income for the city and its woodland: tourism, and movie/film

production. A well-treed, well-managed urban woodland can be a tourist attraction in itself and for the city (Baird, 1977:65), generating tourism revenues. Also, an urban forest with unique or interesting features, or simply the accessibility it provides to a natural forest setting, can provide scenery and locations for movie/filmmaking, generating rental income for the woodland and revenues elsewhere in the city from movie/filmmaking expenditures.

C. Conclusion

This chapter has shown how urban woodlands can provide city residents with many benefits: environmental benefits, recreational and human health benefits, educational benefits, urban form and amenity values, and economic benefits. Most of these values are unique to urban woodlands and cannot be provided by other types of urban open space. Thus, the quality of life in cities can greatly be enhanced by ensuring convenient access to these benefits. The rationale for preserving urban woodlands is based on a view that the availability and accessibility of these values for urban populations are important.

Throughout the fivefold rationale presented in this section there is an implicit concern with the impact of urbanization on the availability of urban natural areas. As urbanization continues to encroach upon rural land on the urban fringe, natural and "wild" areas are becoming increasingly distant and removed from the city, with a concurrent diminution in the benefits they could provide for city residents. It is ironic that people who move to suburbs looking for "greener" surroundings soon find the open space they came for consumed by sprawl (Wilkinson, 1983:40). However, the rationale for conserving urban woodlands is not

meant to be anti-urban--it is intended to convey the message that the setting aside of sizeable woodlands within or peripheral to urban areas would enhance the quality of urban life, for, as the rationale attempted to show, the urban forest enhances the liveability of urban areas, from a physical, sociological and psychological perspective (Deneke, 1983:101). Otherwise, the many potential benefits offered by woodlands will be inaccessible to a large proportion of city-based populations. There is the additional consideration that not only do city-based populations continue to grow, but there is a growing desire among urbanites to seek outdoor recreation in natural areas which provide an escape from the rigours, stress and artificiality of urban life, with a corresponding desire that these outdoor recreation opportunities also be closer to home (Jones, 1978:1413). A similar observation is made by Kardell, in Sweden:

> The Swede, to whom all (of Sweden's) forests are open, seems to use about 1 percent of the forest for recreation. These areas are generally adjacent to towns (1985:146).

It seems, therefore, that a higher quality environment should include an urban woodland, a place where urbanites can experience and benefit from nature first hand without having to leave the urban setting (Dwyer t al., 1983:502). According to Fred Deneke,

> How we handle the changes in land use and how well we incorporate green space into the new cities that accompany urban expansion will affect the quality of living well beyond the turn of the century. . . . We have a fixed land base, an ever increasing population, the loss of traditional expansion frontiers, and are experiencing a realization that we can't just go somewhere else to find the "good life," but must rediscover and reclaim it where we live, in our cities and communities (1983:99, 101).

Chapter 4

SOME CONTEMPORARY EXAMPLES OF URBAN FOREST PARKS AND WOODLANDS

Woodlands peripheral to or surrounded by urban areas are not a universal or even common feature of modern conurbations in general. Neither, however, are they a rarity, for many cities, especially in European countries, have retained residual woodlands within developed areas or on the urban fringe, or have even afforested substantial tracts of urban open space, recognizing forests as important functional entities. Thus, a number of examples of urban woodlands are available in the literature, some of which have been selected for discussion in this Chapter in order to provide an understanding of what has been achieved in the preservation of urban woodlands in various cities.

A. Urban Woodlands in Britain

In Britain, examples of urban woodlands can be found in the urban "common lands" or "commons" of many British cities and towns. Established during the early days of village settlement, commons were originally land "held in common" (that is, privately-owned land with common rights for all members of the community) and were located in the countryside, beyond urban boundaries (I. Laurie, 1979c:232). Urbanization eventually spread into the countryside, but commons which escaped development remain today, encompassed by urban expansion. Commons had once been used for grazing,

and they also served as recreational parks long before the nineteenth-century town park movement in Europe and America, but their natural landscapes were not altered by the formal, ornamental Renaissance design tradition which influenced the designs for planned town parks. Today, according to I. Laurie (1979c:231), many of these commons still contain "natural habitats that have not been cleared and where continuous natural regeneration has not been unduly restricted," including woodlands. Tregay (1979:271, 272) mentions the commons of Hampstead Heath, Richmond Park and Wimbledon Common as good examples of urban woodlands in London, while the city of Southampton has Southampton Common and Birmingham has Sutton Park. He notes that even the old industrial towns, such as Manchester and Liverpool, often have remnants of woodland (such as Heaton Park and Childwall Woods, respectively), while many of the new towns have incorporated existing woodlands into the new developments. Tregay observes that

> even in a densely populated country such as Britain, therefore, with its history of some ruthless woodland clearance, it is possible to find urban woodlands which are highly valued and respected by the towns-people (1979:272).

I. Laurie (1979c) describes in detail the woodland attributes of Southampton and Wimbledon Commons, as well as Clifton Down common in the city of Bristol. He notes that all three of these commons "are situated well within the boundaries of large cities" (1979c:235-236), being "discrete units largely surrounded by suburban housing" (1979c:239), and are "intensively used and enjoyed by the townspeople" (1979c:236). All contain sizeable natural woodlands along with areas of scrub and grassland

habitats (which were created in the past for use as grazing land). Little interference by man in the woodland landscapes (at least in recent history) has resulted in long-established woodland plant communities with ongoing natural regeneration that has produced mixed-age forests of new growth blending with the old, and landscapes with a variety and diversity of natural character. I. Laurie writes of the three commons:

> As a result of the extent and size of mature woodlands, scrub and unmown grasslands, the diversity of wild plants, birds, animals, and insects is extremely unusual for any urban space in any large city (1979c:248).

Recreation management plays an important role in the operation of the commons, as their use for recreation is a very ancient tradition. Thus, all three commons have areas for football and cricket, while Wimbledon also has lacrosse, cross-country running, horse riding and golf courses, and Southhampton has a zoo, a paddling pool, children's playground and model aircraft flying area. Regulation of these activities is an important part of the management of the commons, for active recreation should not interfere with the function of the commons as a place for passive recreation and the preservation of natural habitats, especially since passive activities like bird-watching and nature study have increased in recent years. I. Laurie (1979c) notes that it is interesting how these commons are still used today for passive activities usually associated with the countryside rather than the town park, and that few ornamental parks contain scenes of family picnics, purposeful walking (usually with a dog), or picking of blackberries. Furthermore, ornamental parkland usually provides little of natural history interest.

Yet people are attracted to the woodlands of the commons, evidenced by networks of well-trodden trails created by people exploring the woods, indicating, according to I. Laurie, "just how much woodland is a refuge that man still seeks" (1979c:243).

Thus, the natural landscapes of these British commons fulfill a vital recreational function by providing many of the pleasures of the countryside for people within the town itself, and, in so doing, the commons "extend the functions of the urban park beyond what it is capable of achieving as ornamental parkland" (I. Laurie, 1979c:258). This observation, of course, is not specific to Britain but can be said about urban natural areas in general, as with the following advice from I. Laurie:

> These commons prove . . . what is of great importance in the planning of towns and cities: that a very rich natural environment can exist within the city. It can greatly benefit the lives of many of its inhabitants (1979c:251).

B. Urban Woodlands in Europe

Many of the forests in Europe today are owned by communities, and their use is carefully planned to meet the growing demand for recreation resources, while also maintaining a certain amount of timber production to meet each community's need for wood (Holscher, 1973:52). Indeed, forests are a major urban land-use in some European countries (Tregay, 1979:272). To meet the needs of the citizenry, European city forests may contain scenic automobile routes, foot and bridge paths, hiking trails, sports facilities, playgrounds for children, hunting and wildlife areas, and

contrasting landscapes between forested and open lands. A few examples have been selected to demonstrate the European effort to preserve and maintain city forests for the needs of the people.

1. Zurich, Switzerland

In Zurich, forests occupy 23.6 percent of the city's land area (Holscher, 1973:52), and are visible on the surrounding hills from most parts of the city (Tregay, 1979:272). These forests, which are almost the only reserve of open land in Zurich, range from about 250 acres (101 hectares) to more than 3,600 acres (1,458 hectares) in size, and are within one mile of the center of the city, providing the residents of Zurich with places "for privacy and physical activity in fresh air and relative quiet" (Holscher, 1973:52). Along with fulfilling recreational needs for the city people the forests also have natural and economic functions. Zurich's forests are recognized for their role as a natural cleaner and humidifier of polluted air and as an absorber of noise, in addition to protecting soils on steep slopes around the city from erosion, and providing additional supplies of water if necessary (Holscher, 1973:134). Economically, the forests are also a source of timber, but wood production is of lower priority in Switzerland as forests are perceived to first serve the needs of the people. Timber production provides forest maintenance costs and other city administration costs as well, but Swiss law requires that any deforestation is replaced by an equivalent area of reforestation, and in the same general vicinity (Holscher, 1973:52). In fact, clearcutting of more than one acre (0.405 hectares) is rarely permitted, generally only when light-demanding species are to be

regenerated (Holscher, 1973:135). Instead, silviculture is usually based on natural regeneration from shelterwood and single-tree selection, aiming to preserve and improve all of the economic and social functions of the city forests.

2. Paris, France

Holscher (1970, 1973) describes the urban forests of Paris, France. There are thirty-five individual forests in the region of Paris, ranging in size from 60 acres (24 hectares) to 42,000 acres (17,010 hectares) with those devoted primarily to recreation totalling about 140,000 acres (56,700 hectares). Half of these forests are from 20 to 80 percent surrounded by urban communities, while the other half are located at some distance from the urban area. The forests form two concentric circles around Paris, the inner circle composed mostly of deciduous hardwoods, about fifteen miles (24 kilometers) from the city, and the outer belt, a mixture of hardwoods and conifers, forty miles from Paris (64 kilometers). Many of these forests were originally the hunting grounds of royal families. One of these thirty-five forests is the Meudon forest, situated within two miles (three kilometers) of the gates of Paris, which typifies the French urban forest. With an area of 2,750 acres (1,114 hectares), the Meudon, a mixed-deciduous forest, is intensively used by Parisians and residents of surrounding communities, and is managed under a detailed work plan to accommodate user needs while also protecting the natural character of the forest. The Meudon forest accommodates various uses by being divided into three areas: parks, forest for walking, and undeveloped woods. The parks, occupying 140 acres (58 hectares), are

located next to residential areas and are designed to meet the recreation needs of small children with their mothers, equipped with playground facilities, open spaces for play, occasional shelters, paths for strolling, and grassy fields. The forest for walking, called "Foret Promenade," used by the bulk of the visiting public, occupies 1,100 acres (445 hectares), and is laced with numerous wide footpaths, gathering and rest areas and "comfort facilities," in a forest that is cleared of all undercover for easy access to all parts, with openings cut to create grassy areas. The area of undeveloped woods, covering about 1,500 acres (607 hectares), and located primarily on steep, hilly land, is meant to preserve the character of a natural forest, playing an important role in watershed protection. Therefore, public access is limited and clearly prescribed trails and paths are not laid out, as heavy use would result in instability and erosion. As for the other thirty-four city forests of Paris, management follows similar principles but varies according to the characteristics of the forest and the nature of public use. In general, all of these French city forests are managed so as to maintain as well as possible the natural aspect of the forest, and safeguard it "from the pressures of urban society that may seek to change it or cause it to deteriorate" (Holscher, 1973:54).

3. Oslo, Norway

A forest area of approximately 370,370 acres (150,000 hectares), known as Oslomarka, surrounds the city of Oslo, Norway[44] (Haakenstad, 1976:76) and serves as a year-round "invaluable recreation area" (Friberg, 1979:340) for the residents of Oslo and neighboring communities in the

Oslomarka region. This woodland park is a big, continuous forest area containing hundreds of lakes, rivers and streams formed by the mountainous terrain of the area, and vegetation which is "very luxuriant and rich in species" (Friberg, 1979:340). Although most of the Oslomarka is in private ownership, about 42,000 acres (17,000 hectares) of the forest areas encircling Oslo are owned by the city (Haakenstad, 1976:76, 81), easily accessible for city residents as most of them lie less than a mile (1.6 kilometres) from the city center (Holscher, 1973:53). In 1973, four management objectives were stated in a ten year plan for the city-owned forests, translated by Helge Haakenstad as follows:

1. The organization of practical opportunities for a maximum number of visitors to experience a diversified outdoor life in the forests, including rich and varied impressions of natural beauty.

2. Managing the forests according to biologically, professionally and economically acceptable methods combined with active conservation practices.

3. Adapting forest management to requirements and desires posed by waterworks and public hygiene authorities to ensure the maintenance of the drinking water reservoirs of the city.

4. Maintaining a habitat conducive to diverse wildlife and assuring reliable fishing opportunities (1976:81).

This multiple-use plan is implemented by the division of the city forests into management units. According to Holscher (1973:53), some units are devoted mainly to "forest production and purposeful care of the countryside" while others are devoted mainly to recreational purposes with a strong emphasis on "making the natural woodlands as attractive and beautiful as possible." He further notes that "large, unbroken deforested

areas are avoided" and that "the woodland is preserved in its natural state near ponds, marshlands, lakes, and other places with a particularly fine view" (1973:53). Haakenstad (1976:81) describes the management units of the city forests as "recreational units A, B, and C" delineated "according to their utilization for outdoor life," with each unit further divided into sub-units such as "forest reservations, conservation areas, forest park land [sic], landscape area, and various wild life [sic] biotopes," designated for more specific treatments.

Holscher (1973) also comments on the provision of services and facilities for users of the Oslo municipal forest area. Large parking lots are provided around the borders of the forests, and there are many miles of roads and trails, some for vehicular use, others primarily for hiking and cross-country skiing, some leading only to "places of refreshment" in the center of the forest (Holscher, 1973:53). Great care is taken to construct these roads and trails so that they blend into the landscape, and the appearance of human disturbance is minimized; areas damaged by construction are immediately revegetated. Sporting grounds are provided for various sports, including shooting ranges and areas for winter sports such as ski-jumping, slalom racing, tobogganing, and flood-lit skiing. Commercial enterprises are not allowed, but a network of inns developed by the city of Oslo is intended to give hikers an objective, and to spread traffic throughout the different parts of the forest. Management is also concerned with creating good habitat for game, but the only hunting permitted in the municipal forests is for control of elk herds.

4. Amsterdam, Holland

The European perception of forests as an important urban land-use is especially evident in cities which have dealt with a scarcity of urban woodlands and recreational space by creating entirely new woodlands within the city. In Amsterdam, the Bos Park (Bos = woodland) was created in 1929 on a new "polder"--land recently reclaimed from water--with extensive tree planting undertaken to establish 1,000 acres (405 hectares) of woodland that would provide shelter from wind and also dry out the poorly drained polder (Spirn, 1984:196). (Tregay (1979:271) establishes the area of Bos Park at approximately 2,222 acres (900 hectares)). The Bos Park woodlands contain a wide range of recreational facilities and landscape characteristics, including an extensive system of footpaths, horse-riding trails and cycle paths which enable exploration of the woods, along with open glades, grassy fields, sports grounds and facilities for a variety of outdoor activities--for example, a rowing stadium, an open-air theatre, swimming lakes and campgrounds--as well as a natural history museum and a plant collection and forest reserves for nature studies (Friberg, 1979:346-347; Tregay, 1979:272-273). Tregay (1979:272) remarks that careful management has engendered a "remarkable feeling of naturalness" in this man-made urban woodland.

C. Urban Woodlands in North America

Urban woodlands do exist in North America, but is is common knowledge that there is not the same tradition of urban forests (as a desirable or even necessary urban land-use) in North America as there is in Europe (or the urban common tradition in Britain). (The situation in

additional countries was not invesigated.) Furthermore, there does not appear to be a readily available inventory of urban forest parks or woodlands that have been established in North American cities from which a representative cross-section of existing urban forests could be drawn. In fact, urban woodlands appear to be relatively uncommon in North America, and those which do exist are therefore regarded as unique and prized. The following examples demonstrate what has been achieved in preservation and management of urban natural areas and woodlands in one major metropolitan areas of the United States and three major cities in Canada.

1. Cook County Forest Preserve District, Cook County, Illinois

A large urban forest in the United States, described by Buck (1982) is the forest preserve of the Cook County Forest Preserve District in the state of Illinois, comprising over 66,000 acres (26,730 hectares) of land acquired since its establishment in 1916. More land may be acquired in the future, up to a statutory limit of 75,000 acres (30,375 hectares), including lands "capable of being forested," such as farmland, enabling the District "to re-create natural forest and meadow conditions" (Buck, 1982:158). Buck describes the statutory powers of the District, "a special purpose unit of government established under State statutes," as follows:

> The District has the power to create Forest Preserves and has the power to acquire in fee simple and hold lands containing one or more natural forests or parts thereof, or land or lands connecting such forests or lands capable of being forested for the purpose of protecting and preserving the flora, fauna and scenic beauties within such District and to restore, restock, protect and preserve the natural forests and such lands together with their flora and fauna as nearly as may be in their natural condition for the purpose of the education, pleasure and recreation of the public (182:157).

As of 1982, 3,631 acres (1,471 hectares) (5.5 percent of the District's holdings) of the Forest Preserve land lay within the corporate limits of the City of Chicago, with the rest "interspersed throughout the heavily urbanized County" (Buck, 1982:158). According to Buck, "the Forest Preserve District is surrounded by and immediately accessible to the public from all sides" (1982:158).

The Cook County Forest Preserve District undertakes a variety of activities and programs that provide for year-round utilization of the Forest Preserve, ranging from wildlife and fish management, to public education, to the maintenance of picnic grounds, nature trails and golf courses, and numerous other programs (Stewart, 1975:85) An idea of the extent of recreational areas and facilities was provided by Buck (1982), who reported at that time that the Forest Preserve contained 190 major picnic areas with 2,200 picnic groves and 202 picnic shelters; 90 baseball fields; 36 miles (58 kilometers) of paved bicycle trails; 175 miles (282 kilometers) of equestrian and hiking trails; 34 fishing lakes, ranging from 10 to 500 acres (4 to 202 hectares); 9 rivers and streams; 3 swimming pools; 9 golf courses, with 144 holes plus three lighted golf practice ranges; 14 snowmobile sites; 14 sledding hills; 5 toboggan sites; 11 boat ramps, with 4 boat rental sites; 8 model airplane fields; and 5 nature centers. The Forest Preserve thus complements the recreational system of the metropolitan area by providing for those recreational needs that require large spaces or a forest setting; other sports and recreational interests are served by a separate local park system.

Recreational development in the Forest Preserve is intended to complement the natural environment. Buck explains that

> The District's goal for basic development of its land for access and use is not to exceed 18 percent. This percentage of developed area includes all trails, parking and picnic groves, and golf facilities. The remaining land is kept in natural woodland and meadow that surround and are interspersed with developed areas (1982:159).

Accordingly, long, curvilinear drives with adjacent parking blend in with the natural surroundings better than huge parking lots, and also help to spread the use over the Forest Preserve. Deciduous species of trees native to the area have been grown and planted on acquired land at 8 x 10 foot spacing, and the District has also managed to successfully restock some of the native fauna of the area, for which special management programs will be needed in the future. Recreational facilities for heavy-use activities such as picnicking are usually located in open, grassy meadows with scattered trees adjacent to forest areas, as these areas recover more easily from use, there is less tree damage, and maintenance is thus easier.

In sum, the Forest Preserve District of Cook County represents a successful endeavor to preserve native flora and fauna within an environment of heavy urbanization and development. This unique urban forest resource is greatly appreciated by the citizens of Cook County, who believe the Forest Preserve "to be well managed and to satisfy most of their needs for a quiet natural area in a Metropolitan setting" (Buck, 1982:161).

2. The Morgan Arboretum and Woodlands, Montreal, Quebec

The Morgan Arboretum and Woodlands comprise a six hundred-acre (243-hectare) forested area located on the western tip of Montreal Island in the town of Sainte Anne de Bellevue, approximately twenty miles (thirty-two kilometers) west of the downtown area of Montreal, Quebec, Canada's second largest city. The forest occupies the northern portion of the campus of McGill University's agricultural college, Macdonald College, is administered by the Faculty of Agriculture, and is operated by the non-profit Morgan Arboretum and Woodland Development Association (Anonymous, 1987a). The land was acquired in 1945 by McGill University for the purpose of assuring the conservation of the woods and other resources of the area and also for ecological study and research at MacDonald College (Jones, 1962:5). Three hundred and seventy-six acres (152 hectares) of the Arboretum's six hundred acres (243 hectares) consist of natural woodland, constituting one of the last remaining stands of natural woods on the Island (Anonymous, 1966; Jones, 1962:5).

Following its establishment in 1945, the Morgan Arboretum was initially developed as an arboretum and as an intensively managed forest for research, production, and demonstration purposes, where proper woodland management techniques would be demonstrated to owners of private forests and farm woodlots in southern Quebec, and where ecological studies and research could take place (Jones, 1962:5; Jones and MacArthur, 1977:283). In addition, a twenty-three-acre (nine-hectare) ecological preserve was set aside to be left undisturbed in its natural state and used only for biological study, and the entire six hundred-acre (243-hectare) woodland had already been designated a part of Montreal Island's

Senneville Bird Sanctuary in 1936. None of the original objectives had been specifically concerned with the preservation of the land for recreational use (Inhaber, 1972:14-15), but management and development for recreation became a concern in the late 1950s/early 1960s when the easily accessible forest was experiencing an increasing flow of urbanites seeking forest recreation experiences. Jones wrote of the urbanites' attraction to this forest on Montreal's urban fringe:

> It is one of the few remaining unspoiled areas on the island of Montreal where no enticements (?) such as "hot-dog" stands, Bar-B-Q's, play grounds, picnic areas and other such dubious improvements exist to encourage those attracted by such conveniences. Despite the lack of facilities of this kind the area is experiencing a continuously rising wave of interested visitors, particularly on the week-ends both winter and summer (1962:18-19).

Jones (1962) observed that this demand for recreational use of the Arboretum was stimulated by growing awareness among urban residents of the forest's existence, its function, its conservation objectives, and its aesthetic appeal, in addition to a need for more outdoor recreation areas in the Montreal region to serve a growing urban and suburban population. He suggested that, in order to accommodate this demand in a manner consistent and compatible with the Arboretum's original functions and objectives, and to protect the property from serious effects of overuse, the provision of "conservation education to all who seek it" should be a primary objective of the Arboretum, since an educational recreation program, including "basic training in good forest manners," would help to foster an appreciation for the outdoors and promote intelligent use of recreational time spent in the woods (Jones, 1962:157, 165). A nature

program was subsequently developed to meet forest recreation and education needs as these activities expanded rapidly through the 1960s, and, although the important original functions of the Arboretum continue today, the forest has evolved into an intensively used outdoor education, recreation and nature centre by the urban public:

> The obvious educational values of a managed forest for nature interpretation, to introduce urbanites to forest conservation and use values, and to provide them with an aesthetic outdoor experience have developed concurrently with other forest values and the original purpose of demonstration forestry (Jones and MacArthur, 1977:283).

Accordingly, the current major objectives for the Arboretum are

> to provide a healthy, natural habitat for outdoor educational opportunities for all ages, for compatible recreational pursuits in an attractive landscape so that all sectors of the community can benefit (Jones and MacArthur, 1977:284).

The specific management priorities in developing this multiple use program are that the area be managed firstly as an educational area, secondly as a recreational area, and thirdly, for the production of forest products (Jones et al., 1976:14; Jones and MacArthur, 1977, 284).

Thus, the six hundred-acre (243-hectare) urban woodland of Morgan Arboretum is managed collectively as a conservation demonstration area, an outdoor education laboratory, a research facility, a bird and wildlife sanctuary, a recreation area, and for the production of logs, firewood, pulpwood, ornamental trees, maple syrup and Christmas tree and boughs.[93] Major land uses include (Jones, 1962; Anonymous, 1966; Jones and MacArthur, 1977; Anonymous, 1985):

- 37 acres (15 hectares) devoted to arboreta group plantings of various families of tree species that make up the Arboretum's collection of all the native trees of Canada that can survive in the local climate, as well as some important foreign species for identification or learning of botanical properties or value in landscaping, for example,

- a 23-acre (9-hectare) "ecological preserve," where nature takes its course undisturbed, which "demonstrates" unmanaged forest in contrast to the managed areas; and which may be used for biological research;

- 60 acres (25 hectares) of sugar maple groves, used for the production of syrup, research and demonstrations in sugar bush management, and experiments and demonstrations in sap collection methods;

- almost 90 acres (36 hectares) of conifer and hardwood plantations (mostly reforested former farm and pasture land), used for studies and demonstrations in conifer and hardwood management, silviculture and sustained-yield forestry, and production of forest products; or studies in reforestation;

- almost 10 acres (4 hectares) of nurseries, for growing planting stock for plantations and arboreta groups; and demonstrating nursery management;

- ponds, constructed to provide water sources for wildlife, fire-fighting, and recreation and also to add to the character of the landscape; and

- a "Canada Birch trail," a Canada-wide collection of geographical varieties of white birch, representative of all provinces and territories, planted in a double line for the "Canada Trail," a tribute to a tree of historical, scientific and commercial significance to Canada.

The variety of natural and artificial forest ecosystems of the Arboretum are interlaced with twelve miles (nineteen kilometers) of trails and roads, providing access to a multitude of year-round and seasonal educational and recreational opportunities for city residents. Activities include bird watching and feeding, conservation education, animal tracking and flora and fauna observation, as well as exercising

dogs, hiking, cross-country skiing and snowshoeing, horseback riding, jogging, orienteering, and other forms of exercise. It is a place where Montrealers can go simply to enjoy the peace and tranquility of the woods (Baird, 1977:61). Another interesting activity is "maple sugaring," where the collection of saps and production of syrup are demonstrated for interested visitors. Visitors to the Arboretum can take educational tours demonstrating modern forestry and conservation methods, or attend product sales to buy Christmas trees and greens, maple syrup, firewood, or plants and trees. There are now three self-guided trails--an Ecology Trail, a Forest Management Trail, and a Botanical Trail--providing informational signs along the way (Jones, 1987). In addition to such "casual" activities pursued by the general public, the Arboretum is also intensively used for formal education and research field activities by students, teachers and scientists from local and provincial schools and universities, or visiting scholars, as well as by numerous other groups such as Scouts, Guides, professional organizations or interest groups, in a variety of ecological and biological studies, conservation education, and the study of wise natural resources use (Jones, 1962:17-18; Anonymous, 1985).

Development of recreation facilities in this urban forest has involved providing only those facilities which are basically necessary for servicing and protecting the visitors and also consistent with the Arboretum's objectives for education, conservation and forest production. There are the trails and roads for access to the woodlands (also used for management and production operations); a parking lot; an A-Frame building (built 1985) at the entrance to the property used as an information

centre; two visitor centres within the Arboretum, the "Chalet Pruche" (built 1950), and the Conservation Centre (built 1980) for conservation education and display purposes and also used as a service center on weekends for recreationists (such as a warm-up area and to dispense hot drinks in winter); warning signs with respect to water, fire and poisonous plant hazards; and selected marked trails and maps (Jones and MacArthur, 1977:284; Jones, 1987). There is also a "demonstration sugar house" (built 1970s) for spring tours demonstrating maple syrup production("maple sugaring"), in addition to the main commercial sugar house operation (built 1954) that has no services for visitors (Jones, 1987).

The provision of maps and well-marked, well-maintained and varied trails is also a management measure to protect the Woodlands from its heavy use. They channel traffic into selected areas most suitable for the various uses, enabling the protection of more fragile areas from compaction and overuse and of scenic areas from disruption and overcrowding, as well as allowing much of the Woodlands free for wildlife habitat (Jones, 1978:1416). Other urban forest management measures include: the maintenance of healthy, vigorous vegetation that will withstand the heavy use made of the forest, through intensive forest management practices; dog control; wildlife management; fire protection, and insect and disease control when natural controls are not working (Jones, 1962:63-64; (Jones, 1978:1416, 1417; Jones, 1987). Forest protection and visitor management is also accomplished by controlling entry of recreationists during peak visitor use with a gate-keeper, and by encouraging regular visitors to purchase membership in the Morgan Arboretum Association (also known as the Morgan Arboretum and Woodland

Development Association) (Jones, 1962:19). At first, membership support was solicited as a source of funds for the management and upkeep of the Arboretum (and which still is a main source of revenue), but members tend to be people who are interested in protection of the land against possible exploiters, and they have become self-appointed protectors who help to patrol and guard the forest against abuse, vandalism and damage (Inhaber, 1972:5; Jones, 1978:1416). A Volunteer Committee made up of members helps with patrol, maintenance operations such as tree pruning, signage, trail development, or cleaning up after dogs, production and sale of products, fund raising, and staffing services, for example (Jones, 1987). Members also enjoy special benefits in return for their annual donation, such as free year-round admission, a "sugaring-off" party each spring, discount prices on certain products (Christmas trees, maple syrup, fuel wood, and nursery plants), tree and shrub sales and courses in nature interpretation and conservation education. The membership dues and sales of products and services finance nearly 100 percent of the Arboretum's operating budget.

The successful development of the Morgan Arboretum and Woodlands as a multiple-use urban forest, to meet its original objectives of demonstration forestry and research and also to accommodate the recreation demands of an urban population, has made the Arboretum, according to Jones and MacArthur, a useful working model for the management of metropolitan forests. Certain lessons may indeed be applicable to urban forests having a similar potential for conservation and nature education in a natural forest setting with a minimum of recreation facilities development. It is believed that the Morgan Arboretum provides some useful management ideas

for the provision of forest recreation and education for the urban forest case study of this thesis, designed of course, to suit local needs and preferences and differences in forest attributes and opportunities.

3. Rockwood Park, Saint John, New Brunswick

Rockwood Park is located in the suburban area of Saint John, New Brunswick and, with an area of over 2,500 acres (1,012.5 hectares), may very well have the distinction of being the largest municipal park in Canada. Furthermore, it also contains one of the largest areas of contiguous urban woodland preserved as "wilderness" for recreation in a North American city. A fifteen-year development plan was recently (September 1987) proposed for the Park which would preserve 2,200 acres (891 hectares), more than half of the park, as "wilderness"--a natural area where the only development would be hiking and bicycle trails (Trueman, 1987). Development on the other 700 acres (283.5 hectares) of the Park is designed by the proposal to increase present visits to the Park at least fivefold. The proposed development plan for the next fifteen years includes: the establishment of 100 acres (40.5 hectares) of parkland around a lake (Lily Lake) as a "heritage zone," in which an existing pavilion would be architecturally restored and surrounded by gardens and landscaping reminiscent of the Victorian era, reflecting the Park's Victorian beginnings; a one-way loop road lined with parking lots, starting at the pavilion which will mark the entrance to the park, intended to lead visitors through the entire park; a 600-acre (243-hectare) "recreation and culture zone" which would include lakes in the Park (Fisher Lakes), a golf course, a ski-hill, and the establishment of a

major zoo as an "Atlantic Canada theme zoo," divided by a stream and bridge into two themes--exotic animals and animals native to the Atlantic region; and the enlargement and landscaping of the Park's existing gravel-covered trailer campground, using shrubs and trees to delineate private camping stalls and also providing a shower and laundry facility for campers. The first phase of this plan is expected to take up to five years and cost approximately $5 million, with the zoo, loop road, pavilion and park entrance given priority for completion. Projects envisioned for the next fifteen years include a possible equestrian center for the wilderness zone, a winter activity center at the ski-hill, a group camping area for scout troops and school classes, a recreation and culture center, and commercial attractions such as bumper boats and miniature golf (Trueman, 1987).

4. Stanley Park and Other Urban Woodlands of Vancouver, British Columbia

a. Stanley Park

The Greater Vancouver metropolitan region is blessed with a number of urban forest parks and woodlands, located within and on the edge of the region's urban and suburban areas. Perhaps the best known of these is the woodland of Vancouver's world-renowned Stanley Park, covering 520 acres (210 hectares) of the Park's total 1,000 acres (405 hectares). Occupying the entire tip of the Burrard Peninsula in the heart of Canada's third largest city, Stanley Park is one of the largest inner city parks in North America, and the largest urban park in Canada (Steele, 1985:6). The area was first set aside in 1859 as a Government Military Reserve (in reaction to fear of American invasion of the British colonies). In 1886,

the first resolution of the first City Council of the City of Vancouver was to petition the federal government to convey the military reserve to the City for use as a public park (Steele, 1985:16), and, according to David R. Bakewell (1980:1), also as a forest reserve "to protect these trees for the education and enjoyment of future generations."[1] The request was approved in 1887 and the park was opened on September 27, 1888, and officially dedicated the next year, on October 29, 1889, by the Governor General of Canada, Lord Stanley. The Park is currently leased from the federal government for one dollar per year under a ninety-nine-year renewable lease effective since 1908. In 1947, Stanley Park acquired the additional status of Game Reserve (Steele, 1985:19).

Stanley Park's woodlands are interlaced with trails that wind through a variety of natural woodland types and some plantations. Some of these trails were created during early logging activities which took place in the 1850s and throughout the 1860s to 1880s; the trails were constructed to skid the logs out of the forest. This early logging was, however, very selective, taking only the prime individuals of the merchantable species (Douglas-fir) for spars and timbers, so that today's remaining forest still contains many of the massive first-growth trees that were considered culls or non-merchantable species, or too large for the oxen teams to skid out of the forest, and which had not yet died from natural senescence or the effects of disturbance.

The preservation of these large coniferous trees, now thought to be about seven hundred or eight hundred years old, among second-growth natural regeneration of coastal forest species, plays an important role in the Park's aesthetic appeal and aura of "wildness" within the city. The

western side of the park contains remnant stands of these old-growth veterans which provide habitat necessary for bald eagles, herons, and a variety of other bird species. The lives of old-growth trees are extended by removing dead tops and limbs, a procedure which stimulates renewed vigour in these trees, especially western redcedar (Bakewell, 1980:15). If dying or dead veterans cannot be saved, they are cut off as high as possible so that their large stumps can continue to serve as monuments of the original forest growth for interested visitors. Unfortunately, decline of the coniferous forest has occurred in much of the Park and the lack of a forest management program in the past to replant openings in the forest before large old-growth trees died has resulted in large areas which do not have any intermediate-sized coniferous trees to replace the old growth trees (Bakewell, 1980:41). Measures are now being taken to replant areas where these trees will eventually and inevitably be gone.

Some eighty-two acres (thirty-three hectares) of Stanley Park's woodlands consist of plantations, the majority of these established in areas where a 1962 typhoon blew down the trees. (Blowdown areas which were not replanted were taken over by deciduous trees, shrubs and brush.) The plantations are managed with programs of brushing, thinning and pruning so that deciduous species do not take over, so that the trees remain healthy and vigorous, and so that the stands are aesthetically pleasing and available for recreation use. Similar measures should be undertaken in the remaining natural forest areas to deal with the degeneration of the coniferous forest cover, if these woodlands are to retain the coniferous composition that Stanley Park is identified with. Unfortunately, the public's negative view of forest manipulation and

insufficient funds and manpower have prevented the full-scale implementation of a comprehensive forestry program that would preserve the coniferous forest and limit deciduous growth to designated areas. Thus, along with the management in plantations, other forest management measures which are undertaken in Stanley Park's woodlands include the removal of dead tops and limbs and danger trees where they threaten public safety, a well-maintained system of well-surfaced trails that help to prevent recreationists from straying into and damaging sensitive forest areas, and a fire protection system (water lines and fire hydrants). Downed redcedar trees are salvaged for useful products such as posts, rails and other building materials needed in the Park (Bakewell, 1980:20).

Stanley Park's woodlands provide urbanites with a setting for forest recreation activities such as hiking, picnicking, nature study and observation of the Park's forest wildlife (including numerous small mammal, rodent, and bird species). Two lakes, one completely surrounded by forest, provide a change in forest scenery and attractive places to stroll or watch waterfowl. However, because Stanley Park has been designed to cater to a wide range of recreational and entertainment interests of the urban population, the other half of the Park's acreage, once also covered by forest, has been intensively developed since the Park's establishment with recreational and entertainment facilities, services, manicured gardens, and amusement areas. There are roads--one around the perimeter of the Park and a few through the park, almost all in the highly developed area--that provide vehicular access or simply a drive around or through the Park for sightseeing; parking lots; a walkway along an asphalt and granite seawall which rims the Park that takes walkers,

joggers, cyclists and roller-skaters on a visual tour of the harbor, ocean, forest, mountains, city views and other features of interest; grassy fields for various sports, such as cricket; a pitch and putt golf course; lawn-bowling green; tennis courts; playgrounds; a salt-water swimming pool; beaches; picnic areas; restaurants, cafes, concession stands, giftshops; washroom facilities; an outdoor theatre; manicured rose-gardens; a small zoo and children's "petting" zoo; a miniature railway and pony rides; duck ponds; a world-class Aquarium with thousands of marine animals, including beluga and killer whales, and an "Amazon River" exhibit complete with jungle plants, tropical wildlife species, and intermittent warm "tropical rainshowers"; and numerous other features of interest such as Indian artifacts (e.g., totem poles); statues and monuments, and the massive stumps of old-growth trees, including "The Hollow Tree," a giant, hollow western redcedar stump that can accommodate a car. Thus, this urban woodland and park provides "something for everyone."

b. Burnaby Mountain

Another urban woodland in the Greater Vancouver area is located on Burnaby Mountain, in Burnaby, Vancouver city's urban neighbor to the east. Burnaby Mountain is the most prominent point of land on the Burrard Peninsula, with very steep northern slopes and moderate slopes on its other sides. Over the last few decades the forest on the Mountain has been cleared for certain land-uses: at the summit is the campus of Simon Fraser University, and to its west is the clearing for Centennial Park, containing a parking lot, grassy areas and picnic facilities, playground

area, viewpoints, and a pavillion; roads lead to and from the University and Park; a powerline right-of-way crosses the mountain; and houses and streets occupy some of the gentler slopes. However, much of Burnaby Mountain is still forested with second-growth woodlands that regenerated after early logging operations, composed of a mixed coniferous/deciduous cover that is home to many wildlife species including small mammals, deer, and many bird species (Eberts and Grass, 1984:45-47). Covering a total of 887.5 acres (359 hectares), these woodlands are currently designated by Burnaby as Burnaby Mountain Conservation Lands, with a strip of 137.5 acres (57 hectares) of these lands on the northwest side known as Burnaby Mountain Park (which includes the aforementioned clearing called Centennial Park) (Personal communication with Burnaby Parks and Rec. Dept.). There are trails in the forests of Burnaby Mountain Park and the conservation area, as well as service roads, that provide access for strollers, hikers, joggers and even the occasional horseback rider seeking to experience this natural area. One system of well-constructed trails, also known as the Simon Fraser Circuit, circles the crown of the mountain, just below the University campus, providing a three-hour walk through woods of alder, hemlock, western redcedar and assorted scrub on the uneven and sometimes steep mountain sides. The trails route traffic well clear of the northside cliffs, and creeks and gullies are crossed by wooden bridges.

c. Burnaby's Central Park

At the boundary between Burnaby and Vancouver, on the Burnaby side, is another urban woodland worthy of mention even though it is relatively

small. Originally set aside as a military reserve for the defense of New Westminster (the first settlement in the area), Central Park was officially established in 1891. The Park did not escape the early logging that occurred over most of the Lower Mainland, as evidenced by old-growth stumps, but the forest naturally regenerated. In the 1960s and 1970s much of the 225-acre (91-hectare) park underwent development to provide recreational facilities. Today there are: open grassy glades and sports fields; ornamentally landscaped areas and manicured gardens; a pitch and putt golf course; a horseshoe pitching area; picnic areas; a small man-made lake, home to abundant waterfowl; a fitness circuit; tennis courts; a swimming pool; a stadium, and parking lots. However, the 106 acres (43 hectares) of forest which remain are still of sufficient size to impart a sense of quiet and solitude and a feeling of "naturalness" to those who seek a brief escape from urban surroundings and noise, and some contact with nature.

d. Vancouver's North Shore

The northern urban fringe of the Vancouver area is defined by mountains which limit the extent of urban development to the north, and it is on this urban fringe that more of Vancouver's urban, or urban-fringe, woodlands are found. Urban development is conspicuous on much of the lower south-facing slopes, and cleared areas for skiing are visible on three mountain tops, but vast areas of relatively wild, mountainous woodlands and remoter backcountry remain, designated as essential watersheds, or as parklands. They consist of areas which are too steep, remote, hazardous, or unstable for urban development. Roger and Ethel

Freeman, authors of a book (1986) on exploring these North Shore mountains, claim that this is the most extensive backcountry in North America on the periphery of a major city. Thus, these mountains are a blessing for urban-dwelling nature and outdoors lovers, for they provide nearby, easily accessible forest areas for rugged woodland and sub-alpine wilderness recreation, including survival skills training, nature education, orienteering, wildlife observation, and downhill and cross-country skiing and showshoeing in winter, and, in the remoter areas, backcountry hiking and wilderness camping (by special permit). There are innumerable (literally hundreds of) trails, along with old logging roads, service roads, throughout these forests, which can be accessed from numerous points along the North Shore--from parks, roads and public transportation routes, powerline rights-of-way, ski-hill areas, or from various points at the edges of the neighborhoods and communities that abut the lower reaches of the woodlands. There is also an aerial tramway on one of the mountains (Grouse Mountain), providing an effortless ascent to its summit, from which mountain-top hikes or downhill hikes may be embarked on, if desired. Thus, access to the forests of the North Shore mountains is easy and abundant, and a large variety of walks and hiking circuits (of various distances and degrees of challenge) can be chosen. Parklands which may be visited include two provincial parks (Cypress and Mount Seymour), two regional parks (operated by the Greater Vancouver Regional District (GVRD) Parks Department--Capilano River, Lynn Headwaters), a demonstration forest (operated by the GVRD--Seymour Demonstration Forest), and some municipally-managed forest parks in the lower-level, urban areas (e.g., Lynn Canyon Park, Cypress Falls Park, and

Lighthouse Park). In addition to trails, there are at least a minimum of facilities in most of these parks, consisting of parking areas, washroom facilities and picnic areas, but some of the parks feature additional developments or attractions. Both Cypress and Mount Seymour Provincial Parks contain privately-run ski areas (for both downhill and cross-country, and both day and night, skiing); Capilano River Regional Park features the Cleveland Dam at its northern edge, a salmon hatchery, a privately-run suspension bridge, and allows for fishing and white-water kayaking. Lynn Canyon Park (managed by the District of North Vancouver) features an Ecology Centre, with displays and special programs of entertainment and education; a snack bar; and a suspension bridge spanning the Lynn Creek Canyon.

The Seymour Demonstration forest, comprising 13,827 acres (5,600 hectares) was recently opened to the public (1987) by the GVRD, and contains a man-made fresh-water lake near its entrance, around which a swimming/recreation area in a forest setting is being developed, with beaches, picnic areas, washroom/changeroom facilities and a visitor centre. The Seymour River runs through the forest, where fishing is permitted. There are also the Seymour Falls Dam and a fish hatchery at the northern end of the Forest, beyond which public access is restricted, and construction is under way on interpretive trails, educational displays, and forestry demonstration plots in parts of this mountain valley forest for learning about nature and for demonstration of forest harvesting and management activities. (The Seymour Demonstration Forest is not a park, but rather, it forms the lower part of the Seymour Valley, a watershed retained for future water supply. Forest management practices

are usual activities in the management of a watershed, and have been carried out here since 1961, providing a source of revenue and maintaining forest health and environmental quality in the watershed. As the lower Seymour Valley will not likely be needed for water supply for many decades, it has been opened to the public for limited recreation and mainly educational purposes, to promote awareness of nature and the forest environment, forestry practices, and multiple land-use for a variety of benefits--water supply, forest production, fisheries, wildlife, recreation and education).

Lighthouse Park (managed by West Vancouver Municipality), located on a point of land jutting into the waters of Vancouver Harbor, is a 185-acre (75-hectare) unique combination of virgin (never logged), predominantly coniferous, coastal forest, rugged, rocky terrain, and a scenic ocean shoreline indented by deep bays and tunnellike notches due to wave action. There is a functioning lighthouse at the southern tip (Point Atkinson) of the Park, which can be viewed "from afar" (it is not open to the public), but the main attractions of this park are its unique natural and scenic values. The opportunity to view a stand of virgin forest which escaped the early logging of the area and which has remained relatively undisturbed for hundreds of years is rare for any urban (or even rural) setting. Furthermore, a wide range of different habitats (growing conditions) created by the varied terrain has produced a rich diversity of additional plantlife, ranging from species which can survive the drier conditions of rocky headlands and outcrops along the shores, to those taking root on shaded and humid rock cliffs in the forest, to those growing luxuriantly in the moist, nutrient-rich valley bottoms, to plants

colonizing disturbed sites along trails and roadsides. Other features of interest in the Park include bald eagle aeries, a large variety of forest and marine birds and animals, intertidal organisms along the shore, and geological features such as potholes and seacaves.

e. Vancouver's University Endowment Lands

Finally, perhaps the best example of an urban woodland in the Greater Vancouver area is the 1,700-acre (688-hectare) forest presently known as the University Endowment Lands (UEL), located between the University of British Columbia and the City of Vancouver. This urban woodland is the case study for this thesis and is described in detail in the next chapter, Chapter 5.

D. Conclusion

The examples of urban woodlands described in this chapter show that several cities have set aside woodland areas for use by city residents. The experience in Europe is more extensive than in North America, as forests are generally viewed by Europeans as an important urban land use. Urban populations in Europe apparently view forest recreation as an integral part of the city-living experience, for the forests are very close by, easily accessible, and heavily used.

In North America there are few examples of urban woodlands comparable to those in Europe. Those which have been set aside are viewed with pride by the city residents, for relatively few other North American cities enjoy similar convenience and ease of access to forest recreation and education experiences.

Chapter 5

PRESERVATION OF URBAN WOODLANDS CASE STUDY: A PROPOSED URBAN FOREST PARK FOR THE "UNIVERSITY ENDOWMENT LANDS" WOODLAND IN VANCOUVER, BRITISH COLUMBIA

The preceding chapters examined the history of urban forest parks and woodlands, established a rationale for their preservation, and looked at examples from various countries of the successful preservation of urban woodlands for urban open space. This chapter presents a case study of the large, contiguous tract of woodland in Vancouver, British Columbia called the University Endowment Lands (UEL), introduced in the preceding chapter. This woodland has remained undeveloped and unallocated despite a long history of urban development plans and proposals for the area, and its future is being debated as this thesis is written. This chapter includes a review of the efforts to preserve the UEL woodland as a forest park, and then discusses the value of the UEL woodland in the context of the rationale given in Chapters 3 and 4.

A. Location and Description of Study Area

1. Location

The forested University Endowment Lands, approximately 1,700 acres (688 hectares) in size, are situated on the Point Grey peninsula, and form a continuous north-south band of woodland, extending from the waters of

English Bay to the mouth of the North Arm of the Fraser River (Figure 1). The forest is adjacent on its west edge to the University of British Columbia campus and privately held residential and commercial properties, and on its east edge to the City of Vancouver, British Columbia (Figures 2a and 2b). In a regional context, the UEL are part of the metropolitan area of the Lower Mainland of British Columbia, also known as the Greater Vancouver Region, or simply, Greater Vancouver.

The significance of this location for an urban forest resource is demonstrated by the UEL's accessibility and urban environment. Five arterial roads connecting the UEL residential community and university campus with the City of Vancouver cut through the UEL forest, making it one of the most accessible forests in the Greater Vancouver Region (Klassen, 1976:6) (Figure 3). The central municipalities in the Region (Vancouver, Burnaby, New Westmister) are largely built-up urban areas, and urban development is increasing in the outlying municipalities to accommodate population growth, leaving sizable natural areas scarce and increasingly remote from the urban populations. The Greater Vancouver Region has the largest population concentration in British Columbia with 1.38 million people (1986 census), (close to half the total population of the province), and this number is expected to approach 2 million by the year 2000. Furthermore, more than one-third of the Region's population is found in the City of Vancouver, the municipality contiguous with the UEL.

2. History of Establishment and Land Status

This history is important for understanding why the UEL woodland exists today within a built-up urban area. The 1,700-acre (688-hectare) woodland

LOCATION

Figure 1. Location of the UEL woodland on the Point Grey peninsula, Vancouver, B.C. (From Thompson, 1985).

Figure 2a. Oblique aerial view of the UEL woodland from the waters of English Bay, showing UBC campus on top right of photo (Photo courtesy GVRD Parks).

Figure 2b. View of adjacent urban residential area (Vancouver) from within the woodland (Photo courtesy GVRD Parks).

Figure 3. SW Marine Drive through the UEL (Photo courtesy GVRD Parks).

comprising what is presently called the University Endowment Lands has remained undeveloped in the face of spreading urbanization due to failed attempts (sometimes due to historic events such as the Depression) and/or lack of political action to develop the land as had been done with the remainder of the original UEL. The UEL originally consisted of 3,000 acres (1,215 hectares) of woodland, acquired from the federal government in 1912 in exchange for 160,000 acres (64,800 hectares) of provincially-owned land elsewhere in the province, and was set aside by the province in 1920 under the University Loan Act, providing for the subdivision, servicing and sale (or lease, under the revised Act of 1923) of this Crown land. Under the University Endowment Lands Administration Act, 1925 the "UEL Administration Account" was formed, into which would be deposited a government loan and the revenues from these Crown land sales or lease, and taxes. The income from this account was intended to first provide for the general operation of the lands, with any amounts not so required to go towards repaying the initial government loan which had been provided for the costs of developing the permanent university campus and the UEL townsite--over $2 million; only a surplus to this account, after lands operation and debt retirement were taken care of, was to be applied towards an endowment, allocated to the "University Endowment Account" which would provide annual investment income to the University (UEL Study Team, 1977b:A.1, G.1).[6]

This was not the first endowment scheme to be established for the University. In 1907, the University Endowment Act provided for the reservation over a three-year period (subsequently extended by three amendments to the Act to twelve years), of up to two million acres (810,000 hectares) of Crown land which would be used as revenue property

to provide a continuous source of funding for the University. The idea was a good one at the time the policy was formulated, for there was a strong movement in farmlands and it appeared that the setting aside of agricultural lands would produce a considerable fund for university purposes (McPherson, 1926:5). However, over the 12-year period only 750,000 acres (303,750 hectares) of agricultural land were set aside throughout the province and, due to changing economic conditions, the anticipated demand for these lands did not materialize. It became evident that the procedure of reserving farmland did not warrant continuation as it would not be successful in yielding the desired revenues, and so the original two million-acre endowment land concept was abandoned (UEL Study Team, 1977b:A.1). The University Loan Act, 1920 provided for both the cancelation of the lands reserved for endowment purposes under the University Endowment Act, 1907, and the substitution of a second land endowment scheme, designating the 3,000-acre (1,215-hectare) woodland located beside the 175-acre (71-hectare) site of the university campus on the Point Grey peninsula as the UEL. According to H.L. McPherson (1926:5), "it was felt the development of these lands for high-class residential purposes would provide a surer, safer and earlier return for an endowment fund than any other method." Although the woodlands (and the community which was built beside the University) were called, and are still known as, the University Endowment Lands, neither are a part of the University of British Columbia--they are an unincorporated territory, owned and administered by the provincial government.

From 1925 to 1955 Crown land was leased or sold for residential and commercial purposes and schools and roads were built, but the Depression

of the 1930s and war-shortages in the 1940s considerably slowed down the planned development and sales of the land. By 1955, over half of the undeveloped Crown land remained--it had been reduced to just over 1,700 acres (688 hectares) by the developments for endowment purposes and additional grants of land to UBC. The last residential subdivision had been built in 1949. An area of three hundred acres (121.5 hectares) cleared for development in 1951-1952 reverted to forest because governments changed and decided to review the status of the land--in the more than twenty-five years since the establishment of the UEL the anticipated endowment revenue had not materialized. A government-commissioned master plan survey on the UEL in 1955 reported:

> If the original Treasury advance of $2,184,937.34 had to be repaid, there would be an overdraft of $1,047,167.33. Endowment funds as such have not been realized, much of the original Treasury advance of more than $2,000,000 can be classed as irrecoverable, and a good portion of the endowment land assets has been alienated. The purpose of cash endowment has been defeated and this objective recedes ever farther with the passing years (Turner, 1956:17).

The same observation was made by an uncommissioned report in 1961:

> Events over the last three decades . . . have been far from fulfilling the anticipated endowment revenue. The University Endowment Lands have not lived up to expectations as originally envisaged, and in addition have been failing to hold their own financially (Project Planning Associates Limited, 1961:15).

The master plan survey commissioned by the government in 1955 was an attempt by the government to "place the remaining endowment lands on a stable financial basis" (Turner, 1956:17). The government asked for recommendations for development "which will yield optimum revenue from the

UEL for University endowment" (Turner, 1956:17). The report which was delivered to the government, known as the Turner Plan, or Report, was never acted upon, and the remaining UEL woodlands were left undeveloped. Another proposal prepared by a private developer in 1961, which also attempted to show how the UEL could be developed to provide endowment for the University, was not accepted by the government. A governmental move in 1965 to provide revenue for all three of the province's universities through disposal of UEL and other provincially-held land with the formation of a "Universities Real Estate Development Corporation" also was never followed through (UEL Study Team, 1977b:A.3). Clearly, the concept of endowment, which had not succeeded in its intent, was abandoned. The UEL Study Team in 1977 noted: "The concept of the university endowment [is] for all intents and purposes, defunct since 1956" (1977b:G.1). No payments were ever made to the University from the sales of land, as all revenue was allocated towards repaying the original government loan and for general operating expenses for the lands (UEL Study Team, 1977a:1). (The Endowment Lands Account was finally closed by the government in 1982, showing a net loss of over $1 million (Thomas and Nichols, 1985:256)).

Since 1956 proposals for the undeveloped UEL have included residential and commercial developments, research facilities, areas for playing fields, and preservation as a park. The first proposal for park was put forth in 1957 by the "Lower Mainland Park Advisory Committee" (Klassen and Teversham, 1977:109). However, a controversy over the allocation of the UEL woodland began in earnest in 1972, when the new government (NDP) which had assumed power in the province announced its intention to convert the UEL into a demonstration housing project of

medium-density subsidized housing. (The debate over the UEL is discussed in Section B.) In response to considerable public protest, the NDP government allocated and dedicated 1,066 acres (432 hectares) of the UEL as a park in 1975 which they called the Frank Buck Memorial Park, within which a 221-acre (89.5 hectares) ecological reserve was delineated to protect a colony of Great Blue Heron. The status of this park and ecological reserve have not been changed to date. Aside from 186.5 acres (75.5 hectares) of foreshore land leased to the Vancouver Parks Board, no other undeveloped land has been allocated, so the status of the remainder of the undeveloped woodland of the UEL (610 acres (247 hectares)), up to the time of this writing, remains as unallocated, vacant Crown land. All of the UEL woodland and UEL urban community remain under the administration of the provincial government. Thus, until all of these woodland areas are given official park status or are Crown-leased or Crown-granted to a municipal or regional administrative body to be used as an urban forest park, the preservation of the UEL woodlands will not be secure.

3. Woodland Land Use History and Biophysical Attributes (Natural Values)

a. Woodland Land Use History

The land use history (Figure 4) of the UEL woodland is important in understanding how the present diverse natural character of the second-growth woodland, particularly the vegetation, was formed, as the historical uses and events have influenced its development.

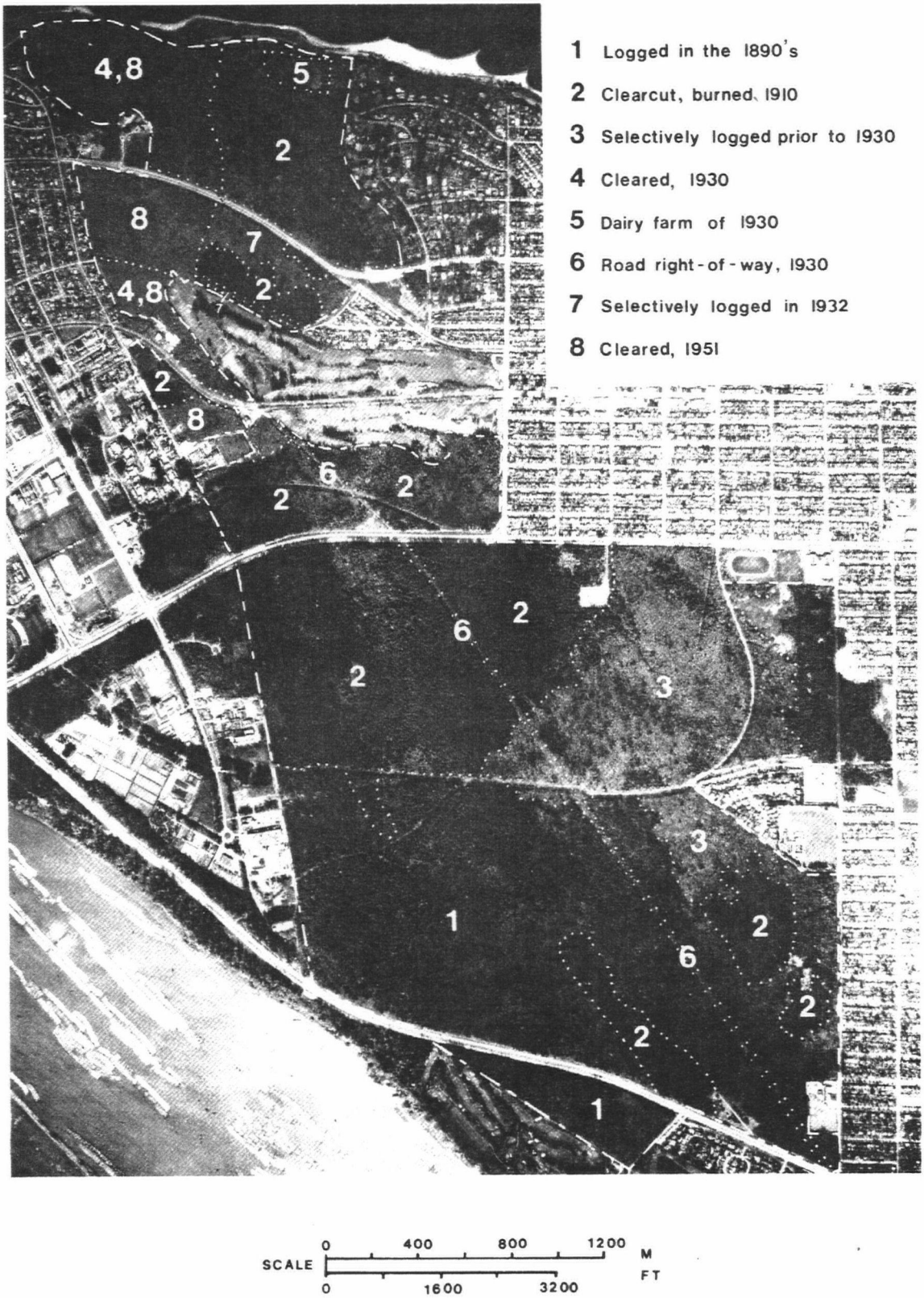

Figure 4. Map showing important historical disturbances to the UEL woodland. (Area 3 was also burned by a wildfire in July, 1919.) (From Thompson, 1985).

Much of the original woodland of the Point Grey peninsula, like that of Stanley Park and Burbaby's Central Park, was once part of a federally-owned military reserve established in the 1860s, and although such status kept these woodlands free from the residential and commercial development which was occurring in the late 1800s, they were not excluded from the logging which swept the Lower Mainland as early Vancouver became established as a sawmill town. Of course, the virgin woodlands had been used for their forest resources even earlier by the native Indians who lived in or at the edge of the woodlands (the Musqueam band lived on the UEL), depending on them for shelter and food--trees for constructing long houses and canoes, and wildlife for food, for example--but it was not until the advent of European settlement, accompanied by its commercial logging industry, that the virgin forests of the Lower Mainland began to disappear in their entirety. Enormous stumps of the virgin trees and old logging skid trails remain over much of the UEL woodland to attest to the era of early logging.

The first timber lease granting cutting rights for much of the Point Grey area was issued in 1865, a time when the tall, straight stems of the virgin Douglas-fir trees were prized for their suitability as masts and spars for navy ships and for lumber. Cutting began on the north slope of the Point Grey peninsula in the 1870s and within the decade, it had been cleared of the best spars and timber (Klassen, 1976:50). It was logged two more times for remaining Douglas-fir and western redcedar which were merchantable as lumber and shingles. In 1880 logging was started on the southern portion of the Point Grey peninsula, and had ceased by 1891 when cutting leases expired, but not before the best timber had been extracted.

Evidence of the early logging on the UEL still exists in several locations in the forest and foreshore: remnants of old skid roads and trails, constructed of small logs stuck into the ground over which teams of oxen pulled the logs; the large stumps of virgin trees; and a log chute constructed in the gulley down to Wreck Beach, needed where the cliffs were steep to dump the logs into deep water. One area that was never logged lies above a steep cliff with shallow water at its base, on the south side of the peninsula, where trees up to five hundred years old (or possibly older) still stand (Klassen and Teversham, 1977:19). During the early 1900s, remaining patches of timber on the peninsula which were passed over as unsuitable during the earlier high-grade logging were also removed.

In 1913, the same year the province acquire title to the federally-held woodlands on Point Grey, the university campus was cleared at the tip of Point Grey peninsula, and the UEL was established in 1920. After 1923, public timber licences were no longer granted, except for individual cutting permits granted in the late 1940s during a general fuel shortage, permitting individuals to cut deciduous trees, except dogwood, south of Sixteenth Avenue and between Imperial and Blanca Streets. Otherwise, cutting and/or clearing of woodland continued up until 1951 only by the university and the government, either to clear land for planned development projects or for fuelwood. Some cleared areas were built upon as planned, while others reverted to forest as development plans were put on hold. The clearance and subsequent abandonment of these areas are responsible for contributing to the present variety of vegetation types to be found on the UEL woodland. For example, a narrow strip of vegetation

running northwest-southeast across the woodland from SW Marine Drive to University Boulevard, clearly discernable on air photographs of the UEL, was cut in 1936 for a planned main road to be called Cleveland Drive, running through an entirely developed UEL. The Depression of the 1930s halted these plans and the old roadway is today a strip of mixed deciduous trees and brush, including red alder, mountain ash and cascara. An area of three hundred acres (121.5 hectares) between Spanish Banks and Chancellor Boulevard and extending up to University Boulevard west of the golf course, which today supports a dense stand of deciduous trees, including red alder, bitter cherry and willow, represents the final attempt at residential development on the UEL woodlands, cleared of vegetation as well as stumps in 1951, the second unsuccessful attempt to develop this area after being cleared once before for the failed development of the 1930s. Two churches and two schools to serve the UEL community which were built on land allocated to them from the UEL still exist today.

The history of disturbances and land use on the UEL woodlands is not limited to commercial and fuelwood logging or clearing of forest and stumps for residential development. A plot of land overlooking Spanish Banks was bought in 1909 by John W. Stewart who cleared the plot completely of stumps and established a dairy farm (Area 5, Figure 4). Today, the remnant of this farm, where it has not reverted to forest since its abandonment, is a clearing known as the Plains of Abraham (Figure 5), and the concrete foundation of a farm building can still be seen just inside the forest on the south side of the meadow. In July of 1919, a wildfire burned on over five hundred acres (202.5 hectares) of Point Grey

Figure 5. "The Plains of Abraham." A remnant of an old dairy farm on the UEL (Photo courtesy GVRD Parks).

land, which included a portion of the UEL woodlands south of Sixteenth Avenue between Imperial and Blanca Streets (Area 3, Figure 4). Today, this area supports a mixed coniferous-deciduous forest of red alder and western redcedar clearly distinguished on air photographs from adjacent coniferous forests of Douglas-fir, western hemlock and/or western red cedar. Large stumps blackened by fire over much of the UEL woodlands provide visible evidence that other fires occurred at one time or another after logging over most of the area, but fires other than the one of 1919 do not appear to have been documented. A small clearing which presently exists in the woodland (Figures 6a. and 6b.) near the junction of Thirty-third Avenue and Camosun Street owes its origins to being cleared

Figures 6a. and 6b. "Clinton Meadow." Clearing in forest, old site of Clinton's Stables (Photos courtesy of UEL Trail Riders).

for a 1920's logging activity site (for the operation of a ground yarding setting powered by a steam engine), and later, in 1931, a man named Alf Clinton obtained a lease on this area and erected his home plus stables for the Point Grey Riding Club. Riders used and maintained old skid trails from the 1920's logging as bridle paths, still used today by riders and walkers and known as Malkin, Clinton and Sasamat trails (Klassen, 1976:55). The stables were sold in the 1950s and subsequently abandoned by 1967 due to poor business, and burned down in 1968; the land has since reverted back to the Crown. However, this was not the last lease to be granted for use of UEL property. During the 1940s a clearing near Sasamat Street and Sixteenth Avenue, on the Sasamat trail, was leased by the City of Vancouver for a works yard, where pruned slippings from street trees were dumped and/or burned (Klassen, 1976:56). The legacy from this land use is a grove of non-native trees, not otherwise found in the UEL woodlands--honey-locust, horse-chestnut, English oak, Norway maple and Manitoba maple--most likely established from the seed of city refuse. Some people call this place "The Garden of Eden." A short distance southeast of this clearing is a water reservoir constructed to service the residents of the UEL and the Dunbar and West Point Grey areas of Vancouver, sitting on land leased by the Greater Vancouver Regional District. Just southeast of this reservoir, a diamond-shaped piece of land was leased by the Northwest Telephone Company until 1961, and subsequently by the Canadian Broadcasting Corporation as an international monitoring station until 1971. Klassen (1976:57) writes: "A receiving tower was erected at each corner of the diamond and the foundations of a building can still be seen near the southern tip of the diamond beside the

Top Trail." A couple of cleared powerline rights-of-way also run through the woodlands to the University.

Finally, a land use which has continued for decades up to the present day is the use of the entire UEL woodlands as a de facto recreation park and outdoor education area. Access has been created over the years by the construction of many miles of trails throughout the woodlands (Figure 7), in addition to the maintenance of the old skid trails/bridle paths, mentioned earlier, and the use of abandoned roads and powerline rights-of-way (Figure 8) as trails (Imperial trail (Figure 9) was once a through road to SW Marine Drive, and Pioneer Trail was originally a road leading to the old Stewart dairy farm). Much of the trail construction, improvement and maintenance has been undertaken by volunteers such as members of the UEL Trail Riders, a horseback riding club, and the UEL Regional Parks Committee, a citizens group lobbying for the preservation of the UEL as park.

b. Biophysical Attributes

i. Topography, Drainage and Soils[1]

The UEL woodlands are located on a gently rounded, undulating plateau which attains its maximum elevation of about 425 feet (130 meters) above sea level near the center of the present golf course. The land slopes gradually down to the north to about 200 feet (61 meters) above sea level and to the south to about 160 feet (49 meters), where it comes to an abrupt edge with the formation of steep cliffs and gullies. The slope over most of the woodland is gentle, averaging five to ten percent, with fifteen percent in a few places.

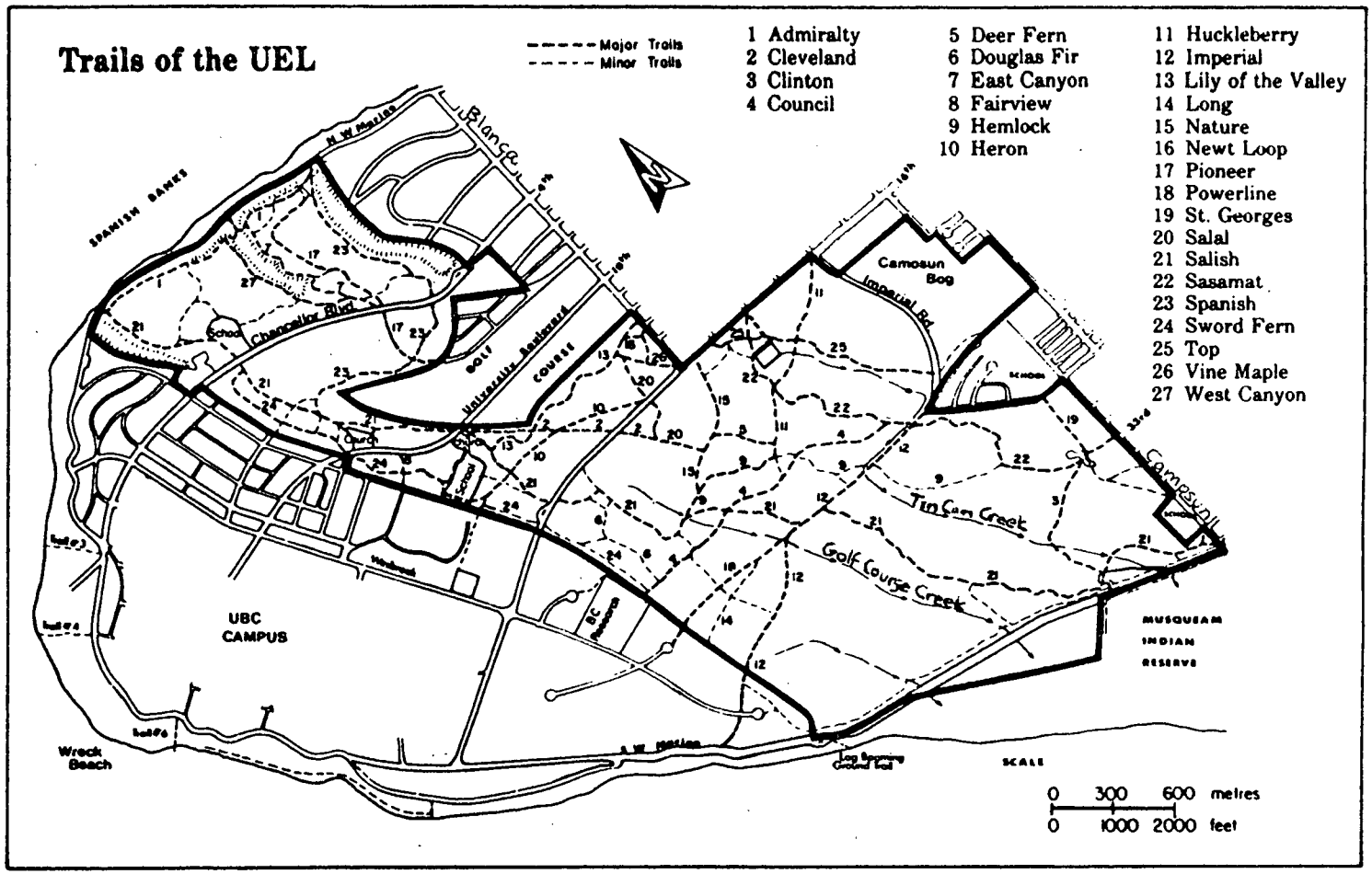

Figure 7. Map of present trails on the UEL (From: Newell, 1984).

Figure 8. Junction of a closed road (Imperial) and powerline right-of-way, both used as trails (Photo courtesy GVRD Parks).

Figure 9. Imperial Trail (Photo courtesy of GVRD Parks).

The UEL receives about 49.5 inches (1,257.7 millimeters) of rain annually, and what is not absorbed by vegetation or the soil results in surface run-off. Three creeks running north-south in shallow depressions drain the southern portion of the UEL, and three deeply eroded ravines which bisect the peninsula north of Chancellor Boulevard, cutting approximately 2,461 feet (750 meters) in a south-easterly direction inland, drain the northern portion of the woodland. Surface run-off, however, fluctuates quite drastically. Often, there is not enough surface run-off to keep the streams flowing year-round--most of these creeks dry up in summer months when rainfall is low. Only one, called Tin Can (or Musqueam) Creek is able to keep running all year due to overflow from the GVRD water reservoir, and the northern ravines may maintain a small trickle in summer months. Furthermore, the northern ravines are deeply incised due to high flows of run-off during winter rainstorms--indicating a limited capacity for groundwater storage on the UEL.

The soil parent material on the UEL from which the soils of the woodland are derived is a relatively thin layer of glacial and marine sands and gravels, from one to five feet (0.3 to 1.5 meters) thick, overlying a thick, hard, compact and highly impermeable layer of glacio-marine till. Three different types of soils have developed from the parent material, largely as a result of variations in drainage and topography (which affects drainage). Soils of the Podzolic Order, the most common on the UEL, have developed where drainage is generally good, in coarse-textured, sandy parent material which drains well. These podzols are highly leached, since minerals and organic matter have been removed by water percolating through the soil, and acidic, and support coniferous or

mixed coniferous-deciduous forests. Soils of the Gleysolic Order have formed in flat areas, seepage areas, or depressions which are poorly drained with a nearly impervious underlay, resulting in a seasonally fluctuating, perched water table and saturated soil. Thus, these soils indicate seepage and wet spots, common in the southern portions of the UEL above and below SW Marine Drive. With less leaching than podzols, gleysols have a higher content of organic matter and higher fertility than podzolic soils. Western redcedar, Sitka spruce and skunk cabbage are common on, but not exclusively limited to, gleysolic soils and red alder and vine maple are also found.

Organic soils make up the third type of soil found on the UEL, consisting mainly (at least thirty percent) of unleached organic matter such as black muck and fibrous peat. These soils are found in two places, the Camosun Bog, and an area due southeast of the golf course. The drainage in these depressions is poor and the water table remains at or near the surface for most of the year, limiting organic matter decomposition and resulting in high acidity. Only plants which can tolerate such wet, organically rich and acidic conditions can grow on these soils, such as shore pine, Labrador tea, spirea, blueberry, and Sphagnum moss. According to Thompson (1985:5), Sphagnum moss has decayed in Camosun Bog over thousands of years to produce an organic layer up to sixteen feet (five meters) deep.

ii. Vegetation

The vegetation of the UEL woodland is one of its most attractive features. Rather than being composed of a single vegetation

association, the UEL woodland is comprised of a diversity of vegetation types that provide numerous habitat types for wildlife, aesthetic diversity and appeal, and a variety of forest settings for recreational and educational experiences. One of the most important factors which has determined the present character of the UEL woodland is its history of site disturbance and land uses, in conjunction with the natural effects on plant distribution of climate, topography, soil moisture, and soil type. What was once a relatively uniform virgin coniferous forest composed of mature Douglas-fir, western hemlock, and western redcedar, with some Sitka spruce and grand fir, is now a mosaic of vegetation communities, with many more tree and shrub species, that reflect past disturbances to the woodland and represent communities in various stages of natural (ecological) succession. The woodland now contains abandoned pasture land, deciduous forests, mixed coniferous-deciduous forests, young and mature coniferous forests, as well as a peat bog. Thompson (1985:83) notes: "Nowhere else in the Lower Mainland is such a diverse collection of woodlands found together in a single parcel of land."

The most recent and comprehensive survey of vegetation types on the UEL (excluding the foreshore) was carried out in 1983-1984 and documented by Thompson (1985). Twenty different vegetation associations were delineated (Table 1) (Figures 10 and 11), based on distinctive combinations of trees and/or shrub and herb species and associated soil and site characteristics.

A general overview of these vegetation communities is provided here, in the context of the land use and disturbance history of the UEL or unique site characteristics which influenced their establishment. For

TABLE 1. Vegetation Associations of the UEL woodland (Thompson, 1985)

Association	Title	Area (ha)	Percent
1	Hardhack - Salmonberry - Fireweed	30.9	4.3
2	Red Alder - Salmonberry	74.6	10.2
3	Bitter Cherry - Willow - Trailing Blackberry	20.9	2.9
4	Bigleaf Maple - Spiny Wood Fern	27.7	3.8
5	Cascara - Mountain Ash - Deer Fern	4.6	0.6
6	Vine Maple - Red Elderberry	97.5	13.4
7	Red Alder - Western Red Cedar - Red Huckleberry	109.7	15.0
8	Douglas-fir - Bracken - Stokesiella oregana*	5.9	0.8
9	Douglas-fir - Salal - Plagiothecium undulatum	135.9	18.6
10	Western Hemlock - Mnium glabrescens	62.1	8.5
11	Western Red Cedar - English Holly	46.6	6.4
12	Western Hemlock - Douglas-fir - Stokesiella praelonga	23.4	3.2
13	Western Red Cedar - Western Hemlock - Sitka Spruce	68.4	9.4
14	Pacific Crabapple - Hardhack - False Lily-of-the-Valley - Skunk Cabbage	1.0	0.1
15	Shore Pine - White Birch - Western Hemlock - Salal	0.9	0.1
16	Western Hemlock - Salmonberry	6.4	0.9
17	Western Hemlock - Red Huckleberry - Plagiothecium undulatum	11.2	1.5
18	Western Hemlock - Salal - Labrador Tea	0.8	0.1
19	Pond Association	0.9	0.1
20	Salal - Labrador Tea - Bracken - False Lily-of-the-Valley	0.2	0.03
		729.6	100

* Scientific names are used for mosses.

VEGETATION COMPOSITE MAP – NORTH

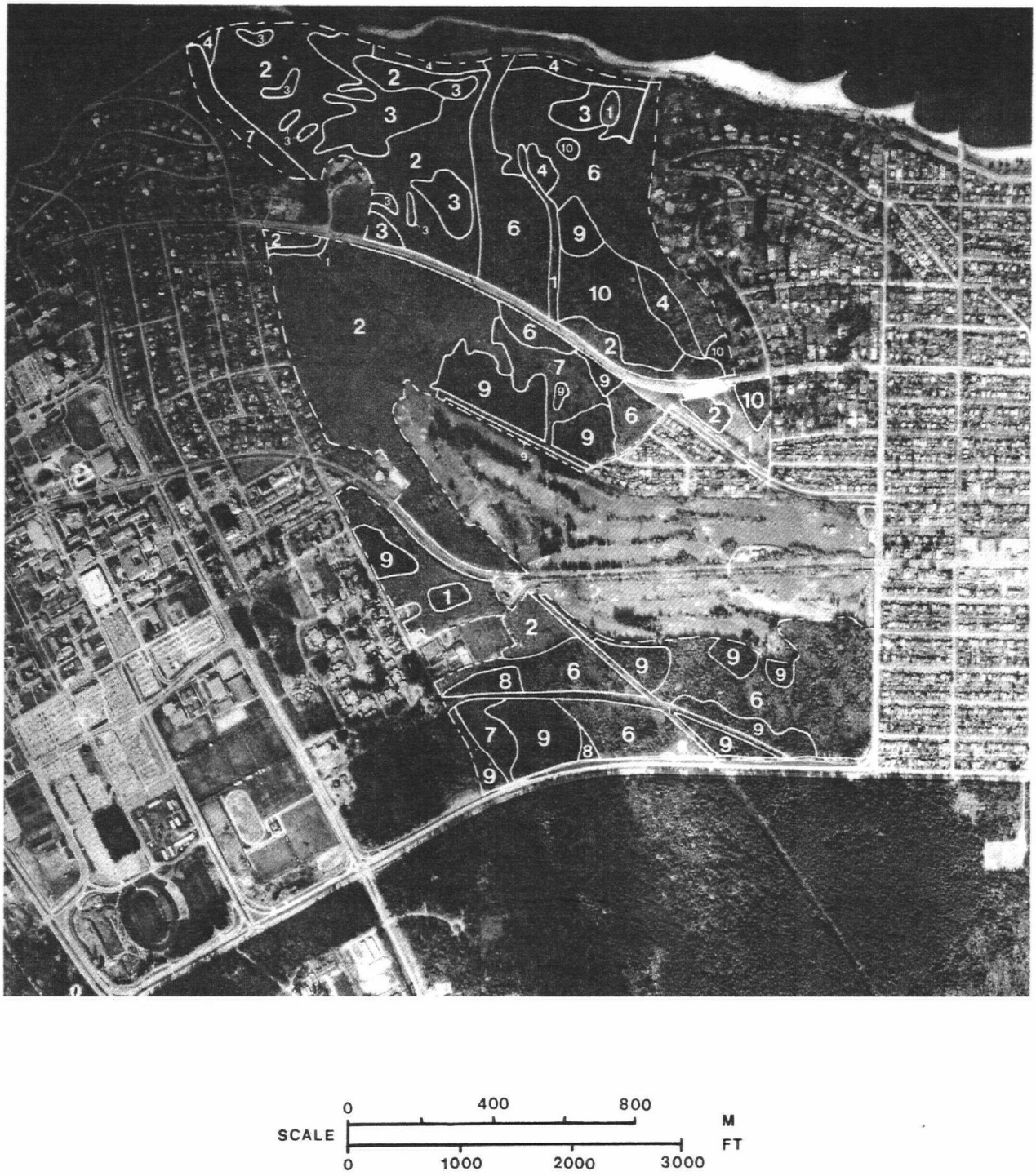

Figure 10. Map showing distribution of Vegetation Associations on Northern half of UEL (From: Thompson, 1985).

VEGETATION COMPOSITE MAP – SOUTH

Figure 11. Map showing distribution of Vegetation Associations on Southern half of UEL (From: Thompson, 1985).

detailed history and complete list of characteristic plant species of associations, the reader should consult Thompson (1985).

Thompson's first association comprises communities which are in the earliest stage of post-disturbance succession to be found in the UEL woodlands, inhabited by early successional plants ("pioneer species") such as grasses and fireweed, hardhack, salmonberry and red alder. Typically this association occurs on areas which are or were heavily impacted by sustained present or past land uses, such as the abandoned dairy farm (Figure 5) and Clinton stable (Figures 6a. and 6b.) areas; present powerline rights-of-way (Figure 8) and certain trails such as Pioneer Trail, the old road to the dairy farm; and the old city works yard, "The Garden of Eden," which is now an anomaly with its exotic tree species having seeded from city refuse. Present heavy use of some of these areas delays their succession to later successional stages. Other areas supporting this vegetation association are described by Thompson (1985).

Deciduous forests comprised mainly of red alder, with salmonberry as the main undergrowth, and in drier places dominated by bitter cherry and willow, now occupy the areas which were cleared for development, and thus extensively disturbed, in the 1930s and again in the 1950s (Associations 2 and 3) (Figure 12). These deciduous species are "pioneer" species, quick to take advantage of disturbed and exposed site conditions (especially red alder). These associations are also found on a few other disturbed areas; young, thick red alder stands are conspicuous along disturbed road sides, for example.

A deciduous forest of primarily bigleaf maple and red alder (Association 4) occurs on a steeply sloped area on the northern edge of

Figure 12. A red alder stand in the UEL woodland (Photo courtesy GVRD Parks).

the UEL, above NW Marine Drive, able to grow here because the root systems of these species are able to spread out and anchor the trees on the cliffs and to enjoy the seepage of water on these slopes. The same vegetation type occurs in a pocket which is lower and wetter than adjoining Douglas-fir stands, allowing red alder and bigleaf maple to grow because Douglas-fir was inhibited, and the biggest stand of this type occurs on a selectively logged area where site conditions favored these deciduous species after the fire of 1919 (See Figure 11).

Deciduous stands (Association 6) of predominantly red alder mixed with abundant vine maple in the understory, and scattered mature western hemlock and western redcedar in the overstory (which were too young to take when these areas were logged prior to 1931), occur in numerous locations over the UEL, where wet site conditions favor these species (Figure 13).

Figure 13. Dense vine maple understory in the UEL (Photo courtesy UEL Trail Riders).

The swath cleared for the "Cleveland Drive" roadway in the 1930s, but subsequently abandoned, became very wet in places due to soil compaction from the road work, and reverted to a deciduous stand (Association 5) of cascara, red alder and bitter cherry, but these grow poorly due to the wet soil. In a part of the roadcut which is drier, red alder is conspicuously absent, replaced by mountain ash and white birch, with some western redcedar and western hemlock also present. Skunk cabbage is common in muck pockets, and salmonberry is a common shrub.

A mixed deciduous-coniferous stand, which is a mid-successional stage between deciduous and coniferous forests, occurs in several places on the UEL woodland (Association 7) (Figure 14). However, the largest stand of this mixed forest dominated by red alder and western redcedar occurs on the logged eastern portion of the UEL woodland north of Sixteenth Avenue which was burned by the fire of 1919. This is the ideal forest type for nesting for the Great Blue Heron, which chooses to locate its nests in a stand of deciduous trees (exclusively red alder on the UEL) that is mixed with, or surrounded by, conifers of the same height or taller, providing protection from the wind.

Second-growth coniferous forest stands logged from the 1880s to the early 1900s occupy much of the UEL woodland, and their character reflects land use history as well as site conditions such as soil moisture. The even-age, uniform Douglas-fir stands, with infrequent western hemlock and western redcedar components, (Associations 8 and 9) occur where clearcut logging was carried out around the turn of the century--excellent examples of these stands occur especially along the south side of Sixteenth Avenue, west of Blanca Street (Figure 15). There is evidence of fires subsequent

Figure 14. Mixed coniferous-deciduous forest in the UEL in winter (Photo courtesy of UEL Trail Riders).

Figure 15. Douglas-fir stand with young hemlock and western redcedar understory (at Graeme's crossing) (Photo courtesy of UEL Trail Riders).

to logging which would have eliminated the logging slash and deciduous cover and exposed the mineral soil, ideal for the establishment of Douglas-fir regeneration. These Douglas-fir grew in thick, creating a closed canopy that prevented development of an extensive understory due to low light levels. The result is a cool, dark atmosphere with good visual penetration into the stand. More undergrowth often grows along trails where light is able to penetrate (Figure 16). Western hemlock and western redcedar, though infrequent at present and shorter than the Douglas-fir, may eventually succeed the Douglas-fir, as their seedlings are able to regenerate and grow in the shaded conditions.

Figure 16. Trail through Douglas-fir forest, where increased light supports vegetation growth along trail edges (Photo courtesy of UEL Trail Riders).

On wet sites the second-growth coniferous stands are dominated by western hemlock and/or western redcedar (Associations 10, 11, 12, 13). Douglas-fir often occurs on dry sites within these stands. Due to the wet soils (Figure 17) these stands usually have a more open canopy (windthrow, with trees falling over, often occurs in wet soils) allowing a larger variety of shrubs, such as salmonberry, salal, vine maple, red huckleberry and ferns to grow in the understory. Associations 12 and 13 also contain old individuals of Sitka spruce which grows on wetter sites. These older stands dominated by western hemlock and western redcedar were logged in the 1880s, containing the oldest second-growth trees on the UEL.

A unique group of trees exists within Association 7, on the south side of Top trail near Imperial Drive--a small grove of trembling aspen, a species rare in the Vancouver area and, furthermore, though native to the Fraser Valley, most have been removed during the development of farmland along the Fraser River (Thompson, 1985:86). Thus, this grove of aspen is a unique "collection" of a rare tree species in the UEL area. Active management by volunteers keeps this grove in good health--in the summer of 1983 competing red alder was removed to provide more direct sunlight for the aspen, and root suckers have sprouted, increasing the number of trees in the grove.

Another relatively rare species on the UEL woodland is grand fir. A few individuals of mature trees are found along SW Marine Drive in the western corner of the UEL, in Association 12.

The Camosun Bog is another special area of vegetation on the UEL woodland (See Pearson, 1985). It is an area rich in vegetation associations that are not found elsewhere on the UEL. Thompson (1985)

Figure 17. A skunk cabbage site on wet soil in the UEL (Photo courtesy of UEL Trail Riders).

delineates seven different associations within the Bog area (Associations 14-20). One distinct vegetation type occurs due to the disturbance of purposive clearing--about twenty-three feet (seven meters) on either side of a powerline right-of-way running north-south through the Bog (Association 18). It contains a thick cover of shrub species typically found in the Bog area, and Sphagnum moss but not the trees; the western hemlock in this right-of-way is in the shrub layer and kept down by periodic clearing to maintain the powerline. Association 19 is distinctive as it contains the only area of open water in the Bog, with pond-edge species such as sedge and common rush occurring in association with other bog species such as hardhack, Labrador tea, Swamp laurel, bog cranberry and Sphagnum moss. Association 17 is characterized by a closed tree canopy dominated by western hemlock with shore pine occurring in places, and a shrub layer where open areas in the canopy occur which includes salal, red huckleberry, oval leaf blueberry, Labrador tea, and young western hemlock. Although bog plant species are not well-represented in this association, it covers most of the historical extent of the Bog indicated by the distribution of accumulated Sphagnum peat. Other vegetation associations found in the Bog area include a dense stand of Pacific crabapple, in both tree and shrub form (Association 14); an open, mixed stand of shore pine, western hemlock and white birch at the northern edge of the Bog (Association 15), where the hemlock is overtopping the pine, a more typical bog tree, thus reflecting moisture changes to the Bog where artificial drainage from the Bog is causing a drying of the land and a succession of bog to forest; and an association of western hemlock with shore pine along the western edge of the Bog (Association 16) which,

although not really a part of the Bog, may represent a transition from bog to forest, indicated by the presence of shore pine in the association.

It must be kept in mind, as one views this map of diverse vegetation types present in the 1980s (or experiences first-hand the diversity of vegetation on a walk through the UEL) that vegetation communities are in a constant state of development (natural succession) and will eventually change even without human disturbance to communities which are different from what is currently observed. As the general tendency of natural succession in the Pacific Northwest, in the absence of disturbances, and on sites not unduly influenced by extreme slope and extreme soil moisture conditions, is for communities to develop into relatively pure coniferous forests composed of a few typical species, most of the early and mid-successional communities now present on the UEL due to past disturbances, composed of grasslands, brush, or deciduous or mixed deciduous-coniferous forest types, will disappear as they succeed to the final (or at least much longer lived) successional stage ("climax") expected for the regional climate. On the UEL, the expected climax over most of the woodland would be composed of a Douglas-fir, western hemlock and western redcedar community, as evidenced by the stumps of the climax virgin forests which once occupied the area. Wetter soils may also support some Sitka spruce, as an existing young climax forest along SW Marine Drive, which is over one hundred years old, demonstrates. Of course, natural disturbances would probably occur (such as windstorms or insects or disease damage) that could create pockets or areas where earlier successional species could grow, but in general, without further disturbances, the present diversity and character of the UEL will change, and then new surveys and

delineations of vegetation types will have to be made. Thompson (1985) describes the natural succession which has already taken place on the abandoned dairy farm (Plains of Abraham)--most of the grassy pasture has now been taken over by red alder and bitter cherry since its abandonment although a small open area remains in a prolonged early (grass) successional stage due to heavy impact by recreationists. (An example of disturbance impacts in maintaining a successional stage.) Clearly, if conservation of the present diversity and character of the UEL is desired, or the creation of even more diversity is acceptable, forest vegetation management practices, as a kind of applied disturbance, will have to be used to create and/or maintain desirable early and mid-successional communities in the woodland.

The vegetation of the UEL woodlands has been described in various reports predating the Thompson report, in more generalized groupings (Urhahn and Lee, 1974; Klassen, 1976; Klassen and Teversham, 1977; UEL Study Team, 1977b). The most recent publication on UEL vegetation is an illustrated identification guide to the vascular plants of the UEL woodlands (no mosses), which includes a comprehensive list (384 species) of the plants, including non-native ones, that have been found and identified by the authors (Straley and Harrison, 1987). Appendix 1 contains a list of the plant species identified in Thompson's (1985) report.

iii. Fish

Fish are not a common inhabitant of the UEL woodland, but are known to occur. A 1974 study of the three streams draining the southern

portion of the UEL, which attempted to determine accessibility for anadromous fish and overall capability for supporting fish populations, found that only Musqueam Creek, also known as Tin Can Creek, had high capability for coho, chum salmon and migratory cutthroat trout, as it is potentially accessible to salmonids for nearly its entire length, while the other streams had low capabilities for supporting these fish (Urhahn and Lee, 1974, Appendix 10). The northern drainages in ravine gullies were declared unsuitable for fish. Urhahn and Lee (1974) reported that Tin Can Creek was, at that time, actually utilized by cutthroat trout which had been observed both above and below SW Marine Drive, concluding that the value of this creek for fish was significant, with high potential as fish habitat.

In 1987, Dr. T.G. Northcote of the University of British Columbia provided an update on the current status of fish populations on the UEL. He reported that a small population of cutthroat trout occupies a creek area (called "Cutthroat Creek") on the UEL where they remain all year and do not migrate. For Tin Can Creek, Dr. Northcote (1987) noted that western brook lamprey are quite common, and chinook have also been reported, but rainbow trout (steelhead) once known to occur are no longer found. In the upper-middle reaches of the Creek, Northcote contends that there are up to forty or more adults of coho salmon producing around one thousand fry which migrate out to the ocean, making this a viable salmon stream; a considerable number of the sea-run form of cutthroat trout are also found here. In lower reaches of the Creek, threespine stickleback and prickly sculpin are present.

iv. Wildlife

Wildlife species are each adapted to certain combinations of plant associations and successional stages to provide needs for food and water and for several types of cover: escape cover, nesting cover, resting cover (for sunning, preening, etc.), sleeping cover, climatic or thermal cover (to escape from rain, snow, sleet, cold, heat and wind), and travel cover (to provide visual concealment when moving from place to place). Obviously, the more opportunities there are available to provide different requirements for cover, the more wildlife species will make use of an area. Thus, the greatest abundance of different wildlife habitats exists when many successional stages are represented in a given area--they provide a horizontal diversity with a number of different opportunities to meet wildlife needs, increasing the likelihood that a wide range of different wildlife species will inhabit the area, since many species require or prefer more than one type of plant community/successional stage to meet their needs. For example, deciduous UEL forests are subject to seasonal changes, so mature closed canopy Douglas-fir stands on the UEL provide crucial habitat for several species of insects, birds and small mammals during winter months of cold and snow.

Another important aspect of a variety of successional stages is in the "edge effect" created where two different successional stages, plant communities or habitat types meet--an edge zone (or "ecotone") occurs, a transitional area between the two, which contains a blending of characteristics of both types of communities. Thus, these edge zones normally support a greater diversity of vegetation than either neighboring community alone, and, in effect, a greater diversity and density of

wildlife also. Many wildlife species prefer these areas. This underscores the importance of a variety of successional stages/plant communities within a given area for supporting a diverse wildlife population. Equally important for many species as well is the existence of certain plant communities/successional stages which have a high vertical diversity--plant communities containing several different growth forms, such as herbs, shrubs and trees, of various species, heights and/or ages, which provide several layers of vegetation for wildlife species to meet habitat needs within one community. Plant communities with high vertical diversity and of mixed species and ages are usually mid-successional, in transition from one forest successional stage to another (e.g., deciduous to conifer), and are richer in wildlife than communities with few layers and/or species.

The situation on the UEL woodland is a good one for wildlife--the diversity of vegetation species and successional stages enables many wildlife species to use the forest to meet some or all of their habitat needs. The high number of vegetation types found on the UEL and the various successional stages they represent, together with the scattered distribution and intermingling of many of these types to produce extensive edge zones, have contributed to a horizontal diversity that favors a high species diversity over the woodland. Furthermore, much of the forest cover of the UEL woodland has high vertical diversity, in those vegetation associations which support an open-canopied, uneven-aged mixture of coniferous and deciduous species and extensive underbrush (e.g., Vegetation Associations 4, 6, and 7). The highest diversity and density of wildlife on the UEL is found, as expected, in these edge zones and open

canopy/mixed deciduous-coniferous vegetation associations (Urhan and Lee, 1974:23). The edge zones of the UEL include the wetlands surrounding the UEL, where forest and ocean meet such as the estuary zone on the North Arm of the Fraser River (Figure 18), wetlands within the woodland (e.g., streambanks, marshy areas), and edge zones in and around Camosun Bog.

Species of amphibians, reptiles, mammals and birds which have been found on the UEL are listed in Table 2, according to the general habitat types in which they are usually found. Large mammals which once inhabited the virgin forests of Point Grey are no longer residents of the UEL woodland, although deer have been reported, presumably swimming back and forth across the Fraser River, but not as permanent residents. Spottings of coyotes and red fox have been reported, but are not common. Even most of the small mammals known to reside on the UEL are not always obvious. The Douglas-squirrel and numerous birds of the UEL are the most

Figure 18. Estuary zone of the North Arm of the Fraser River (Photo courtesy of GVRD Parks).

TABLE 2. Amphibians, Reptiles, Mammals, and Birds in the UEL, Listed According to Habitat Types in Which They Commonly Occur (Adapted from Urhahn and Lee, 1974).

WETLANDS AND BOGS	MATURE DOUGLAS-FIR FOREST	OPEN CANOPY AND EDGE ZONE SHRUB THICKETS
Mammals		
(Insectivores)		
Dusky shrew Bendire shrew Wandering shrew Pacific Coast Mole	Shrew-mole Duskey shrew Pacific Coast mole	Pacific Coast mole
(Carnivores)		
Mink (along coastline, Fraser River) Canadian river otter (prefers caostline, maybe along Musqueam Creek) Raccoon (frequents coastline)	Short-tailed weasel	Red fox (especially clearings and roadsides) Raccoon Short-tailed weasel Spotted skunk (may be, rare) Coyote (sighted since 1972 along roadsides)
(Rodents)		
Townsend vole Norway rat	Douglas-squirrel Northern flying squirrel White-footed deermouse	Townsend vole Western redback vole (rare) Oregon vole Black rat Northwestrern chipmunk White-footed deermouse

* More detailed information on the wildlife of the UEL can be found in D.M.G. Newell, Amphibians, Reptiles and Mammals of the University Endowment Lands (Burnaby, B.C.: Greater Vancouver Regional Parks Department, 1984)

TABLE 2 (Continued)

WETLANDS AND BOGS	MATURE DOUGLAS-FIR FOREST	OPEN CANOPY AND EDGE ZONE SHRUB THICKETS
Mammals		
(Lagomorphs)		
		Snowshoe Hare (rare)
(Ungulates)		
	Black-tailed deer	Black-tailed deer
Bats on the UEL (habitats variable)**		
	Little Brown Myotis	California Myotis
	Yuma Myotis	Silver-haired Bat
	Long-eared Myotis	Big Brown Bat
	Long-legged Myotis	Western Big-eared Bat

**More detailed information on the Wildlife of the UEL can be found in D.M.G. Newell, The Terrestrial Vertebrates of the University Endowment Lands, University Endowment Lands Forest Park Research, Technical Paper #1 (Vancouver, BC: Greater Vancouver Regional Parks Department, 1983).

TABLE 2 (Continued)

WETLANDS AND BOGS	MATURE DOUGLAS FIR FOREST	OPEN CANOPY AND EDGE ZONE SHRUB THICKETS
Birds		
Canada goose	Goshawk	Great blue heron
Mallard	Sharp-shinned hawk	Sharp-shinned hawk
Osprey	Blue grouse	Red-tailed hawk
Sparrow hawk	Ruffed grouse	Bald eagle (prefers coastline scavenging)
Common nighthawk	Screech owl	Ring-necked pheasant
Black swift	Great horned owl	Killdeer
Vaux's swift	Pileated woodpecker	Common snipe
Belted kingfisher	Hairy woodpecker	Glaucous-winged gull
Red-shafted flicker	Downy woodpecker	Mew gull
Western flycatcher	Western flycatcher	Bonaparte's gull (all gulls found feeding on termites)
Western wood peewee	Western wood peewee	Band-tailed pigeon
Cliff swallow	Olive-sided flycatcher	Mourning dove
Rough-winged swallow	Steller's jay	Rock dove
Barn swallow	Red-breasted nuthatch	Saw-whet owl
Common raven	Brown creeper	Common nighthawk
Red-winged blackbird	Winter wren	Black swift
Brewer's blackbird	Bewick's wren	Vaux's swift
Brown-headed cowbird	Varied thrush	Anna's hummingbird
American goldfinch	Hermit thrush	Rufous hummingbird
	Ruby-crowned kinglet	Red-shafted flicker
	Cedar waxwing	Yellow-bellied sapsucker
	Northern shrike	Eastern kingbird
	Hutton's vireo	Western kingbird
	Solitary vireo	Trail's flycatcher
	Myrtle warbler	Dusky flycatcher
	Audobon's warbler	Violet-green swallow
	Townsend's warbler	Tree swallow
	Western tanager	Rough-winged swallow
	Black-headed grosbeak	Barn swallow
	Evening grosbeak	Cliff swallow
	Purple finch	Purple martin
	Pine siskin	Common raven
	Red crossbill	Northwestern crow (prefers coastline)
	Oregon Junco	

TABLE 2 (Continued)

WETLANDS AND BOGS	MATURE DOUGLAS FIR FOREST	OPEN CANOPY AND EDGE ZONE SHRUB THICKETS
Birds (cont'd)		
		Black-capped chickadee
		Chestnut-backed chickadee
		Common bushtit
		House wren
		Winter wren
		Bewick's wren
		Robin
		Swainson's thrush
		Townsend's solitaire
		Golden-crowned kinglet
		Ruby-crowned kinglet
		Cedar waxwing
		Northern shrike
		Starling
		Red-eyed vireo
		Warbling vireo
		Orange-crowned warbler
		Yellow warbler
		Audobon's warbler
		Black-throated gray warbler
		Wilson's warbler
		Brown-headed cowbird
		Western tanager
		Evening grosbeak
		Purple finch
		House finch
		Pine siskin
		American goldfinch
		Rufous-sided towhee
		Oregon junco
		White-crowned sparrow
		Fox sparrow
		Song sparrow
		Gold-crowned sparrow

conspicuous, with birds being the most abundant wildlife on the UEL. Raccoons can be seen wandering around in the evening. Appendix 2 contains a descriptive account of the UEL wildlife.

One important wildlife feature of the UEL woodland is that it supports one of the largest colonies of Great Blue Herons in the Lower Mainland. Sites for establishing their colonies are becoming rare as urbanization in Greater Vancouver continues. An Ecological Reserve was established in 1975 to protect the heronry from disturbance (bounded by SW Marine Drive on the south, Imperial Trail on the north, the University campus to the west and Salish Trail to the east (See Figure 19). However, the colony has since moved and formed a new heronry between Sixteenth Avenue and Imperial Trail near Imperial Road. While the herons use the woodland for nesting, they feed mostly along the beaches and tidal mudflats around the Lower Mainland.

Another interesting bird on the UEL is the Bald Eagle, frequently seen around the foreshore area and cliffs or perched in tall trees throughout the UEL; Newell notes that there is at least one breeding pair on the UEL, if not more (Newell, 1983:26).

Several species of cavity-nesters (including bats, owls and woodpeckers) are able to nest on the UEL due to the presence of large dead trees and snags which provide hollows to meet their nesting requirements. The abundance of insectivorous bird species on the UEL (more than one hundred) is due not only to the diversity of vegetation but also to the large insect populations, which inhabit the woodland and wetland areas, and which also support the bats and other insectivorous animals. The most numerous mammals on the UEL are rodents (the Douglas-squirrel is

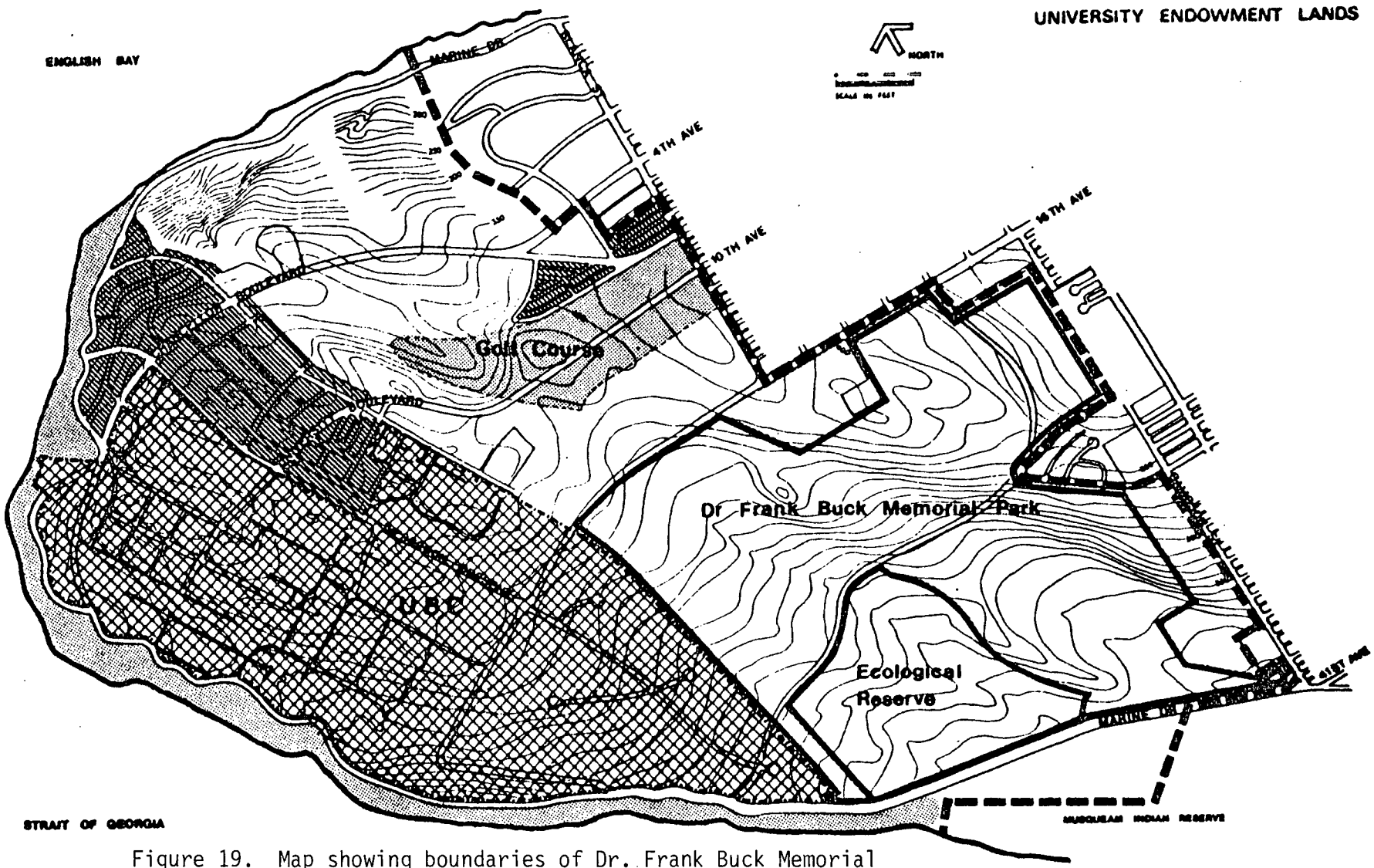

Figure 19. Map showing boundaries of Dr. Frank Buck Memorial Park and the Ecological Reserve on the UEL (From: UEL Study Team, 1977a).

most frequently seen), which are a source of food for the carnivorous mammals and birds (e.g., Short-tailed weasel, red fox, raccoon, owls and hawks.

This section has provided a generalized account of the wildlife on the UEL. The wildlife of the UEL have been described in detail by David Newell (1983, 1984), including species descriptions, scientific names, and information on the habitats they prefer, and their occurrence.

B. The 'Fight" to Preserve the UEL Woodland for an Urban Forest Park

1. Evolution of the debate over use of the UEL

The UEL woodland was initially set aside for residential development at a time when its development seemed desirable, as the urbanization of the Lower Mainland was under way and this vacant Crown land on the Point Grey peninsula, with its scenic views, proximity to ocean beaches, and mainly gentle topography appeared to be an ideal area to locate an attractive, planned, model community. In 1926, the UEL was described by Alfred Buckley (1926:2) in a town planning journal as "raw swamp lands, covered with mighty stumps" which would be "valueless unless the people occupy them." It was felt in the 1920s that proper town planning of a model community on the UEL would <u>create</u> living conditions which would ensure that

> no resident can complain that his life is being worn away by needless noise, dirty smoke, chemical stinks, needless ugliness, jumble building, poverty of light and air and inability to play and to find some contact with natural beauty (Buckley, 1926:4).

Ironically, just such complaints have arisen since the 1920s in response to urban development, and the longer that 1,700 acres (688 hectares) of the UEL remained undeveloped, the more development became an undesirable land use to those who had discovered values in the natural state of the woodland. Horseback riders had been using parts of the woodland as early as the 1930s (Point Grey Riding Club at Clinton's Stables), and over the decades that no action was taken to further develop the UEL the woodland was increasingly used for recreation and education--an alternative use of the UEL was being realized. The first proposal that the UEL woodland be preserved as park was made in 1957, the year after the Turner Report development plan, indicating that the importance of the UEL as open space for a growing urban population had, by then, been recognized. Government plans to dispose of UEL lands in 1965 as an endowment for all three of the province's universities were not followed through because, according to a group called ECO (Environmental Crisis Operation), the government could not decide which view was held by the more influential segment of society--to develop the UEL as much as possible, or to preserve the UEL "in its present semi-wilderness state" (ECO, 1972:4).

Indeed, by the early 1970s two such opposed camps had clearly formed, making it difficult for the government to exclusively consider urban development as the best use for the UEL, as it had in the past when such undeveloped land would have been perceived as "wasted." On the pro-development side, a UBC President's Ad Hoc Committee formed in 1971 and promoted development of the remaining land "to yield maximum benefits to,

and significant control and influence over, the lands of UBC" (UEL Study Team, 1977b:A.3). In the same year the opposing camp spoke up. The Point Grey Action Group of SPEC (Canadian Scientific Pollution and Environmental Control Society) circulated "A Proposal for Preserving the University Endowment Lands as Park," and recommended specific uses for certain areas, such as the rehabilitation of Tin Can Creek so that a salmon run could be re-established; the development of loop nature trails with markers, and the design of group camping facilities in certain areas for school children to camp and study in natural surroundings (Point Grey Action Group, 1971). A brief expressing the views of UBC students on the UEL was prepared for the Students' Council of UBC, which expressed support for development to be restricted to lands already owned by the University to build a "student community," and preserve the UEL as a park, adding that

> in an era where cities are wantonly gobbling land, it is vital to preserve wilderness areas close to them so that city dwellers not forget what wild country looks like (Belshaw, 1971:3).

A third report prepared by D.J. Norris (1971) for a graduate course in forestry at UBC, assessed the educational use of the UEL by professors and students of UBC, and found that extensive use of the woodland was made by several departments (such as agriculture, forestry, botany, zoology, geography, archeology, geology and education) for field trips, collection of laboratory materials, students' field exercises, and academic research. He reported that if there was one feeling that was common to most of the respondents, it was the feeling that the Endowment Lands should be minimally developed.

In 1973, another UBC President's Ad Hoc Committee to consider the future use of the UEL gathered opinions from students, faculty, and staff about the recreational, educational and financial potential of the UEL and its possible development and future. Most of the respondents (mainly faculty) preferred to see the UEL woodland preserved for park and educational uses by UBC departments as well as non-university groups. The Committee stated that a non-monetary endowment was likely to be more important to UBC than a monetary one, since UBC may only receive a portion of monetary returns, but a non-monetary endowment "can by its nature accrue only to UBC" (President Ad Hoc Committee, 1973:3). The Committee wrote:

> Much value is placed by many individuals on retention of the lands to provide "open space" amenity values and to facilitate low intensity recreation use (trails, hiking, bird-watching, cycling, horseback riding) as well as maintenance of situations for instruction of students from many schools, universities, and related groups in the Lower Mainland (1973:8).

This 1973 report differed somewhat from the 1971 Committee report, by recommending preservation of areas having particular value for education and recreation. However, in July of 1973, the new NDP government, which had assumed power in 1972, announced that the UEL woodland was being considered for development. This prompted a brief from citizens in November 1973 who had formed a committee to fight development proposals for the UEL, believing strongly that urban development was an unacceptable land use as it had long been used for park purposes and its recreational value would steadily appreciate in the future (Dunbar-West Point Grey

Endowment Lands Committee, 1973). Although this Committee acknowledged the need for housing in the Lower Mainland, they argued that the intention to develop the UEL was a short-term response to a lack of a long-range development program for the Vancouver area. The Committee stressed that

> any sensible long-range program would accord top priority to the preservation of open spaces for recreation. It would not allow short term considerations to ruin forever an already grown forest within easy access of the citizens of the Lower Mainland. . . . Before we destroy forever existing natural forest lands for housing, should we not first establish an overall policy for development and population growth in the Lower Mainland? (Dunbar-West Point Grey Endowment Lands Committee, 1973:7).

Despite the plea of this citizens' committee the government realized that other groups were agreeable to development plans. There were groups who argued, for example, that the UEL was too distant from residents of the city most in need of recreational space, and that moderate- and low-income housing must be given top priority. In May of 1974, the government announced that the UEL would probably be used for medium-density housing and large open spaces and parks (Klassen and Teversham, 1977:109), a "demonstration housing project" (Thomas and Nichols, 1985:256). There was considerable protest from the Dunbar-West Point Grey Neighborhood Area Council, which represented thirty organizations as well as people from the university, and others (Klassen and Teversham, 1977:109). "The Endowment Lands Regional Park Committee" was officially established as a non-political, ad hoc, volunteer citizens' group through the neighborhood Council to fight threats to the UEL woodland and get it preserved as a major regional park.

2. Efforts to Preserve the UEL Woodlands for a Regional Park.

a. 1974 to 1976

The intent of the Endowment Lands Regional Park Committee was to arouse public awareness of the potential of the UEL as a major regional park. To do so the Committee submitted briefs to government, made representations to municipal governments throughout the Greater Vancouver region, sponsored public meetings, lobbied members of the provincial Legislature, and gathered thousands of signatures (Thomas and Nichols, 1985:257). They also invited those who supported the designation of the UEL as a park to become members of the Committee. In a November 1974 brief to the government, the Committee asked for public recognition of the UEL's value as a regional park, explaining that "mini-parks surrounded by high density housing are of benefit only to those resident in the adjacent developments," but a natural area of the size of the UEL, uniquely located "at the tip of the most densely populated peninsula in Canada," with its good accessibility, unique ecological features, its plant life and wildlife, and potential for both recreation and education, could serve the entire region (Endowment Lands Regional Park Committee, 1974:8, 9). The Committee asked for a full study of a regional park on the UEL, and obtained wide spread support from Lower Mainland municipalities, university faculty and large turnouts at public meetings.

The public pressure was successful in demonstrating to the government that there seemed to be a greater interest in preserving most of the UEL woodland than there had been in the past, when development and endowment schemes had not met with as large or vocal an opposition. The

NDP government made a concession in December 1975, just before the election in which they were defeated, and dedicated 1,066 (432 hectares) of the UEL between Sixteenth Avenue and SW Marine Drive, including Camosun Bog, as a park, naming it Dr. Frank Buck Memorial Park. Within this park, an Ecological Reserve (about 221 acres (89 hectares) was delineated, to protect the heronry that existed near SW Marine Drive at the time (it has since moved), and to be used for scientific observation purposes only, by University departments (Figure 19).

Interestingly, the Minister who had originally suggested developing low-cost housing over much of the UEL now spoke about the "growing need to make sure that we provide enough space for recreation. . . . particularly . . . in our urban centres, where the competition for land for various uses becomes particularly severe, and recreation land all too often gets forgotten" (Williams, 1975:1). He spoke proudly of how the government had spent over $2 million in acquiring recreation lands in the Lower Mainland, and conceded that even more recreation lands were needed "closer to home" in the Greater Vancouver area as weekend traffic to reach recreation areas outside of the region was growing, and that in this respect, the UEL was a key area (Williams, 1975:1-2). Yet, despite these statements, much of the UEL woodland was still excluded from the park. However, the Endowment Lands Regional Park Committee's goal had at least been partially realized:

> The Order-in-Council designation in December 1975, of 1066 acres south of 16th Avenue as a park by the past Provincial Government was welcome but incomplete. It does demonstrate a consensus on the key role of the special recreation-education function of the forest land (Greater Vancouver Regional District and City of Vancouver, 1976:2).

The government changed soon after this declaration without an official dedication having been made. It was felt by advocates of a regional park that the area declared was insufficient and that a formal declaration of key park areas was necessary to enable resolution of park boundaries (GVRD and City of Vancouver, 1976:2). Thus, The Endowment Lands Regional Park Committee members were joined in their efforts by the Greater Vancouver Regional District (GVRD) and the City of Vancouver who determined to examine the potential for a major park in the UEL. They published a report in April 1976 recommending that the majority of the woodland should be preserved as a regional park for recreational and educational purposes, identifying three key areas as necessary components of the park: most of the northern portion of the woodland north of Chancellor Boulevard, valuable as a supplemental recreational area to the beach area of Spanish Banks; most of the southern portion, south of Sixteenth Avenue, having the greatest educational interest but also a high potential for recreation; and the central corridor of woodland, between the golf course and university campus, necessary to provide a strong physical and visual link between the other two areas (GVRD and City of Vancouver, 1976:1). The report argued that, combined with the educational resources of the adjacent university, the existing drives and beaches along the perimeter of the UEL, the major sightseeing attractions, landmarks, and gardens in the area, and existing and potential recreational facilities, this easily accessible major park on the UEL would serve a broader public than just the immediate community. The provincial government was asked to endorse this concept and reserve the

areas that had been identified pending future discussions on the establishment of a park (GVRD and City of Vancouver, 1976:13).

Meanwhile, another request for land had been announced, by the B.C. Development Corporation who wished to establish an industrial research park on 100 acres (40.5 hectares) of forest land. Although this request was seriously considered, it was not granted.

b. A Milestone in the Efforts to Preserve the UEL: The 1977 UEL Study Team Report

Due to the conflicting interests that continued to put pressure on the government for a decision on the UEL woodland, the Social Credit government appointed a task force in July 1976 to study the situation by canvassing public opinion, collecting all available data, and undertaking a thorough review of the future use of the UEL (Klassen and Teversham, 1977:110). This in-depth study took many months to complete as the study team initiated an exemplary public process, an intensive program of community meetings, interviews and public forums, in an attempt to reach a consensus upon a conceptual plan for the UEL. By the time it was finished, the study had cost $60,000. The UEL Study Team Report (1977a) (also called the Byron Olson Report) was submitted to the government in March of 1977. Its thick volume of Appendices is the most comprehensive document on the UEL, including historical data; biophysical inventories; views of numerous people, organizations, institutions, and governments; uses of the woodland, proposals for future use, et cetera (UEL Study Team, 1977b).

The recommendations of the UEL Study Team were greeted with general applause (Thomas and Nichols, 1985:257). The Team recommended that

> the majority [ninety-nine percent] of the UEL should be dedicated as a natural area supporting integrated uses for recreation, education and forest ecology research (UEL Study Team, 1977a:40).

Figure 20 shows the boundaries recommended for the park, including the golf course, Camosun Bog, and the Foreshore Park area leased to the City of Vancouver. It was felt that Camosun Bog should be recognized as "a unique and valuable natural feature that merits protection under the Ecological Reserve Act" (UEL Study Team, 1977a:vii). The GVRD had already expressed its support for a major regional park, and the consultation process found that public opinion favored retaining all of the UEL woodland in its natural state.

The same view was shared by the University of British Columbia during the study--UBC stated its view that "the highest and best University endowment is the nature resource for education and research (UEL Study Team, 1977a:33). The UEL Study Team reported:

> In stating its position on the UEL, December 7th, 1976, UBC recommended that "the Province make a clear declaration that the UEL are not to be developed for financial endowment of the University of British Columbia but rather are to be managed for the benefit of all citizens of British Columbia" (1977a:35).

The Study Team (1977a:36) noted from the views expressed that UBC did not need to expand its land holdings, but was in need of expanded research and teaching activities on the UEL, and its adjacent location offered a unique education potential, with "maximum efficiencies in travel time and

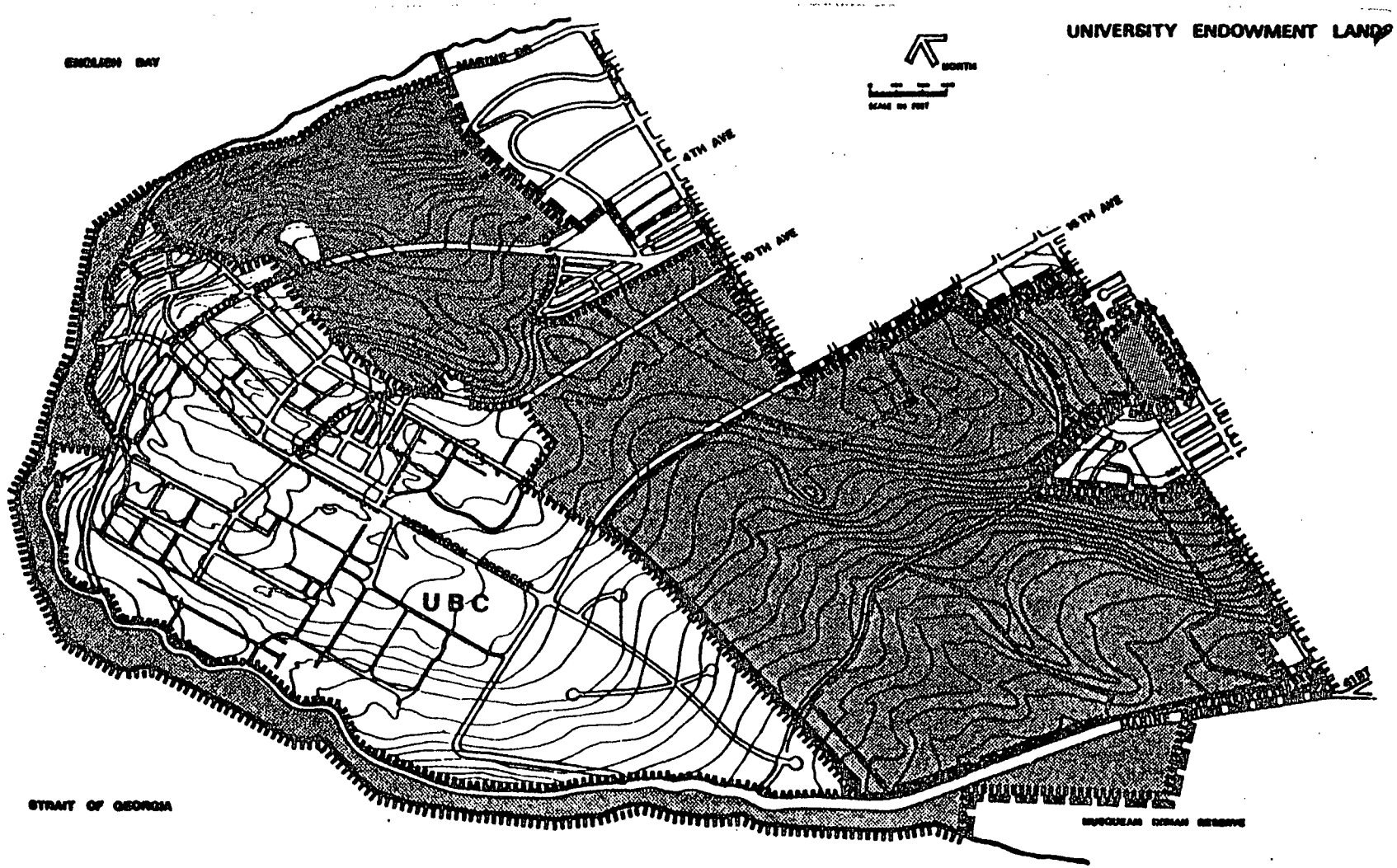

Figure 20. Park boundary for a UEL forest park recommended by the UEL Study Team in 1977 (From: UEL Study Team, 1977a).

access." The conclusion was that UBC should play an important co-operative role in the management of the natural environment, and be ensured continuing access to the woodland for non-consumptive education and research projects which would be compatible with the concept of a major park, so that the education and research potential of the woodland could be more fully developed by UBC. The construction of research facilities (a "research park") on the UEL was not recommended.

As for housing development, the Study Team's general view was

> that housing should be discouraged in areas having high open space, conservation and recreation value. Therefore, limited additional housing should be introduced (1977a:43).

Thus, a very small amount of the land, one percent, was recommended for residential development--a narrow strip adjacent to the existing community extending from Chancellor Boulevard to a short distance south of University Boulevard--in "a phased program of addition and infill to the existing UEL residential community" so that the community could absorb its share of projected regional growth while maintaining its natural amenity (UEL Study Team, 1977a:40, 43).

The Study Team (1977a:vi) recommended that the park be designated a provincial park for five years, or until the GVRD had "acquired operating competence to administer the parkland," at which time it would convert to a regional park, leased and operated by the GVRD.

With the submission of the 1977 UEL Study Team Report, it appeared that the preservation of most of the UEL woodland would soon be realized. With the consensus reached from an intensive consultation process, the government's indecision on "the best use" of the UEL should have been resolved.

c. The Efforts Continue

While a government decision on the UEL was pending, the Endowment Lands Regional Park Committee continued lobbying and education on the value of the UEL. With help from other interested groups such as the Boy Scouts and the Southlands Riding Club the Committee members and other volunteers continued to maintain and improve the trail network of the UEL, much of which had been established by volunteers, and clearing garbage dumped around the edges of the forest. The Committee also circulated a map of the UEL trail system to encourage recreational use and nature hikes in the woodland.

In August of 1979, the government requested that the Parks department of the GVRD prepare a proposal for a five-year park development and management program, including a physical description of improvements, budgets, timing and staffing. Drawing heavily on the 1977 UEL Study Team findings, and holding public meetings to discuss public wishes for the park, the GVRD prepared a report entitled A Regional Park for the Endowment Lands which included a park concept (policies for the forest nature park, a suggested minimum park boundary, and plans for recreational use zoning) and a proposed five-year program, submitted to the government in April 1980 (GVRD Parks Dept., 1980).

In this report, the GVRD recommended a minimum park boundary of about 1,520 acres (616 hectares) and excluded 180 acres (73 hectares) as reserve lands for possible other uses that had been suggested to the GVRD (Figure 21). The width of the central corridor linking the northern and southern portions of the park was not as wide as the GVRD preferred (at least 656 feet (200 metres)) but was delineated according to negotiations

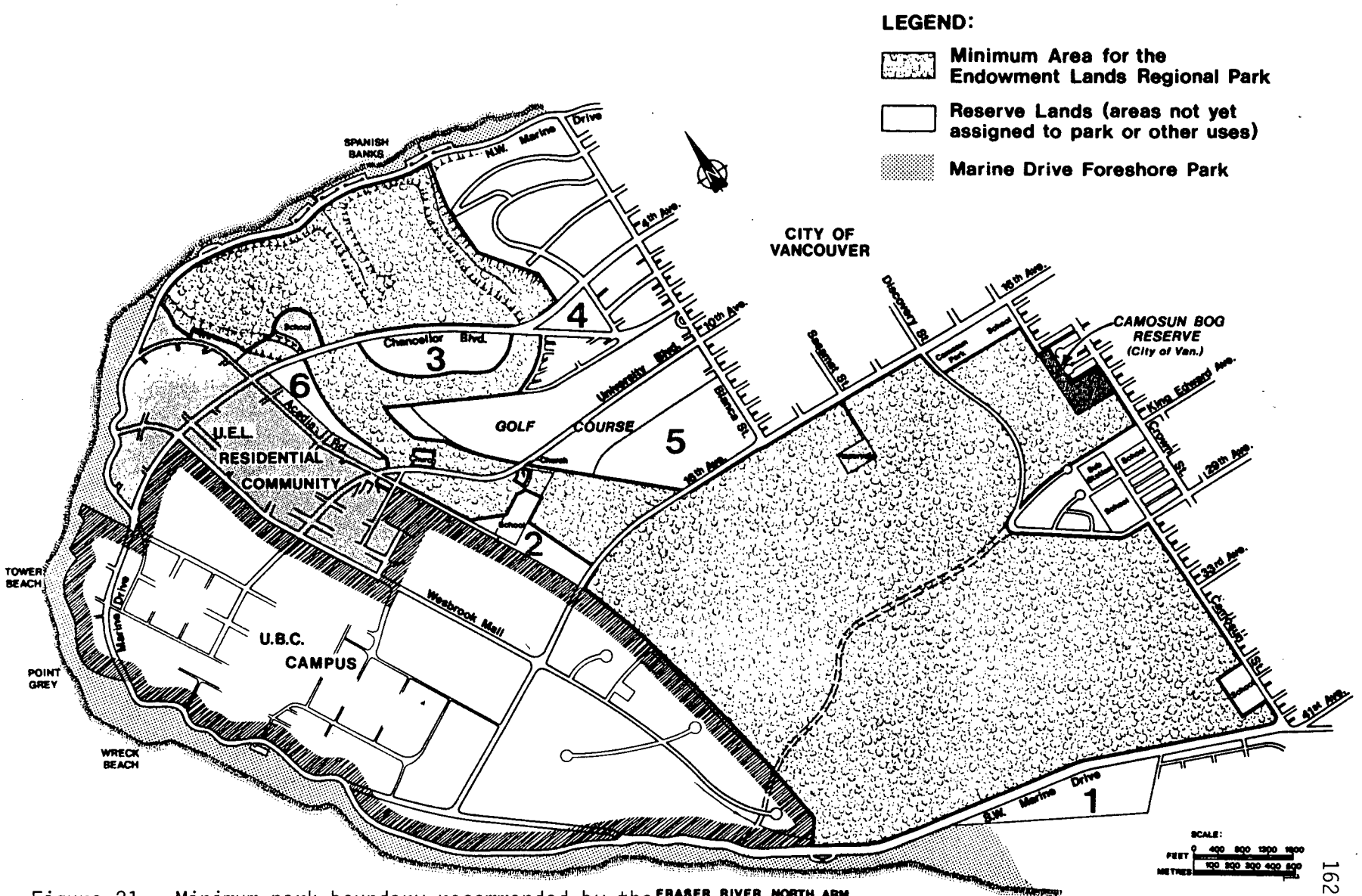

Figure 21. Minimum park boundary recommended by the GVRD in 1980 (From: GVRD Parks Dept., 1980).

with the provincial government. The golf course was excluded by provincial government request. The Foreshore Park was to be transferred to GVRD management in the third year, as had been agreed to by the Vancouver Parks Board. Among the proposed park policies were: to use the park first and foremost as a nature park, encouraging those activities which would increase people's awareness of the forest and its ecology; to provide facilities for the recreational uses to be undertaken in the park (e.g., hiking, jogging, horseback riding, nature study, picnicking, bicycling) as well as facilities and programs to serve handicapped people and senior citizens; to encourage volunteer and other community involvement in the park; to conserve, restore, and enhance the integrity and quality of the forest and its ecology; to integrate the forest park with the university campus (physically, educationally and activity-wise); and to ensure a high level of public and institutional consultation in decision-making on park policy, development and management.

The GVRD presented its report to the government in April with the explicit hope that "agreement on early establishment of a Regional Park in the Endowment Lands can be reached with the Ministry of Lands, Parks and Housing" (GVRD Parks Dept., 1980). Despite the GVRD's carefully thought-out and well-presented proposals, which they attempted to "keep within the intent of recent understandings and agreements with Provincial representatives" (GVRD Parks Dept., 1980) the report did not result in any government action. The Endowment Lands Regional Park Committee followed up the GVRD report with a brief requesting a wider central corridor in the proposed park than in the GVRD's recommended minimum park boudary, specifically requesting that four of the GVRD's proposed "Reserve

Lands" be included within a park boundary (Farrow, 1981) (areas 2, 3, 5, and 6 in Figure 21). It is possible that this disagreement over the central core and boundary locations was the stalling factor (Farrow, 1981). The Committee was sure that all parties involved agreed upon the main portions of the park but that final boundary resolution remained the final impediment to the declaration of a regional park. The Committee submitted a second brief in late 1980 with the same request, arguing that a wide central corridor was necessary for several reasons: to maintain the continuity between the two larger park areas; to allow for enough space to locate separate walking, bridle and bicycle paths within a forest atmosphere, so as to minimize conflict between these uses; and to accommodate, if the demand arises, a more organized recreation area with various facilities than the other areas of the park, which should remain as "wilderness" (Farrow, 1981). The government acknowledged the brief but did not initiate any discussions. The Committee was able to publicize their cause further by gaining newspaper coverage in January of 1981 (Farrow, 1981). Later that year, the Minister of Lands advised the Committee that legislation was being prepared to lease most of the 1,700 acres (688 hectares) of the UEL to the GVRD for a regional park, yet nothing was finalized.

The continued stalling by the government led to renewed requests for grants of land. In 1981, the UBC Board of Governors demanded 69 acres (28 hectares) from the narrow central core for faculty housing, which would have split the proposed park in two (Endowment Lands Regional Park Commitee, 1986:2). Again, the Endowment Lands Regional Park Committee protested, and believe that their efforts prevented any such allocation.

In November of 1982, the UBC Board of Governors yet again made a request, but this time asked to be given title to all of the lands. Briefs, letters from the public to the government, and support from the media, all initiated by the Committee and concerned parties once again, fought against this biggest threat so far to the establishment of a regional park on the UEL. The UBC Board of Governors claim was not recognized by government, but neither was the regional park declared, as had almost seemed achieved in 1981.

Throughout 1983 and 1984, while the government sat on the UEL issue, the Endowment Lands Regional Park Committee proceeded with improving the recreational access to the UEL woodland and using it unofficially as a park. In cooperation with the Outdoor Recreation Council, the Committee obtained federal and provincial job creation grants, totalling more than $300,000 and hired and supervised unemployed people in upgrading the UEL's thirty-one miles (fifty kilometres) of trails, building twenty-six bridges, installing drainage culverts, and erecting over 125 trail marking signs. Necessary funds, materials and equipment were donated by various sectors in the community (Thomas and Nichols, 1985:258). Technical guidance was provided by the UBC Technical Committee on the Endowment Lands, consisting of GVRD Parks Department members and University faculty members. Thompson's vegetation classification of the UEL woodland was also carried out under the same job creation programs. Thus, the efforts of the Endowment Lands Regional Park Committee to preserve the UEL woodland as a park were not limited to oral or written lobbying, protesting, or campaigning to foster public support for saving a large expanse of trees, but also involved the physical tending and enhancement

of the resource to increase the area's park potential and thus ensure the delivery of its recreational opportunities to a larger spectrum of users. By creating a functional park in unallocated woodland, albeit a de facto one, this strategy would help the Committee in its efforts. According to Thomas and Nichols:

> It made the Endowment Lands attractive and accessible to a growing number of people who will certainly resist any attempts to reverse the unofficial process of park development which has been carried out successfully by dedicated volunteers (1985:258).

In 1984, another citizens group formed and became active in helping to preserve the network of trails in the UEL woodland, as they had a special interest in their use. The UEL Trail Riders, members of the Southland Riding Club, wished to continue riding on many of the twenty-eight trails in the UEL, rather than being confined to a few trails because of user-conflict or trail deterioration from their activities. They undertook to preserve multiple-use of the trails and to assist in maintaining them, and also actively support the Endowment Lands Regional Park Committee's efforts to preserve the woodland (Anonymous, 1987b). In 1985, the UEL Trail Riders designed and erected sixty signs which are distinctively marked with horseshoes (Figure 22) on many of the multiple-use trails open to horseback riding. In 1986, the group designed and manufactured three large display maps showing the trails of the UEL woodland, which were formally presented and erected at three key entrances to the trail network (Figure 23). Furthermore, the UEL Trail Riders continue to organize volunteer work parties to help maintain and improve the equestrian trails. The work of these volunteers and improvements

Figure 22. "Horseshoe" signs like this one have been erected by the UEL Trail Riders to mark trails open to horseback riding (Photo courtesy of UEL Trail Riders).

Figure 23. A display map of UEL trails erected by the UEL Trail Riders in 1986 (Photo courtesy of UEL Trail Riders).

carried out since the 1970s by the various interest groups have effectively increased the accessibility of the woodland for a wide spectrum of users, and helped to foster even greater support for its preservation. The concerted efforts of concerned citizens have produced a functional and actively used de facto park while they await its formal dedication.

The GVRD Parks Department, like the concerned citizens' groups, also did not wait passively while the government failed to act on the declaration of a regional park. Since the strong indication from the government in 1981 that a regional park for most of the UEL was close,

the GVRD had begun to promote the UEL in its regional parks directory as a proposed regional park. The GVRD Parks Department's Special Events program, designed to increase public awareness of regional parks with one-day events at the parks, began to include the UEL in 1984, with the first annual "Endowment Lands Trek," providing bus service from the beach at Spanish Banks to the start of Salish Trail at SW Marine Drive for "trekkers" to hike through "the forgotten forest" back to the Beach, experiencing the natural values of the UEL. The event, still an annual affair, also features shorter guided nature walks for children, entertainment, and information booths featuring displays on the fight by various groups to save the UEL (Figure 24).

Figure 24. Displays at GVRD Parks Department's annual Special Event day for the UEL: "Endowment Lands Trek" (Photo courtesy of UEL Trail Riders).

The GVRD had also formed a joint technical committee with faculty of the university and the management personnel of the provincial UEL Administration Office, called the "UBC Technical Committee on the Endowment Lands," to promote research, through the publication of a series of technical papers, which will assist in the design and management of the recreational and educational uses of the Endowment Lands Regional Park and in the conservation of its natural heritage. By 1982 data collection for such research was well underway, and in 1983 the first two technical papers were published (Klassen, 1983; Newell, 1983). Research on Camosun Bog which started in 1982 was completed and published in 1985 as the third technical paper (Pearson, 1985), while the vegetation classification already mentioned was undertaken in 1983 and 1984, and published as technical paper no. 4 (Thompson, 1985). In the summer of 1985 two students (of whom the author of this thesis was one) were hired to conduct interviews with various professionals for their suggestions on how the forest of the UEL should be managed in a regional park. The results from these interviews were prepared as a "discussion paper" for the GVRD Parks Department, called "Forest Management Options for the Endowment Lands" (Wege, 1985). The research for these technical and discussion papers was funded through various grants. Thus, although the GVRD could not undertake to operate and spend money on the UEL, they were nonetheless active in creating and promoting awareness and support for the area as a regional park, and preparing for its management once their jurisdiction over the area was granted.

By the end of 1986, no action had been taken by government on the initial 1981 "promise" to dedicate a regional park. The issue of park

boundaries, repeated claims for non-park uses, and changes within government contributed to more delay. The Endowment Lands Regional Park Committee attempted again, in early 1987, to "get the ball rolling," through media coverage and Vancouver Parks Board support. A presentation made to the Board in February called the UEL "the largest vacant lot in Canada" that could be made into "the greatest urban park in North America" (Lee, 1987). This prompted the Parks Board to declare publicly that the government "should not waste any more time in declaring the University Endowment Lands a regional park" (Lee, 1987). Even though the university had not given up requesting land for expanded research park facilities and real estate development, the general feeling of park advocates was that the UEL's status as a regional park was imminent. In February of 1987, the Vancouver Parks Board voted unanimously "to give the province the final nudge that could turn the 1,700-acre parcel into Point Grey Regional Park" (Dahm, 1987). They declared that they would turn over the Foreshore Park to the GVRD if the government would establish the regional park under GVRD control, which, together with Vancouver City School Board-held lands adjacent to the UEL, promised to the GVRD, would create an urban forest park almost twice the size of Stanley Park (Dahm, 1987). However, in March of 1987, the government replied that any plans for a regional park on the UEL would be put on hold until the newest minister to acquire the portfolio responsible for the UEL was able to review the situation (Anonymous, 1987c).

In the meantime, further support for the park came from the newly-elected Social Credit member of the Legislature, Kim Campbell, who, in January of 1987 initiated discussions between government officials and

GVRD staff so that they could, once again, try to come to an agreement on park boundaries. Inadvertently, this well-intentioned move initiated the most recent controversy over the UEL.

3. The Current Debate and Continuing Efforts to Preserve the UEL

The working map produced by these discussions (Figure 25a) delineated a possible minimum park boundary which excluded certain areas for UBC research facilities expansion (100 acres (40.5 hectares)) and possible real estate development (200 acres (81 hectares)), but this was influenced by past requests for such land from UBC and was only intended to reflect development potential while maintaining park viability, and was not presented as a formal proposal (Campbell, 1987). However, when news of this working plan became public, an outcry ensued. In addition, the university president, after learning of the working map, announced his own proposal for the UEL, delineating several areas for real estate development by UBC (totalling 287 acres (116 hectares)) for income, as well as 100 acres (40.5 hectares) to extend facilities of UBC's Discovery Park (a research park) (Figure 25b). The university president argued that UBC is entitled to some of the land of the UEL, since "the land is an endowment in terms of history" (Draaisma, 1987). Much backlash ensued.

The efforts of the Endowment Lands Regional Park Committee to preserve the UEL woodland from UBC's proposal and to prevent the government working map from becoming a reality began. They gained media support, protested to the government by letters and petitions, enlisted the support of as many prominent members of the community as possible, as well as the support of Vancouver City Council, the Parks Board and GVRD.

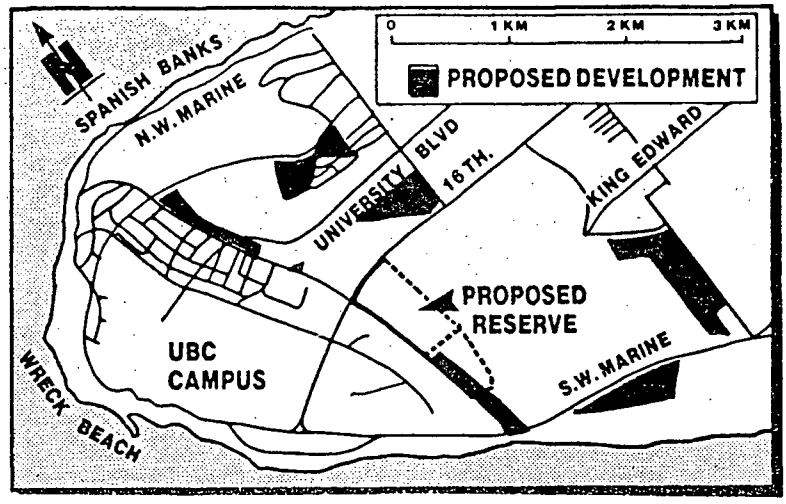

Figure 25a. Working map produced by government in 1987 to show possible exclusions from the UEL for development (From: Draaisma and Rebalski, 1987).

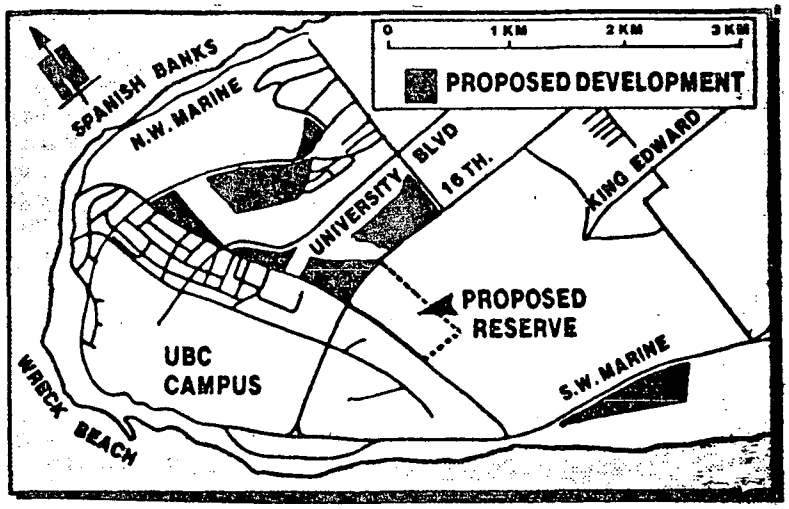

Figure 25b. The UBC President's proposal in 1987 for areas on the UEL to be given to and developed by UBC (From: Draaisma and Rebalski, 1987).

A public forum was held in June 1987. The Social Credit representative for the Point Grey area, Kim Campbell (1987), gave an update on her understanding of what had initiated the heated debate, the situation at that date, and her views on the issue. To complicate the issue, the Musqueam Indian Band applied for an injunction a few days earlier to halt the transfer of any undeveloped UEL woodland to the GVRD, pending negotiations of their land claim to aboriginal title to the area. At least one thousand people attended the forum and unanimously voiced their support for the proposed park, with the only possible concessions to exclusion being the forty-acre (sixteen-hectare) triangle south of SW Marine Drive and a ten-acre (four-hectare) triangle near the junction of Fourth Avenue and Chancellor Boulevard. Any other exclusions would cut up the park and reduce its value.

In October of 1987, Kim Campbell announced that she was in favor of the entire UEL woodland as a regional park, that she did not believe that either UBC or developers were entitled to any of the lands, and that she would be pressuring the government for a resolution of the issue (Anonymous, 1987d). Many had expected the park to be declared in the summer of 1987, but the new controversy had delayed any decision. Then, in December of 1987, President Strangway of UBC made a formal request to the provincial government for the 387 acres (157 hectares) of UEL land which it had delineated in its proposal earlier in the year (Strangway, 1987). He also announced the University's intention to create a UBC Real Estate Corporation which would plan the development for market housing on twenty acres (eight hectares) of woodland owned by the University adjacent to the UEL, located on the northeast corner of Sixteenth Avenue and

Wesbrook Mall, to provide financial return to the University (Strangway, 1987). With both the large group of pro-park lobbyists, including government and opposition MLAs, the Vancouver City Council and Parks Board of Vancouver, the GVRD, and others, as well as the University of British Columbia with its development proposals putting pressure on the provincial government for a decision, the government, announced in early 1988 that yet another study of future use was to be undertaken. Whether the government expected any significant difference from the 1977 UEL Study Team Report is not clear, but the support for a regional park for the majority of the UEL had not changed and has in fact grown. One new group interested in saving the UEL was formed in March of 1988, a "Friends of the Woodland" club, started by UBC students opposed to President Strangway's requests for land. In advertising their first meeting, the club asked for help in informing the University president "that there are limits to sane urban growth, and that one of them has been reached at the perimeter of the UEL" (Friends of the Woodland, 1988). Furthermore, the request for land by UBC was a request by the UBC President and the UBC Board of Governors, and did not necessarily reflect the views of the University as a whole. Indeed, at the public meeting held for the 1988 Study, on April 8, 1988, the support for the entire UEL woodland as a regional park was overwhelming, and included numerous members of the University faculty who did not support the development proposals. There was also much frustration and anger voiced at the forum that another study and meeting had to be held over the UEL issue when the overwhelming majority of interest in the UEL had been demonstrated for more than a

decade to be for the preservation of most, if not all, of the UEL woodland as a regional park.

4. Outcome to Date

The government MLA appointed to study the future of the UEL is at the time of this writing reviewing the submissions which he received at, and subsequently to, the public forum. He plans to submit his recommendations to government within the next few weeks. In the meantime, the Endowment Lands Regional Park Committee continues to seek increased membership and to circulate a petition to save the UEL. At the public forum supporters made it clear that any decision involving major exclusions to the proposed park will be met by an escalated fight to preserve the area's integrity. However, many are optimistic that a government commitment to the park they have sought for so long is now closer than ever before.

C. The Value of the UEL as an Urban Forest Park

The preceding section showed how the fight to preserve the UEL woodlands as a major urban forest park has gained enormous support because urban residents are becoming aware of the role that woodlands can play in the quality of their lives. The arguments in favor of preserving the UEL woodland demonstrate various perceptions of the UEL's value to the urban population. In this section, the UEL's value to the Greater Vancouver region is assessed in terms of the rationale established in Chapter 3, in order to determine its potential contribution to a system of urban open space in the city.

1. The UEL's Ecological/Biophysical/Environmental Values

The woodland of the UEL has environmental significance for a number of reasons. The area represents a woodland habitat which has largely disappeared from the Lower Mainland, and is only available if it is preserved as a park. The only other sites of natural, coastal woodland habitat in the urban area exist due to their park status. Furthermore, in comparison to the other such habitats in the area, the UEL woodland has an unusually high diversity of biological communities, and includes a number of uncommon or relatively rare species. Trembling aspen is one of the rare tree species on the UEL, and individual grand fir and yew are also found. The Camosun Bog contains some rare bog plant species such as round-leaved sundew which traps and digests insects; and cloudberry, which is usually found in the northern muskeg--probably established thousands of years ago when glaciers covered the land (Anonymous, 1987e). The Bog is important because there are no other bogs in the Vancouver area. In addition, the diverse woodland provides habitat for many wildlife species, described earlier, some of which are also very rare in urban areas. Many would argue that the protection of the plantlife and wildlife of the UEL should be considered for its own sake, and not just in terms of usefulness to humans. For wildlife, the UEL woodland provides a remnant habitat and a refuge from the urban environment. Furthermore, the woodland may provide important ecological linkages (e.g., food chains) with other natural systems within and around, or even distant from, the city. Further encroachment on its integrity could therefore lead to ecological instability within these natural systems. Many of the plant

and wildlife species present especially rare ones, could be eliminated entirely from the Lower Mainland.

Over one hundred species of birds nest and feed in the area, and, in terms of human enjoyment, many of these species are difficult to find in other areas of the Lower Mainland. The Great Blue Heron colony is one of only three left, and the largest, in the western Lower Mainland, as breeding sites have been destroyed by urban development. The presence of old trees and snags enable several species of cavity-nesting birds such as woodpeckers and owls to reside on the UEL (Figure 26), and the Bald Eagle along the foreshore.

In terms of environmental benefits to the surrounding urban area, the UEL woodland is of sufficient size to act as a "green lung," reducing the degree of air pollution as described in Chapter 3. Noise reduction is also a benefit to both the adjacent neighborhoods and users of the forest --the UEL woodland's ability to absorb and attenuate noise has been documented (Matthews, 1971). Integrated into a city-wide system of trees and forested parks, the UEL can contribute to the clean air and relatively peaceful atmosphere which the city now enjoys as well as to the ecological linkages necessary to sustain nature in the urban environment.

2. The UEL's Recreational/Human Health Values

One of the most important functions of the UEL woodland is its role in meeting the recreational needs of the urban population. It provides an easily accessible alternative experience to the manicured playing fields that abound, and one which urban residents in other cities must travel great distances to reach. A natural, relatively wild forest experience is

Figure 26. An old western redcedar snag used by woodpeckers in the UEL (Photo courtesy of GVRD Parks).

rare in a major urban centre. The contact with nature and the variety of experiences the woodland provides may be necessary to maintain the health of urban residents, as described in Chapter 3.

In the UEL, an extensive network of trails (Figure 7) allows easy access to the woodland, where activities include walking, hiking, jogging, bicycling, horseback riding, or cross-country skiing if sufficient snow falls in winter (Figures 27 to 32). Informal picnic sites are located along small streams, and with park management, permanent picnic sites can be established in heavily used settings, such as the Plains of Abraham. Orienteering is also undertaken through the "uncharted" woodlands, and camping is a favorite activity of scouting organizations. Passive recreational pursuits such as bird watching and nature study, photography and resting are also engaged in during recreational outings.

Figure 27. Dogs enjoy walking in the UEL woodland (Photo courtesy of UEL Trail Riders).

Figure 28. Joggers on Admiralty Trail (Photo courtesy of UEL Trail Riders).

Figure 29. Bicyclists on Imperial Trail (Photo courtesy of UEL Trail Riders).

Figure 30. Bicyclists in Douglas-fir forest at "Graeme's Crossing" (Photo courtesy of UEL Trail Riders).

Figure 31. Horseback riding on Imperial Trail (Photo courtesy of UEL Trail Riders).

All these recreational pursuits provide opportunities for physical/physiological benefits, psychological benefits, spiritual benefits, and sociological benefits, as described in Chapter 3. For the surrounding community these benefits are available on a daily basis, while for a regional population day trips and weekend trips are easily within reach to take advantage and enjoyment the forest experience can bring. Everywhere in the UEL woodland, recreational activities bring simultaneous contact with nature. The diversity of vegetation types also provides a variety of aesthetic experiences that precludes monotony and can make the recreational experience more exciting and satisfying (Figures 33a. and 33b.). The aesthetic qualities of the UEL are not limited to the

Figure 32. Cross-country skiing in the UEL woodland (Photo courtesy of GVRD Parks Dept.).

Figure 33a. Fall colors along the Imperial Trail powerline provide aesthetic interest (Photo courtesy of UEL Trail Riders).

vegetation; the views from the northern slopes of the woodland, as from the Plains of Abraham, greatly enhance the visual experiences in this part of the woodland (Figure 34). Tranquility and solitude can be found in the tall, dark, closed canopy Douglas-fir stands (Figure 35), while the mixed and deciduous stands have a more lively atmosphere, with the "music" of rustling leaves and singing birds, and the entire woodland with its seemingly endless winding trails can stimulate and satisfy a sense of adventure and exploration for hours on end. It can be challenging to try to spot some of the more reclusive wildlife residents of the UEL, but encountering the ubiquitous Douglas-squirrel and a variety of birds not commonly seen in the urban environment can be worthwhile as well. The

Figure 33b. An attractive, inviting mixed species stand, aesthetically enhanced by a well-maintained trail (Photo courtesy of UEL Trail Riders).

Figure 34. Mountain and ocean view from the UEL (Photo courtesy GVRD Parks Dept.).

Figure 35. The closed-canopy Douglas-fir stands provide a peaceful setting for recreation in the UEL (Photo courtesy of UEL Trail Riders).

woodland is also large enough that users may not meet anyone else for miles, bringing a sense of "wilderness" to the experience that is hard to match in other urban forest parks that are smaller and more developed. In the depths of the forest all city noise is effectively blocked out, and the user can imagine what the pre-urban Lower Mainland might have been like before the arrival of settlement by the Europeans. Also, the pleasant microclimate of the conifer stands provides a cool, shady retreat in hot summer weather, while in winter the interception of rain and amelioration of cold and wind also provide an escape from the harsher extremes outside the forest. With this range of recreational environments and experiences, there are numerous opportunities for users to find mental and physical relaxation, relief from the stresses of urban life, maintain physical fitness, obtain spiritual enrichment and engage in social interaction. With the adjacent foreshore, which would be included in a regional park, these woodland opportunities are enriched by the added dimension of a shoreline experience--marsh areas for wildlife observation, and developed, sandy beach areas for seashore recreation and watersports.

With the management that could be undertaken in a regional park, the recreational values of the UEL could be further enhanced. Location of picnic facilities was already mentioned. Establishment of forest openings and ponds could create attractive rest stops within the woodlands. User conflict in the woodland, which is already apparent with the degradation of fragile trails by mountain bikes, could be minimized by appropriate zoning and monitoring of trails, for the UEL is large enough that all kinds of users can probably be accommodated. (At present, signage on trails exists to limit certain uses, but is often ignored.) Furthermore,

the topography of the woodland is gentle enough to enable the development of trails for handicapped access, such as by the use of boardwalks and railings, bringing a forest experience to people who are often excluded from such environments due to rough terrain. If necessitated by user demand, certain areas may be suitable for the limited development of more organized recreation facilities, although this would take careful planning and consultation with users. The natural woodland experience is the most important recreational feature of the UEL. However, to maintain the diversity of vegetation types presently found on the UEL, which contribute immensely to the recreational and educational value of the woodland, it may be desirable to manage the vegetation to conserve this diversity and also enhance wildlife habitat; suggestions for such management are contained in Appendix 3.

3. The UEL's Educational Values

The UEL woodland's educational value is as important as its recreational value. The opportunities which defined the educational rationale in Chapter 3 are all applicable to the UEL. It is ideally located for day or even half-day field trips for students and the public from the city and neighboring municipalities to study forest ecology, plant identification, and other forest-related material. The accessibility of the UEL ensures that the valuable learning experience that comes from direct contact with the nature does not have to be foregone by those unwilling or unable to travel to more distant, less accessible natural areas, for either lack of time or financial reasons. Time constraints and limited financial resources are common for many

students and educators at UBC and inner city schools, as well as members of the general public.

The UEL presently serves as an invaluable scientific "outdoor classroom" and "living laboratory" for groups from the University--students and faculty in forestry, soil science, botany, geology, geography, plant science, zoology, education, and others--to carry out field work in student courses and small research projects that are invaluable to their education. Unique features of the UEL which could not be studied elsewhere are especially important--the Camosun Bog, the heronry, and the cliffs along the foreshore, for example. Features of historical interest include the 10,000 year old Bog and its accumulation of Sphagnum peat and fossilized pollen, the large tree stumps, (Figure 36) the geological history of the area, and the study of natural succession following disturbance, which is especially well-provided for by the documented history of land-use on UEL woodland and the present diversity of successional communities. Archeological artifacts have also been collected on the UEL, which have helped to contribute to an understanding of the native cultures which once inhabited the area. In all, the educational and research uses of the UEL woodland by the University have been, and are, extensive as documented by Dooling (1976) and Klassen (1983). The quality of education in the departments which rely on the accessible woodland to supplement studies or provide research material would decline with any removal of these opportunities. In this sense, the UEL woodland has been serving invaluably as an educational endowment to the University ever since its establishment. Most universities do not

Figure 36. One of the many large tree stumps on the UEL (Photo courtesy of UEL Trail Riders).

enjoy this enviable proximity to such a diverse collection of natural educational material.

The educational value of the UEL woodland for the general public and children would be greatly enhanced by the establishment of a regional park, which would enable park managers to organize educational programs for the park. A nature centre housing displays, information booklets and providing of guided nature walks would be most effective in stimulating interest and learning experiences for the general public. Self-guided nature trails, with various themes, posted with directional markers and information signs about the features of interest, are additional means to deliver educational opportunities to those who might not take the initiative to study the natural history themselves (Figure 37). Some work

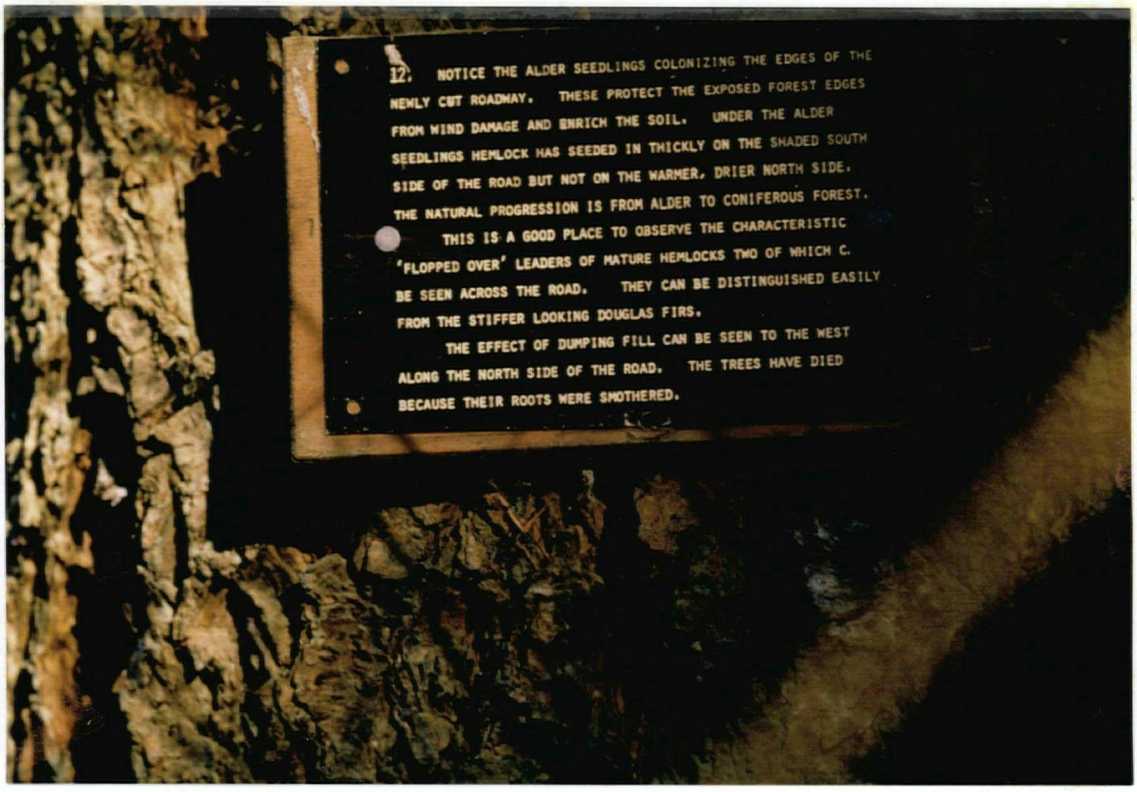

Figure 37. An educational information sign on the UEL (Photo courtesy of GVRD Parks Dept.).

on developing such a trail was initiated by forestry students in 1977, in the triangular section of forest south of SW Marine Drive, where almost every tree native to the area grows and would have been marked for identification, along with special features of interest such as western redcedar trees with "aerial roots," large stumps of virgin trees, and feeding holes made by woodpeckers in trees and snags (MacLachlan, n.d.). In sum, the development of such programs could increase the educational use made of the woodland by those who are not students or researchers, and help to promote a better understanding and appreciation of forest resources and the natural environment amongst urbanites who might otherwise be insensitive to their value. Furthermore, a program involving the active participation of the public in various park management activities could help to create a sense of responsibility towards the woodland that would aid in the conservation of its natural values.

4. The UEL's Contribution to Urban Form, Amenity and Civic Pride

The urban form of Vancouver is presently distinguished by a proportionate distribution of a few large natural landscapes which impart a sense of balanced naturalness and spaciousness to the cityscape, and which contribute to a sense of place to their neighboring communities--the North Shore Mountains in North and West Vancouver, Stanley Park in Downtown Vancouver, Central Park and Burnaby Mountain in Burnaby, and the UEL woodland in Point Grey. Thus, the UEL is an important element in the maintenance of this balance of open space and greenbelts in the design of the city, effectively conveying the image of a city "designed with nature."

The urban amenity values of the UEL woodland include its aesthetic appeal and contrast to the built-up urban environment; its strategic location providing excellent access by both private and public transportation; and its range of forest recreation and education opportunities in combination with a shoreline recreation experience and the additional recreational, educational and cultural opportunites on the university campus. As the urban population continues to grow and residential areas densify, such values will become even more important, especially to those urban residents unable to travel to more distant locations for contact with nature. Thus, the availability of adequate open space to serve the growing population and maintain urban form and amenity values can also be a source of civic pride, especially since the incidence of sizeable urban forest parks in North American cities is rare.

5. Economic Benefits of Preserving the UEL

Residents of neighborhoods adjacent to the UEL will likely be able to enjoy the locational benefits of a nearby regional park, as described in Chapter 3. If forest management is carried out in the woodland, it may be possible to obtain some economic benefit to defray costs of management and maintenance from the sale or salvage of marketable wood products. The potential also exists for a regional park on the UEL to become widely known and attract tourists or movie-making to the city, thus contributing to the generation of tourism and business revenues. However, the most important potential economic benefit of preserving the UEL woodland is in the prevention of a situation in which public funds must be spent to acquire land for re-establishing woodland open space in the future. Thus,

foresight is needed by planners and decision-makers to ensure the provision of an adequate supply of large-scale open spaces that will be able to absorb anticipated levels of population growth and a concomitant demand for such spaces. Concerned citizens need not be the only ones with this foresight.

D. Conclusion

The UEL woodland has remained in its natural state since being originally established for development purposes due to events and circumstances which fortuitously delayed any action on such plans. The longer the area remained undeveloped, the more city residents made use of it for recreation and education. Today, the woodland is perceived as a forest park by many people due to this long-established use, and attempts to develop the land have met with increasing opposition.

The woodland is a rich recreational and educational resource and its invaluable contribution to the enhancement of city life is evidenced by the strong protests to its possible loss. Even a reduction in its size is seen as a threat, for the size of the area is viewed as one of its unique attributes which contributes to the "wilderness" experience within the city. If large areas are lost from the woodland the unique experience of such an extensive "piece of wilderness" within a city would be greatly diminished. The most recent development proposal (by the university president) is so adamantly opposed for this reason--it would essentially cut the park in two.

There is no doubt that the UEL woodland provides unique and valuable opportunities to urban residents that would otherwise be hard to find

within the city. These opportunities and attributes of the UEL have already been described. The forest rates extremely high as a recreational and educational resource, thus contributing to the amenity value of the city, and also possesses many valuable inherent environmental qualities (e.g., rare species, valuable wildlife habitats). Furthermore, there are relatively few large urban forests in North America, so the preservation of the entire UEL would provide the city with yet another source of civic pride. It would very well become one of the largest urban woodland parks in North America and stand out as a fine example of planning for urban open space needs.

Chapter 6

CONCLUSION

This thesis has attempted to show that woodlands can play an important function in meeting the recreational, educational, and other needs of urban populations, enhancing the quality of life in built-up urban areas. People have always desired some contact with nature, as the historical background for this thesis showed. This desire led to the establishment of gardens and forests for private use by the wealthy and elite, to the inclusion of trees in the public landscape of cities; to a city park movement which provided pastoral, landscaped parks for the public; and most recently, to the setting aside of more "untamed" natural areas such as woodlands, to provide opportunities for contact with nature usually lacking in other types of urban open space. To understand this perceived need for trees and forests in cities, a comprehensive rationale was developed to explicitly define the many values which are provided by urban woodlands, showing exactly how recreational, educational and other needs of urban populations are met.

The rationale for preserving urban woodlands established that woodlands can serve a useful function in urban society, providing the urban population with ecological and environmental values, recreational values, educational values, urban form and amenity values, and certain economic values. Many of these benefits cannot be provided by other types

of urban open space. Woodlands have environmental values that can play a protective role in cities, helping to conserve biophysical resources (e.g., providing habitat for wildlife and protecting plantlife), to prevent flooding and protect water quality, and to contribute to improved air quality, for example. For recreation, woodlands provide urbanites with an alternative experience, a setting for outdoor activities which either require a forest environment or are enhanced by it, enabling city residents to seek such recreational activities close to home. This is important, for the recreational activities undertaken in a woodland can contribute to the maintenance of human health by providing physical/ physiological benefits as well as the direct contact with nature which is believed to be important or even necessary for psychological health and spiritual benefits. The educational values of urban woodlands lie in the availability and accessibility of opportunities for direct study of nature and forest related topics. For students and researchers in the city this accessibility provides a vital learning experience that may otherwise be foregone due to inability to travel greater distances for the same experience. The amenity values of urban woodlands include the convenient accessibility they provide to the forest recreation experience, and associated benefits (recreational, educational, et cetera), for city residents. Also the aesthetic appeal of natural scenery brings a pleasing contrast to the developed urban areas and adds character to the local landscape. Economically, urban woodlands can contribute to increased property values, generate tourism revenues for the city, and the sale of wood products from the forest can help offset woodland management costs. Also, the preservation of urban woodlands, when the opportunity arises,

can be economically wise in the long run, preventing the need to acquire comparable open space at greater cost in the future.

Examples of urban woodlands described in Chapter 4 showed that several cities have set aside areas of forest in or near the urban area to fulfill recreational and other needs of urban residents. However, most of these woodlands are found in Europe. The European experience appears to be one of having recognized the preservation of woodlands as an important urban land use, providing a recreational resource for the people, as well as limited production of wood products in some cases. Their preservation reflects the influence of the naturalist movement that started in Europe in the eighteenth century, as well as a strong tradition of community management of scarce forest resources (described in Chapter 2). The recreational use of European urban forests is strong, and various facilities are provided to enhance the forest recreation experience, which seems to be very important to the urban population.

In North America, relatively few examples of urban woodlands can be found. An apparent perception of endless wilderness, which formed in response to the vast woodlands encountered by the first settlers in North America, appears to persist today. Thus, the need to set aside forests for urban use has not been felt as strongly as in Europe and Britain. However, some North American cities stand out as exceptions, and the woodlands that have been preserved are viewed with pride by the local citizenry. In Montreal, the Morgan Arboretum is highly regarded as an educational and recreational resource. In Vancouver, Stanley Park has become quite famous and is a symbol of civic pride. The importance that residents place on such preserved forests suggests that they recognize the

values provided by these areas, and the preservation of urban woodlands may become as important in North America in the future as it already is in Europe. A case study was undertaken to explore a local experience in efforts to preserve one of the few urban woodlands in North America, with respect to its potential value to the people of the urban region and their views on why it should be preserved.

After examining the case study in Chapter 5, the University Endowment Lands (UEL), it became clear that this urban woodland would, if preserved, be a rare North American example of affirming the importance of urban woodlands in the quality of life in urban areas. The case study showed that the UEL provides a significant amenity, and perhaps necessity, for the people of the Lower Mainland, being so easily accessible to city and suburb residents and full of recreational and educational opportunities that cannot be met by traditional city parks. Many opportunities in the UEL were, in fact, shown to be unique. The UEL could be as great a source of civic pride as the city's well-known Stanley Park, which is now used so heavily that its ability to provide enjoyable recreational and educational opportunities is approaching its limit. The UEL are of value in providing an alternate forest recreation resource, to absorb some of this pressure, and with the potential to provide even greater benefits. The examples of urban woodlands elsewhere demonstrated that these areas can be designed to enhance the supply of recreational and educational benefits to be obtained, and thus serve a greater number of potential users. In a growing city, the UEL could supply many of these potential users with the direct contact with nature that is necessary to meet many human needs.

In conclusion, the viewpoint that the UEL should be preserved as an urban forest park for its value to society is a legitimate one. The UEL has remarkable potential, in the context of the rationale established in this thesis, and in light of its rich natural heritage, to complement the region's urban open space system with a unique and valuable urban forest resource that would greatly contribute to the amenity and quality of life in the built-up urban environment.

Further research into the preservation of urban woodlands could be conducted to provide more insight into the need to preserve these areas and their potential contribution to urban society. Quantitative analyses of the demand for such areas could help to establish an empirical basis for preserving woodlands for urban open space. Case studies of successful efforts to establish urban woodlands may provide useful guidelines for acquiring woodlands in the future. For urban woodlands which are already established, research could be conducted into appropriate and publicly acceptable methods of management that would conserve the biophysical resources and enhance the delivery of opportunities to the urban public, for in order to justify their preservation, the viability of urban forest parks must be sustained.

ENDNOTES

Chapter 1

1. For example, the preservation and management of town forests has been promoted in the state of New Hampshire in the United States by several publications, including Mauran et al. (1980), and McBane and Barrett (1986).

Chapter 2

1. Wilkinson (1983:61) however, contends that Nash designed Regents park as an estate for Prince Regent (George IV) before it became a public park.

Chapter 3

1. See Wilkinson, 1983:14-41; Tregay (1979:277-280) also gives a good discussion on the role of urban woodlands in climatic amelioration and reduction of pollution.

Chapter 4

1. It has been suggested that this request to establish a forested park, the first item of business for the first city council sitting at its first meeting, showed great foresight (Werschler, 1985:106; Steele, 1985:16), considering that Vancouver in 1886 was a city with a small population "only barely emerging from the wilderness," without any shortage of treed expanses and natural vistas, and "conquering the impeding forest was the primary goal of the period, not conservation" (Steele, 1985:16-17). Steele offers another perspective on the motivation for this request, noting that the establishment of the park would prevent the selling off of the Reserve land by the government to developers and further expansion into the peninsula, thereby increasing property values of land holdings in the downtown area as the railway extended west to Vancouver. Patricial Roy (1980:49) similarly mentions that Stanley Park was meant "to advance real estate values" in its immediate vicinity, and also "act as a tourist attraction." Today, the establihsment of the forested Stanley Park in 1888 is perceived as an act of remarkable foresight in providing for future generations.

Chapter 5

1. More detail on the topography, geology, hydrology and soils of the UEL is given in the references used for this section: Urhahn and Lee (1974); Appendices 6 and 9; and (UEL Study Team, 1977b.).

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APPENDIX 1,

List of Vegetation Species found on the UEL, by common and scientific names (Thompson, 1985).

Common names	Scientific names
TREES	
Bigleaf maple	Acer macrophyllum
Bitter cherry	Prunus emarginata
Black cottonwood	Populus trichocarpa
Black hawthorn	Crataegus douglasii
Cascara	Rhamnus purshiana
Douglas-fir	Pseudotsuga menziesii
Grand fir	Abies grandis
Mountain ash	Sorbus aucuparia
Pacific crabapple	Malus fusca
Pacific dogwood	Cornus nuttallii
Red alder	Alnus rubra
Scouler's willow	Salix scouleriana
Shore pine	Pinus contorta
Sitka spruce	Picea sitchensis
Trembling aspen	Populus tremuloides
Western yew	Taxus brevifolia
Western hemlock	Tsuga heterophylla
Western red cedar	Thuja plicata
White birch	Betula papyrifera
SHRUBS	
Bog cranberry	Vaccinium oxycoccus
Broom	Cytisus scoparius
Canada blueberry	Vaccinium myrtillus
Labrador tea	Ledum groenlandicum
English holly	Ilex acuifolium
False azalea	Menziesia ferruginea
Hardhack	Spirea douglasii
Oregon grape	Mahonia nervosa
Oval-leaved blueberry	Vaccinium ovalifolium
Red elderberry	Sambucus racemosa
Red huckleberry	Vaccinium parvifolium
Salal	Gaultheria shallon
Salmonberry	Rubus spectabilis
Snowberry	Symphoricarpos albus
Stink currant	Ribes bracteosum
Swamp laurel	Kalmia polifolia
Thimbleberry	Rubus parviflorus
Trailing blackberry	Rubus ursinus
Vine maple	Acer circinatum
Wild rose	Rosa gymnocarpa

Common names	Scientific names
FERNS AND FERN ALLIES	
Bracken	Pteridium aquilinum
Wood horsetail	Equistem sylvaticum
Deer fern	Blechnum spicant
Lady fern	Athyrium filix-femina
Licorice fern	Polypody glycyrrhiza
Parsley fern	Cryptogramma crispa
Sword fern	Polysticum munitum
Spiny wood fern	Dryopteris assimilis
HERBS	
Bleeding heart	Dicentra formosa
Bunchberry	Cornus canadensis
Coltsfoot	Petasites speciosa
Cloudberry	Rubus chamaemorus
Dwarf mistletoe	Arceuthobium compylopodium
False solomon's seal	Smilacina racemosa
False lily-of-the-valley	Maianthemum dilatatum
Fireweed	Epilobium angustifolium
Foam flower	Tiarella trifoliata
Grass spp.	Poaceae spp.
Large-leaved avens	Geum macrophylum
Narrow-leaved cotton-grass	Eriophorum angustifolia
Round-leaved sundew	Drosera rotundifolia
Skunk cabbage	Lysichiton americanum
Twinflower	Linnaea borealis
Twisted stalk	Streptopus amplexifolius
Water parsley	Oenarthe sarmentosa
Western buttercup	Ranunculus occidentalis
Yellow pond lily	Nuphan polysepalum
Youth-on-Age	Tolmiea menziesii
MOSSES	
Hanging moss	Antitrichia curtipendula
	Atrichum selwynii
Golden short-capsuled moss	Brachythecium asperrimum
	Dicranum spp.
Stepmoss	Hylocomium splendens
	Hypnum circinale
	Isopterygium elegens
Thread moss	Isothecium stolonifera
	Isothecium spiculiferum

Common names	Scientific names
	MOSSES (cont'd)
Palm tree moss	Leucolepis menziesii
Star moss	Mnium glabrescens
	Mnium insigne
	Mnium nudum
Baby cedar moss	Plagiothecium laetum
Cedar moss	Plagiothecium undulatum
	Pleurozium schreberi
	Pogonatum contorum
	Rhytidiadelphus loreus
Electrified cat's tail moss	Rhytidiadelphus triquetrus
	Sphagnum spp.
Oregon beaked moss	Stokesiella oregana
Slender beaked moss	Stokesiella praelonga
	LIVERWORTS
	Calypogeia trichomanis
	Lepidozia reptans
	Lophocolea cuspidata
	Lophocolea heterophylla
	Plagiochila porelloides
	Ptilidium californium
	Scapania bolanderi

UEL a paradise for nature lovers in city

By Rose Klinkenberg

From the spotted skunk with its distinctive odor to the raccoon with its insatiable appetite, the University Endowment Lands support a wide variety of wildlife. And for many visitors to the forest and the beaches below, it is the possibility of seeing or hearing some different living creatures which attracts them to the area.

Judy Williams of the Wreck Beach Preservation Society, says that for her, the sound of coyotes howling in the forest above the beach gives the UEL a "special ambiance". Although most of us have never experienced the excitement of encountering a coyote in the UEL, they are frequently seen early in the morning along the quiet roadways and trails by joggers and maintenance workers. Often mistaken for the family dog, the coyote's bushier tail and more pointed nose give it away.

Provincial wildlife biologist Jack Evans, says that coyotes moved to the UEL about 20 years ago, quickly replacing the red fox as one of the forest's more common species of wildlife. Because foxes and coyotes don't co-exist very well, the fox population declined, and today sightings of the slim, red-coated, bushy-tailed canid are rare. Evans claims they are still there though, and still breeding in the vicinity.

The owls in the UEL look just as curious as the people who seek them out.

However, he is more skeptical about the numerous reports of mountain lions in the area, and says that most of the sightings of this stealthy carnivore remain unconfirmed. He adds that in most cases, what people see are simply large dogs. However, he doesn't rule out the possibility completely, citing the incident of the mountain lion that was tranquilised in the Vancouver Coliseum after swimming across Burrard Inlet last year.

Deer, on the other hand, are very common in the UEL. They are often spotted in groups of two or three in the early morning south of 16th Avenue. Evans says they breed in the forest, but points out they are timid, probably the result of being run down for sport by neighbourhood dogs.

Lawyer David Newell, author of a book on wildlife of the UEL entitled Mammals, Reptiles and Amphibians of the University Endowment Lands, says birds are the most commonly seen wildlife group in the forest. In particular, the great blue heron is frequently spotted slowly winging its way to feeding areas in the wetlands. The UEL is home to one of the largest heronries in the Lower Mainland of this large, exotic-looking bird.

Some birds, though, are harder to spot, as provincial wildlife biologist Doug Wilson points out. Wilson says he spends his time in the UEL engaged in what has to be one of the more esoteric but interesting of birding activities—owling. Because the UEL forest supports several species of owls, he finds that calling them, either by mimicking or through the use of taped calls is often rewarding when curious Saw-Whet, or tiny, Screech Owls appear. These being the two most common species in the area.

Barred Owls, Great-Horned Owls and Long-Eared Owls may also be found in addition to rare occurences of the Great Grey Owl and the Hawk Owl. These large-eyed predators feed mainly on the wide variety of rodents found in the forest, including voles and mice, and their nocturnal habits draw owlers night and day.

Although birds are the most common wildlife group in the UEL, in the spring the frogs are the most easily heard. They and their more reticent relatives, salamanders and newts, gather in spring ponds to lay eggs and mate, sometimes laying their eggs in the backyard ponds of area residents. In some parts of the surrounding subdivisions, the raucous chorus of a hundred frogs can be heard blocks away.

And then there's the toads. For those of us who walk at night, it's not unusual to encounter them in the streets, foraging for food by the glow of the streetlamps. For the unwary walker, the hard part is trying to avoid stepping on one.

APPENDIX 2.

A Description of wildlife on the UEL. (Klinkenberg, 1987).

APPENDIX 3

VEGETATION MANAGEMENT OF URBAN WOODLANDS

It has been shown that urban woodlands can provide the urban populace with many benefits, social, psychological, ecological, educational, et cetera, which help to improve the quality of life. Certainly, people who have experienced the opportunities that urban woodlands have to offer are well aware of their values. There are also non-users who derive vicarious pleasure from knowing that the opportunities and benefits are available for those who desire them, or for themselves should they desire to take advantage of them in the future. To these people, the value of conserving urban woodlands is quite clear. What may not be so clear, however, is how sensitive management of urban woodlands can enhance the range of benefits to be derived, maximizing the possibilities for the satisfaction of all users of the urban woodlands.

A. Methods in Forest Vegetation Management

Woodland vegetation management can be passive, involving no treatment at all to the forest stand, or a variety of silvicultural techniques may be applied to achieve certain goals. Silviculture is the theory and practice of controlling the establishment (regeneration), composition, quality and growth of forests, and is based upon a knowledge of silvics--the characteristics and life histories of trees, how they

grow, reproduce, and respond to changes in their environment. A knowledge of forest ecology is also important to the successful silvicultural management of forests; an awareness of the interrelationships and interactions amongst the living organisms of a forest (plants, animals, insects, micro-organisms, etc.) and their physical environment is necessary in order to anticipate the outcome of silvicultural practices on the whole forest community, not just the trees. Silvicultural techniques are the "tools" of foresters, or "silviculturalists"--the methods used to produce, tend, and manipulate a forest crop which, in the case of timber management, will eventually be harvested, for economic benefits. Silvicultural techniques do not have to be regarded as suitable only for the production and extraction of timber crops, however. In the case of urban woodlands, where the primary "harvest" is, the "extraction" of recreational and educational opportunities for social and environmental benefits, the woodland vegetation can still be maintained or manipulated through the timely and discretionary application of silvicultural techniques, based on ecological principles, that will help to produce a desired vegetative effect or habitat. Silvicultural techniques discussed in this thesis are outlined below.

1. Regeneration or Reforestation

Regeneration, synonymous with reforestation in forestry, is the renewal or re-establishment of trees. In timber management, this occurs after a forest stand has been harvested, starting a new cycle of forest crop production and tending. In an urban woodland where trees are meant to be maintained and not produced for timber, reforestation may be

necessary where trees have died (due to old age, injury, insect or disease attack, fire, etc.), blown down (e.g., in strong winds), or been removed for some other reason. Regeneration may be accomplished through natural means, relying on surrounding trees to re-seed the cleared spot or area, or through sprouting or rhizomes, depending on species, or through artificial means, such as direct seeding or planting.

2. Brush Control (Brushing) and Cleaning

Brushing involves eliminating or reducing underbrush, such as ground vegetation, vines and shrubs, either manually with hand tools or chemically with herbicides. In producing a timber crop, this is done to reduce competition from the brush to the favored tree crop species, and is carried out at an early age when the desirable trees are seedlings or saplings, in order to improve their growing conditions and, hence, their chances of survival. In an urban woodland, brushing may similarly be needed if reforestation is required and a young stand is being established, but it is likely that brushing is more often required where recreational or educational needs dictate a reduction in the underbrush of a stand of any age.

Cleaning is similar to brushing but refers to the removal of undesirable small trees in a young forest stand which are competing with the desired tree species and may outgrow and suppress them if a cleaning is not done. This may happen, for example, in an urban woodland where conifers have been selected to comprise a newly-established stand, but fast-growing hardwood species (such as red alder) have also become established and may soon overtop and dominate growth on the site.

3. Sanitation and Salvage Cuttings

Sanitation cutting is the removal of diseased or insect-infested trees in order to prevent spread and maintain the health of the stand. A salvage cutting occurs when trees that are dead, dying or damaged are removed for economic gain before their commercial value is totally lost--these trees may have been affected by insects, disease, lightning, fire, winds, old age, or other injuries, and their removal contributes to maintaining healthy development of the remaining stand, as well as providing some income towards financing management activities. However, it is not always desirable to remove old, dead or damaged trees from the forest, even for economic gain, as they are an integral part of the forest ecosystem--they are a source of food and habitat for forest wildlife, and dead and decaying trees play an important role in the nutrient recycling of the forest ecosystem.

4. Pruning

Pruning is the removal of the branches from the stem of a tree, usually the lower branches. In timber production, pruning is carried out at an early age for trees destined for lumber or veneer, so that when subsequent growth grows over the stub, knot-free wood is produced. In an urban woodland, pruning may be necessary at any age, where high levels of public use necessitate the reduction of hazards--branches falling, or obstructing movement in regularly-used areas--and where pruning is desirable to improve the aesthetic appearance of the stand. Pruning may also contribute to fire protection, since a ground fire can pass with

little damage through an older stand without climbing to the tree crowns if there are no branches or piles of brush and debris serving as fuel to help carry the flames upward.

5. Girdling

Girdling involves encircling the stem of a living tree with cuts that penetrate well into the sapwood, in order to kill the tree by preventing passage of nutrients or by introducing toxic substances into the tree. In an urban woodland, this method is useful for creating snags for wildlife habitat, in particular, for cavity-nesting birds and animals.

6. Fertilizing

The application of fertilizers may be necessary in an urban woodland to promote the health of forest stands where sites may be deficient in one or more soil nutrients/elements. Fertilization is often used in timber production to accelerate tree growth, but is is unlikely that this would be as much a concern in an urban woodland, except perhaps, to expedite any attempts at reforestation.

7. Thinning

Thinning is the removal of trees from an immature stand so that stand density and therefore competition among the trees is reduced, and the growth-rate and quality of the remaining trees is thus improved. Trees that are removed may have a commercial value and thus be a source of revenue. Thinning can be a source of timber when older trees are cut, or of firewood, charcoal, posts, or poles when the trees are younger. A

thinning is also called a spacing as trees are selectively removed in order to leave space for the remaining trees to grow; that is, the spacing of the remaining stems is controlled. In an urban woodland, the benefit of thinning is that it prevents stagnation of a high density stand and the resulting thinned stand is more vigorous, will last longer, and is aesthetically more attractive.

8. Clearcutting

Clearcutting is a method of tree removal in which all of the trees in a designated area are removed in one cut (i.e., the area is cleared of trees), and a new stand is subsequently regenerated either through direct means, such as hand seeding or planting, or by relying on natural regeneration. Clearcuts may be carried out in large blocks, or smaller, scattered patches, or in alternating strips. In timber production, this method of harvesting/regenerating the timber crop is very commonly used, especially in the Pacific Northwest. It should be the method used if the primary objective is to re-establish a new, even-aged stand after removal of the mature crop of a tree species that will establish successfully in an open situation, or to convert the site to a different tree species from the one removed, or to remove a stand that is decadent or has been damaged by insects, disease, or fire, but clearcutting is often used primarily because it is technically simpler and easier to plan and control than other cutting methods and it is more economical in the short-run. In an urban woodland, clearcutting of relatively small areas would be appropriate for creating openings within or on the edges of the woodland, either to produce permanent openings (glades) re-seeded with grass for

picnic or play areas, and/or to create or maintain habitat for wildlife species which utilize forest openings or clearcuts to meet some or all of their habitat requirements. Clearcutting would also be useful in an urban woodland where education is the primary goal, whether to demonstrate forestry practices for forestry education programs, or to demonstrate the process of ecological succession for nature/forest ecology education programs, for example.

9. A Variation on Clearcutting: The Seed Tree Method

If, in timber management, scattered individual trees, or scattered small groups of trees of the species preferred for regeneration are selectively left standing in a clearcut, then the method of harvest/regeneration is called the "seed tree method," as the trees which are left are relied upon to produce seed that will naturally regenerate the area rather than relying on trees at the edges of clearcuts to provide seed. These seed trees may be harvested after regeneration has been established. The method allows cutting over a larger area than clearcuts alone, if natural regeneration is relied on, as the seed source is spread out over the entire cut area. In an urban woodland primarily used for forestry demonstration and education, the seed tree method may be demonstrated for what it is--a silvicultural practice. If, however, clearcuts are carried out to create forest glades for recreation and wildlife, then leaving individual or groups of trees may be more desirable than clearcuts alone (depending on their size or their function), not for "seed trees," since regeneration is not the goal, but because open areas with scattered trees are aesthetically more attractive than clearcuts. Shade is provided

within the open area rather than just at the edges, and a wider range of wildlife may also make use of the area with trees providing nesting sites, or perhaps a source of food, or protection.

10. Shelterwood Method

The shelterwood method of removing/regenerating trees is used in timber production to produce a new, even-aged crop of trees, usually of species which need some shade and protection in order to become established during the early stages of their growth, thaty is, tree species which would not regenerate or establish successfully in the harsher conditions of an open clearcut. The shelterwood method involves regenerating a new crop under the shade and protection of mature trees, which also protect the growing site from problems such as soil erosion and/or nutrient loss, or damage to aesthetic qualities. This method may also be used to regenerate species which would tolerate open clearcut conditions (called "shade intolerant" species) if protection of the site is a concern, however more light is required to enter the stand so that these species may regenerate.

Cutting is usually carried out in three steps. The first step is an initial, "preparatory" cut, which is a partial cut that could also be called a late thinning, as it opens up the stand to a lower density of stems and more growing space between the remaining trees. This step allows the remaining trees to increase their vigor, to develop larger crowns for better seed production, and to increase their root systems so that they will be more windfirm (that is, able to resist blowing down in high winds) when the stand is opened up even more in the next cut. If the

stand is an old-growth stand which has reached the point of already opening up itself due to dying old trees, or if it is an intensively managed stand which has been continuously thinned, this first step may not be as necessary as for younger, dense, unmanaged stands, which may need the first cut to be carried out more than once. After several years, the second step, called the "seed cut," removes additional trees and opens up the stand further, leaving only the trees considered the best candidates for dispersing the seed needed for natural regeneration and in sufficient numbers to provide favorable growing conditions, (e.g., enough shade and protection for shade-tolerant species) for the new crop to become established. The light requirements and/or shade tolerance of competing, unwanted species of vegetation must be considered when judging the degree to which cutting is to be carried out, in order to minimize the undesirable invasion of the stand by such vegetation after the seed cut. The final step in the shelterwood method, the "removal cut," removes the overstory (the seed trees which were left) after regeneration has been adequately established and has grown sufficiently in size. The overstory may be removed gradually (in more than one cut) if some shade is still considered necessary to protect the regeneration of species which will not tolerate being suddenly exposed to open conditions, and/or to help control competing vegetation, but care must be taken with each removal cut not to damage the newly established crop by these removal operations.

In an urban woodland, the shelterwood method, like other timber production methods, could be demonstrated alongside other silvicultural practices if forestry demonstration is an important use of the woodland,

or it provides an alternative strategy for vegetation management or the creation/maintenance of wildlife habitat.

11. Selection Cutting (Selective Tree Removal)

The selection cutting method of harvesting/regenerating a timber crop, also called selective tree removal or selective clearing, removes selected individual trees or small groups of trees at continuous intervals. This method is used to harvest and perpetuate (or create) an uneven-aged stand, composed of a variety of ages and tree sizes, which may be either of single or mixed-species composition. The species are usually those which are shade-tolerant (such as western redcedar), as they must regenerate where only single or small groups of trees have been removed--older trees are always present to provide protection for the site and shade and protection (or competition) for the younger trees. Most trees are cut when they are considered mature by timber production standards, but smaller, immature trees may also be taken for other reasons such as if the stand is considered too dense, or if they have been damaged during the cutting of mature trees. Alternatively, mature trees may be left if they are needed as a source of seed or for wildlife or aesthetics, or to maintain soil stability. Selecting groups of trees is still considered selection cutting as long as the openings created are no larger in size than the height of the surrounding trees, so that the site protection provided by the surrounding trees, the aesthetic values, and the biological diversity of the uneven-age stand are still maintained. If openings exceed this maximum size they are really more like small clearcuts and the benefits of the selection method are lost.

Selection cutting appears to be an ideal method of cutting and regenerating trees in timber management, as it produces a regular, continuous flow of lumber and small wood products and, therefore, income; it ensures the most protection for the site and least ecological disturbance of all the cutting methods; it maintains the high aesthetic qualities of the uneven-aged forest as the forest is perpetuated; and it provides a diversity of habitat for wildlife. However, the disadvantages of selection cutting often discourage foresters from using the method, especially in selection of single trees or very small groups, since: a high level of skill is needed to practice the method successfully; it is technically complex, and time-consuming, to plan, monitor, and execute; extreme care must be taken in scheduling the cutting intervals such that the volume of harvest at each cut is kept in balance with the growth and yield in volume of the remaining trees over the cutting interval; cutting costs are high because the operation is spread out over the forest, taking out a relatively small amount of timber at a time and requiring extra care to minimize the inevitable damage to the uncut trees; shade intolerant species are not favored; and a permanent road system must be maintained. Selection of larger groups of trees to cut mitigates some of these disadvantages, as shade-intolerant species, if desired, can grow, damage to remaining trees is lower, and cutting is concentrated in fewer places so that cutting costs can be lowered.

In an urban woodland, selective tree removal is an appropriate method of cutting if any cutting is acceptable or necessary in the vegetation management of any uneven-aged stands. The advantages of selection cutting for timber production are also relevant for the

management of urban woodland vegetation--the site is protected, aesthetic values are maintained, ecological diversity is maintained, wildlife benefit from the diversity of habitats, and trees which are removed provide a source of revenue to finance management activities. Timber production is likely to be a minor activity in any urban woodland not engaged in the demonstration of forestry practices, and may be only a by-product of management activities, in which case the disadvantages of the selection method for timber production have little importance for an urban woodland. If uneven-aged areas of shade-tolerant species in an urban woodland are either non-existent or small, or are managed only for wildlife habitat, reduction of hazards to the public, and/or for maintenance of vegetation diversity, then selective cutting will be sporadic, not requiring the planning of continuous cuts or specific volumes of timber. Perhaps the only significant problem then will be limiting the amount of damage to remaining vegetation by cutting operations.

12. Coppicing

Coppicing is a method of regenerating a stand of trees by relying on dormant buds located in the lowest parts of the tree trunks to sprout new growth vegetatively (not from seeds) from the stumps after the tree has been cut. Most sprouting trees are hardwoods. These trees also regenerate by seed, but their dormant or "adventitious" buds are an alternative reproduction strategy that ensure regeneration if regular reproduction by seed is somehow curtailed; for example, a tree snapping off in the wind or cut down by a beaver, or damaged by fire. New growth

will sprout from these buds which are close to the ground and grow into new trees, feeding off the root systems of the parent stumps (which eventually rot away). If the adventitious buds are located in the roots, as in aspens, the vegetative growth is called a sucker. Coppicing is usually used to produce firewood, pulpwood and other small wood products such as posts and garden stakes, which can be obtained in large amounts in relatively short periods of time, since multiple sprouts usually arise from a single stump, and sprouts and suckers then grow rapidly for the next ten to twenty years.

In an urban woodland, coppicing is useful to regenerate species which may not regenerate easily otherwise. For example, trembling aspen seldom produces seed in the West, or so it is thought, as there are not many aspens to be found in the West that have originated from seed. These trees may be desired for nature education (e.g., for tree identification; or, for education about the reproductive methods of trees, coppicing would help demonstrate the regeneration of trees which sprout or produce root suckers), for vegetation diversity, or for wildlife habitat purposes. As with other forestry practices, coppicing may also be demonstrated as a way to produce small wood products.