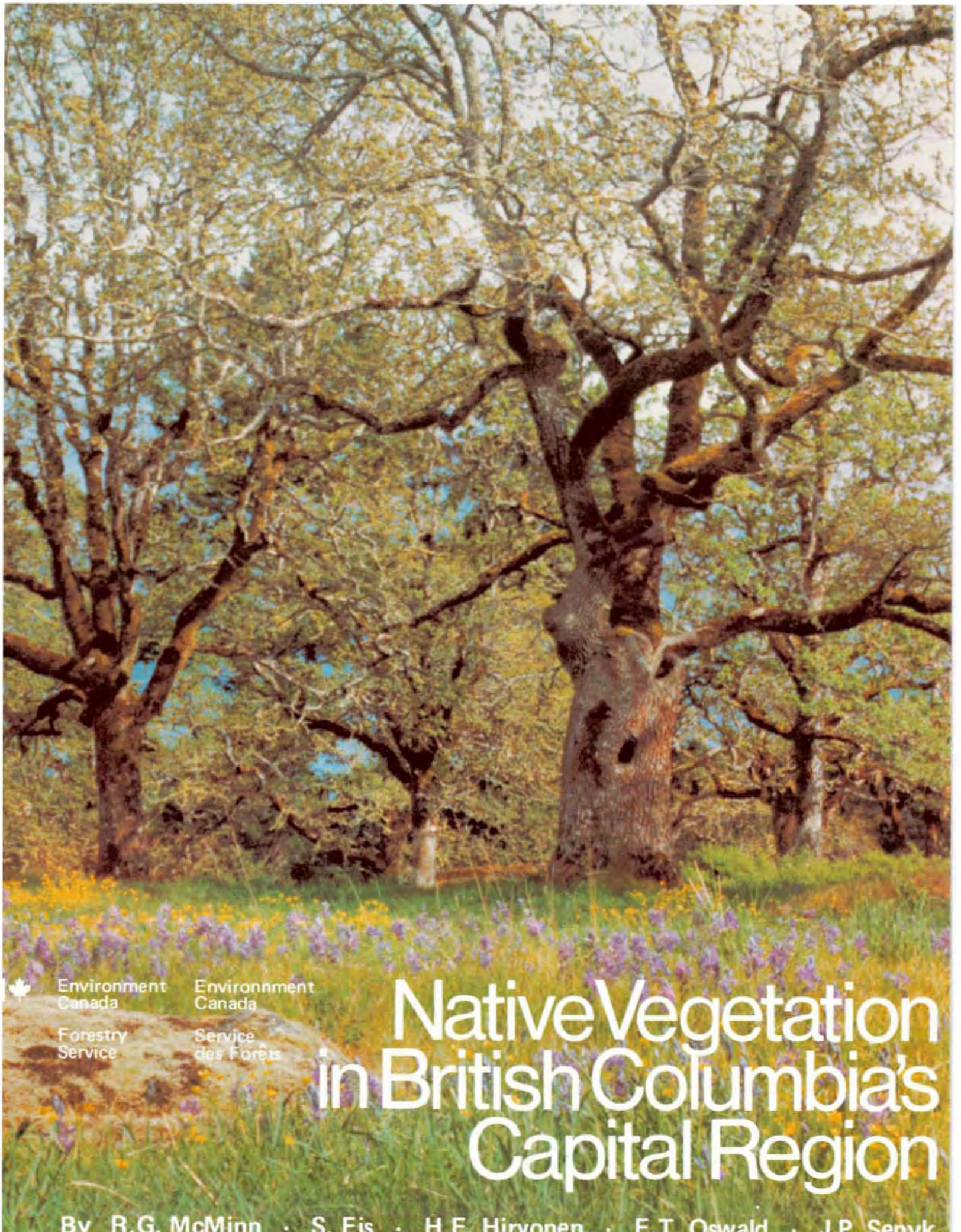

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Native Vegetation in British Columbia's Capital Region

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ABSTRACT

Native plant communities in the Victoria Metropolitan Area vary from Garry oak parkland to majestic coniferous forests. This range of communities corresponds to a climatic gradient extending from the dry, Mediterranean climate of the southeastern coastal lowlands to the moister climate of westerly and high elevation areas. Native vegetation in British Columbia's Capital Regional District offers distinctive and attractive settings for various land uses.

RÉSUMÉ

Les associations de plantes indigènes de la région métropolitaine de Victoria sont variées. Elles vont du chêne peuplant les parcs forestiers de Garry aux conifères majestueux de la forêt. La gamme des essences correspond à un gradient qui s'étend du climat sec méditerranéen des basses terres côtières du Sud-Est au climat plus humide des régions plus élevées de l'Ouest. La végétation originaire du district de la capitale de la Colombie-Britannique offre un cadre distinctif et attrayant qui se prête bien à diverses utilisations des terres.

Introduction

When traders from Europe first came to the area destined to become the city of Victoria, Garry oak parkland was a distinctive feature of the landscape. So appealing was this parkland that James Douglas, then Chief Factor on the Pacific Coast for the Hudson's Bay Company, wrote in 1842, that the area "... appears a perfect 'Eden', in the midst of the dreary wilderness of the Northwest Coast, and so different in general aspect from the wooded, rugged regions around, that one might be pardoned for supposing it had been dropped from the clouds into its present position." The popularity of oak parkland with subsequent settlers has been such that almost none remains in its original condition.

Recognizing that other attractive or unique landscapes in the vicinity of Victoria might not survive further urban expansion, the Planning Department of the Capital Regional District[1] requested inclusion of native vegetation in an inventory of land resources being prepared as background for developing a Regional Plan for the Victoria Metropolitan Area[2]. The Pacific Forest Research Centre prepared a map of native plant communities as one of its contributions to the land resource inventory (Stanley-Jones and Benson 1973). This report reproduces the map, provides an introduction to the Area's topography, soils and climate, a brief description of plant communities and suggestions concerning their value as settings for various land uses.

Physical Setting

The eastern part of the Victoria Metropolitan Area is a coastal lowland consisting of broad valleys and rolling uplands less than 75 m (250 ft) above sea level (Fig. 1). This lowland is part of the Georgia Depression Section of the Coastal Trough that separates Vancouver Island from the Mainland of British Columbia (Holland 1964). Several isolated hills (for example, Observatory and Bear Hills and Mount Douglas and Mount Newton) form conspicuous landmarks rising above the coastal lowlands (Fig. 2). West of the lowland area, the terrain is more rugged and elevations are higher. The Goldstream Watershed on the westerly boundary of the Victoria Metropolitan Area is part of a southern extension of the mountainous backbone of Vancouver Island. Elevations in this area rise to nearly 600 m (2000 ft) above sea level.

[1]The Capital Regional District includes Victoria, British Columbia's capital city, adjacent portions of southern Vancouver Island and the southern Gulf Islands.

[2]The Victoria Metropolitan Area includes the city of Victoria; the municipalities of Esquimalt, Oak Bay, Saanich, Central Saanich, North Saanich and Sidney; the electoral areas of View Royal, Langford, Colwood and Metchosin; and the Goldstream Watershed of the Greater Victoria Watershed.

Geology and Surficial Materials

Bedrock formations date from Mesozoic and Quaternary Eras (Clapp 1912). Most rocks are igneous or metamorphic in origin, although a small area of sedimentary rocks occurs at the northern end of the Saanich Peninsula. No significant differences in plant communities have been associated with differences in bedrock (Roemer 1972), probably because surficial[3] deposits brought from other areas by glacial activity mask most of the direct effects of underlying bedrock.

During glacial periods, the most recent of which lasted until about 10,000 years ago, the Victoria Metropolitan Area was covered by ice, hundreds of meters in thickness. These masses of ice scoured and rounded hilltops and ridges and, by their weight, depressed coastal lands below present sea level. The southerly end of Vancouver Island was some 85 m (275 ft) lower than at present when ice from the last glacial advance started to melt (Nasmith 1969).

Most land more than 85 m above sea level is covered by coarse-textured[4] morainal deposits[5] (Fig. 3). Deep deposits have developed under the influence of climate and living organisms into coarse-textured soils consisting of 45 to 60 cm (18 to 24 in) of moderately well-drained, gravelly sandy loam above a compact semi-impervious subsoil. Morainal deposits in areas of steep topography formed pockets of shallow-to-bedrock soil among rock outcrops. In areas mapped as shallow deposits (Fig. 3), some deep morainal deposits are present, but they cover less than 30% of the land surface. Colluvial materials[6] are present in areas shown as shallow morainal deposits. Coarse- to medium-textured alluvial materials[7] cover parts of some valley floors.

[3]Surficial materials are rock fragments, gravel, sand, silt and clay that form the surface of the land.

[4]Texture refers to size of particles making up materials. Soil textural classes range from coarse (sand) through medium (loam, a mixture of sand, silt and clay) to fine (clay or silt and clay).

[5]Morainal deposits (also called glacial till or boulder clay) are mixtures of boulders, stones, gravel, sand, silt and clay deposited by glaciers without sorting or stratification.

[6]Colluvial materials are rock fragments and soil that have moved downslope through gravity. Colluvium occurs on moderate to steep slopes and at the base of cliffs.

[7]Alluvial deposits are materials that have been transported and dropped by rivers and streams since the last glacial period.

[8]Glaciofluvial deposits are materials moved by glaciers and subsequently sorted and deposited by streams flowing from melting ice.

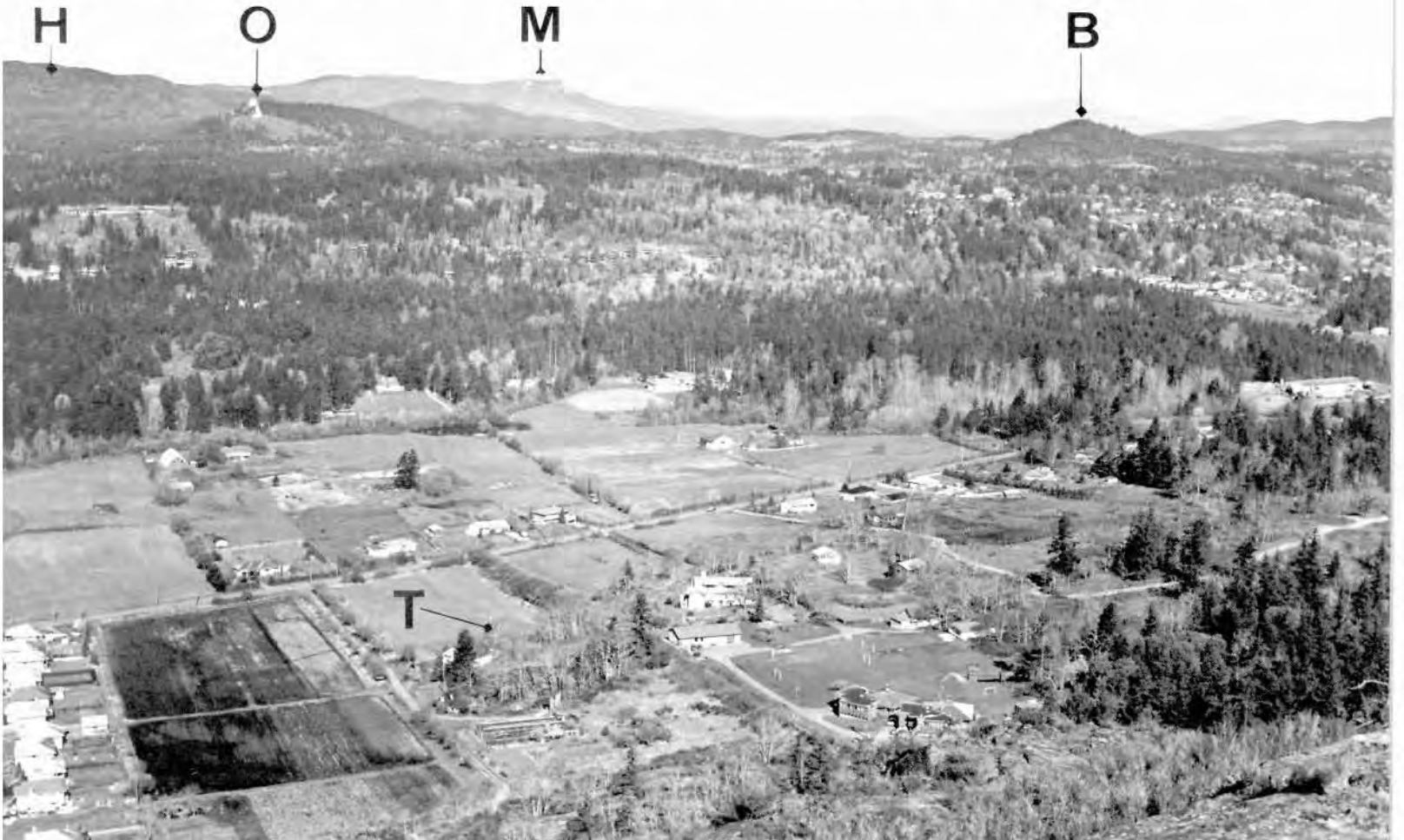


Fig. 1. View from Mount Douglas across one of the valleys characteristic of lowlands in the Victoria Metropolitan Area of British Columbia's Capital Regional District. Before clearing, valley floors were covered by Swordfern, Black Cottonwood and Wetland Communities. Fine-textured marine deposits in bottomlands provide agricultural soils, although housing has reduced acreage available for farming. Oak trees (T) on near side of valley are growing in shallow, rock outcrop soils. Douglas-fir is the dominant conifer on hillsides covered with coarse-textured soils developed from colluvial and morainal deposits. Observatory Hill (O) and Bear Hill (H) are two of several conspicuous hills rising above the lowlands. The Highland District (H), behind Observatory Hill, is part of the rugged higher elevation terrain west of the lowlands. The mountainous backbone (M) of Vancouver Island is visible in middle and far distance beyond the Victoria Metropolitan Area.

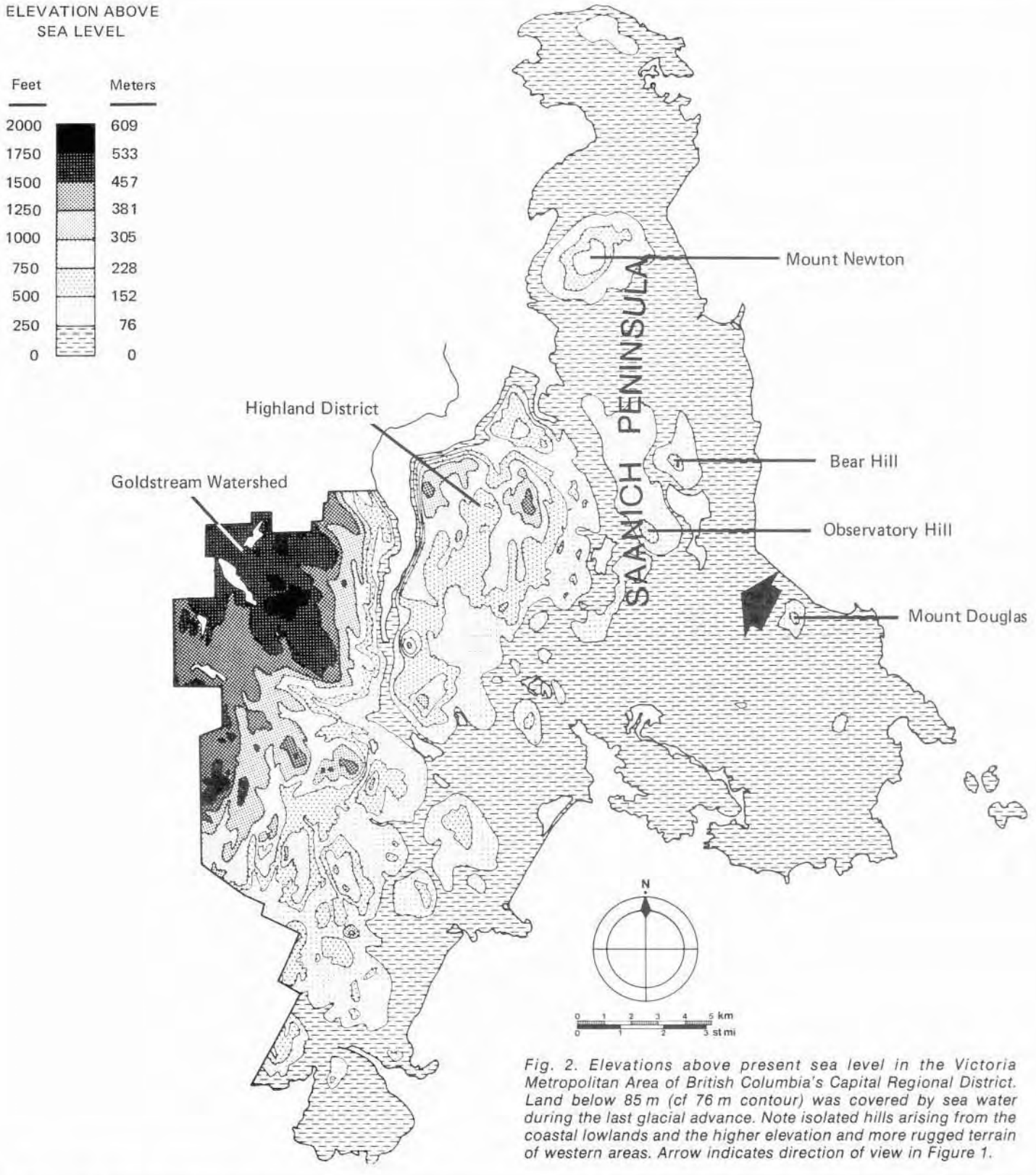


Fig. 2. Elevations above present sea level in the Victoria Metropolitan Area of British Columbia's Capital Regional District. Land below 85 m (cf 76 m contour) was covered by sea water during the last glacial advance. Note isolated hills arising from the coastal lowlands and the higher elevation and more rugged terrain of western areas. Arrow indicates direction of view in Figure 1.

Most of the lowland area is covered by materials originally deposited in the sea. At the end of the last glacial period, water from melting ice sorted and transported some of the materials dropped by glaciers. Fine materials, easily transported by water, were carried out to sea where they formed deposits that in many places reached considerable thickness. Following re-emergence of land when glacial ice melted, these fine-textured materials became the clay and loam soils of the coastal lowland (Figs. 1 and 2). Coarser glaciofluvial[8] materials, less easily carried by water from melting ice, were moved shorter distances to form interstratified gravel and sand deposits.

Organic materials that accumulated during the post-glacial period through the growth and decomposition of plants in low-lying boggy areas constitute a minor but distinctive type of surficial material (Fig. 3).

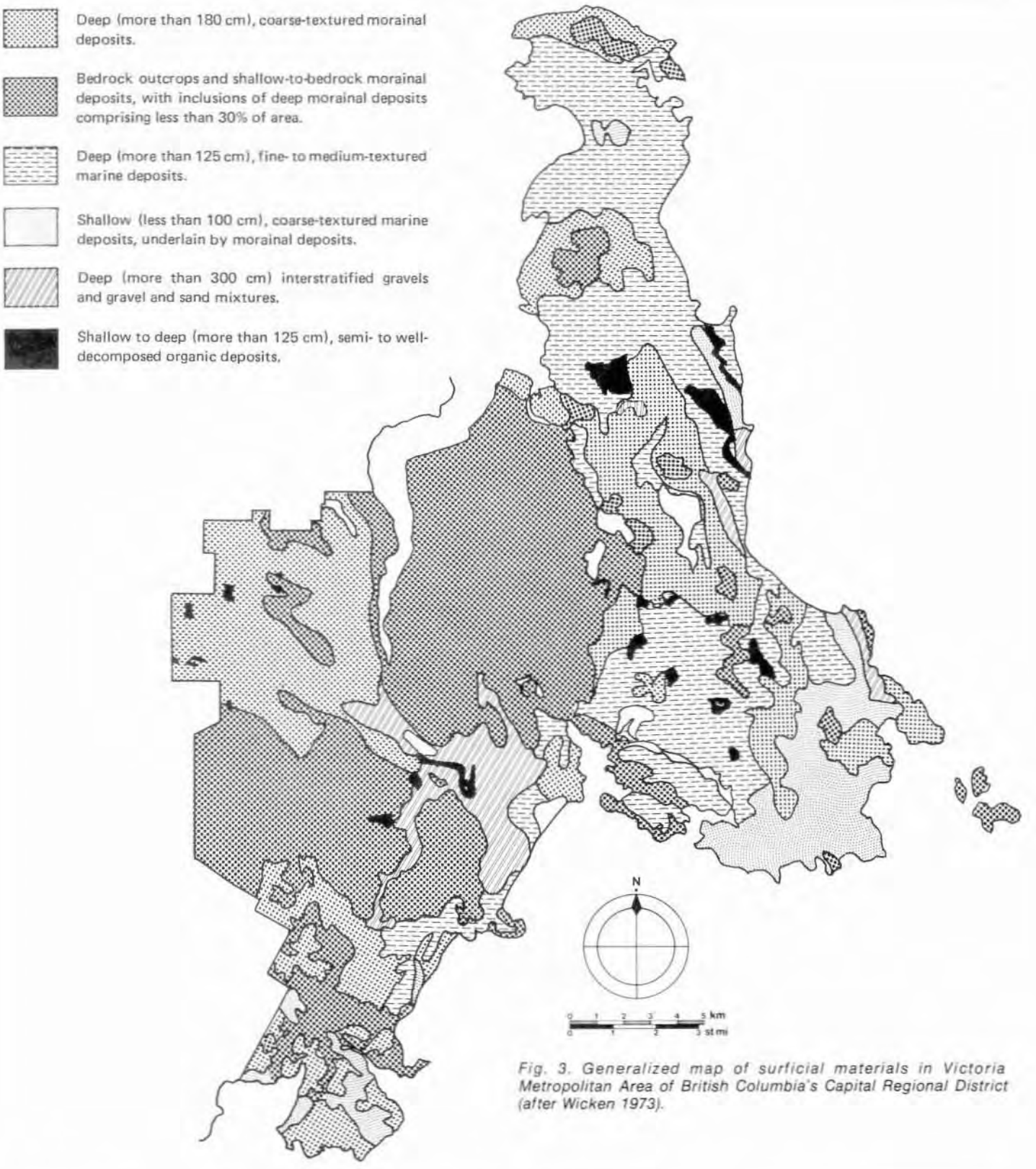


Fig. 3. Generalized map of surficial materials in Victoria Metropolitan Area of British Columbia's Capital Regional District (after Wicken 1973).

Soils developed from morainal and marine deposits have contrasting properties that exert considerable influence on the distribution of native plants (Roemer 1972). Marine clays developed into soils that are richer in plant nutrients and less rapidly drained than soils derived from morainal deposits. Clay soils, consequently, commonly support lush growth of species able to tolerate periodic flooding. Morainal soils generally are drier and poorer in nutrients so that plant growth is not as lush. Exceptions are morainal soils that are fertile thanks to nutrient enriched moisture seeping downslope. Such sites, and alluvial deposits that are adequately supplied with moisture, are very productive for trees. Differences in soil-forming materials above and below 85 m above sea level (morainal above, marine below), together with differences in climate, are important factors influencing distribution of native plant communities.

Fig. 4. Annual precipitation and annual water deficit in the Victoria Metropolitan Area of British Columbia's Capital Regional District (after Chilton 1973).

Climate

The Victoria Metropolitan Area enjoys a relatively dry climate. Dryness in summer results from northward diversion of westerly moving weather systems by a semi-permanent ridge of high pressure lying to the west of Vancouver Island. Even those systems that do penetrate, drop much of their rain on the Olympic Mountains in Washington State and on Vancouver Island's mountains.

Although none of the Area has high rainfall because it lies in a rainshadow, there is a gradient of increasing rainfall from east to west (Fig 4). This gradient coincides with increasing elevation and reduced effectiveness of the rainshadow in the westerly portion of the coastal lowlands. Moisture deficits (Fig. 4) follow a parallel but inverse trend. High temperatures, as well as lack of rain, cause moisture deficiences. Gonzales Observatory in the southeastern corner of the Victoria Metropolitan Area records more hours of bright sunshine than any other station in British Columbia. Further west at higher elevations and even in coastal lowlands, cool cloudy weather is more common. The dry Mediterranean[9] climate of the southeastern portion of the coastal lowlands excludes trees and lesser plants not adapted to drought. Conversely, plants requiring warmth and sunshine do not thrive in the cooler and more cloudy parts of the Victoria Metropolitan Area.

[9]Mediterranean climates have hot, dry summers and wet winters.

Native Plant Communities

The Mediterranean climate characteristic of the southeastern lowlands endows the Victoria Metropolitan Area with many native plants that are unique. Garry oak *(Quercus garryana)*[10] occurs in the driest sites in which trees can grow. Colorful flowers such as blue camas *(Camassia quamash* and *C. leichtlinii)*, shooting star *(Dodecatheon hendersonii)*, easter lily *(Erythronium oreganum)*, chocolate lily *(Fritillaria lanceolata)* and satin flower *(Sisyrinchium douglasii)* decorate landscapes beneath oak trees and in shallow-to-bedrock soils (Frontcover). Such plants have bulbs to carry them through parched summers until they leaf out again the following spring. The coppery-red bark of arbutus *(Arbutus menziesii)* adds color to many landscapes. Douglas-fir *(Pseudotsuga menziesii)* is the most widespread conifer, ranging from distorted, wind-sculptured sentinels on rocky shorelines to veteran forest giants with enormous girth on moist forest slopes. Lodgepole pine *(Pinus contorta)* growing on exposed seashores commonly has the rounded crown of its "shore pine" form. It also occurs on hilltops in wetter areas and in bogs unattractive to other conifers. Where wetter climates or moister soils supply ample moisture all year round, red alder *(Alnus rubra)*, bigleaf maple *(Acer macrophyllum)*, western red cedar *(Thuja plicata)*, grand fir *(Abies grandis)*, flowering dogwood *(Cornus nutallii)*, the provincial floral emblem, and black cottonwood *(Populus trichocarpa)* are common trees. Rowe (1972) includes the entire Victoria Metropolitan Area within the Strait of Georgia Section of the Coast Forest Region.

The various trees occurring in different landscapes are accompanied by particular shrubs and herbaceous plants. The distribution of plant communities formed by different combinations of trees, shrubs and herbs is dependent on the presence of distinctive habitats. Although rainfall and moisture deficiencies exert a general influence, the distribution of habitats is a mosaic because topography and soil are also important. Moisture deficiencies are greater at the top of hills than at the base of slopes and south-facing slopes are drier than northern exposures. Amounts of moisture and nutrients available to plants are also influenced by soil depth and texture. Only plants tolerant of excess moisture occur in wetlands. The following descriptions of native plant communities are arranged in order of increasing moisture availability.

The vegetation units shown on the Centerspread Map of Native Plant Communities are more generalized than the detailed classification of plant associations developed by Roemer (1972). Generalization was necessary because mapping was by airphoto interpretation and only areas larger than ± 10 ha (25 ac) could be delineated at the scale of mapping used. Map units are designated according to predominant plant community. Inclusions of other types occur within any one area.

Areas are mapped on the basis of the original native plant community believed to have been present even though many landscapes have been altered by urban development, clearing for agriculture and logging. A map of present land use is given in the land resource inventory prepared for the Regional District (Stanley-Jones and Benson 1973).

[10]Latin names for plants used in this report are those given by Szczawinski and Harrison (1972). Plant descriptions and keys for plant identification may be found in Hitchcock and Cronquist (1973), Clark (1974), Lyons (1952), Hosie (1969) and various handbooks published by the Provincial Museum.

Garry Oak Community

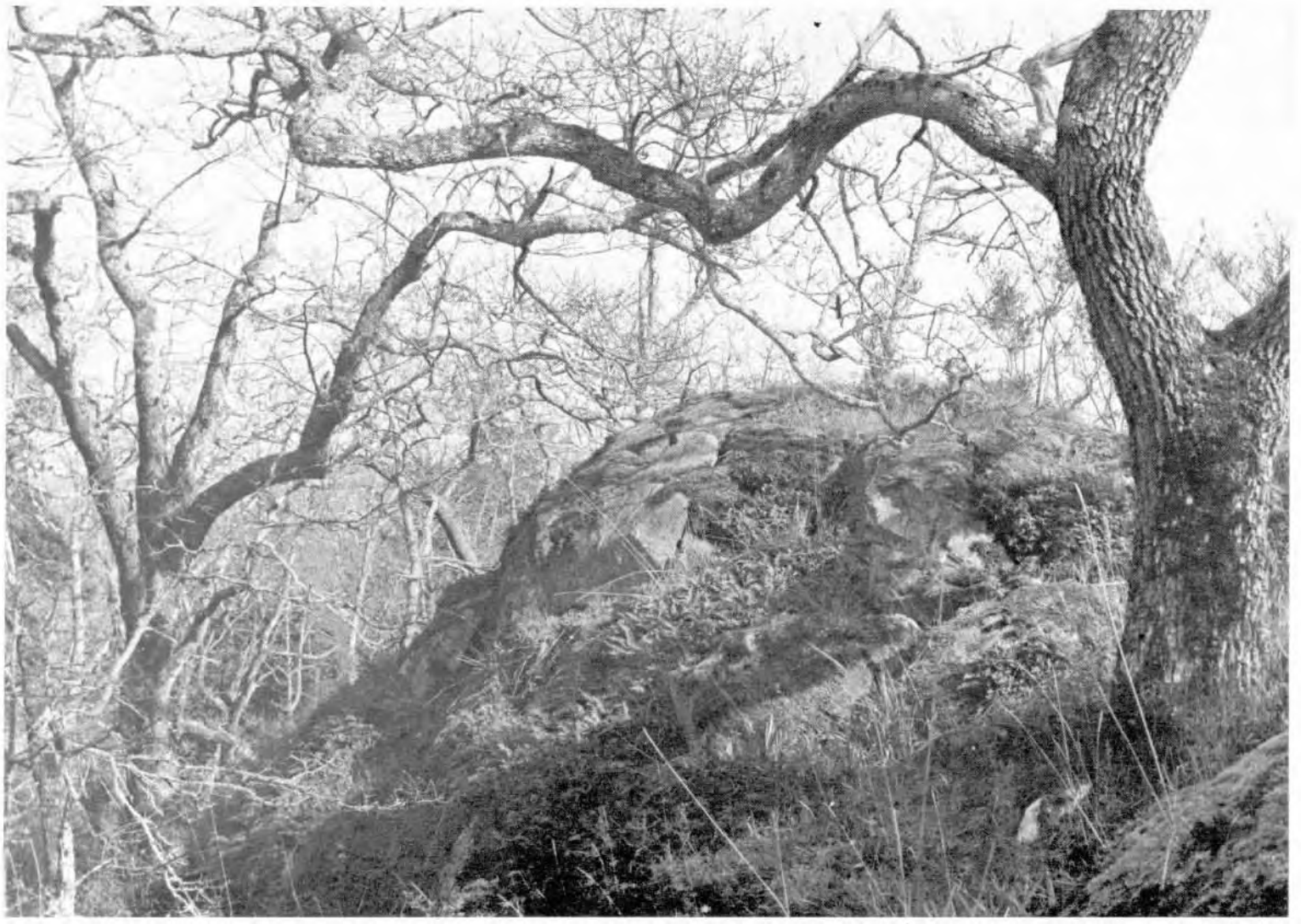
Two types are included within the Garry oak map unit, an **Oak Parkland Type** and a **Scrub Oak - Rock Outcrop Type.**

The **Oak Parkland Type** occurs in the driest parts of the Victoria Metropolitan Area. Soils are relatively deep, but dry in summer. Oak parklands with a ground cover of grasses (Fig. 5) have abundant, brightly colored, spring flowers. Stands with a shrub layer of snowberry *(Symphoricarpos albus)* have fewer flowering bulbs. Whether oak parklands lacking a prominent shrub layer generally result from human influences is uncertain. Even before European settlement, oak parklands were affected by the agricultural practices of native people. Indians who lived on the Saanich Peninsula prized the bulbs of blue camas as a source of starch. Shrubs were controlled by periodic burning, and digging for bulbs with pointed sticks "cultivated" the ground, encouraging more bulbs. The presence of death camas *(Zygadenus venosus)* in bulb digging patches was a problem that differences in flower color solved. Although blue and death camas bulbs are difficult to tell apart at harvest time when leaves and flowers have withered, village women were able to cull out the poisonous bulbs in spring because death camas has white flowers. Little oak parkland remains in its original state, although Garry oak trees still beautify parks, golf courses, residences and farmlands in dry parts of the coastal lowlands.

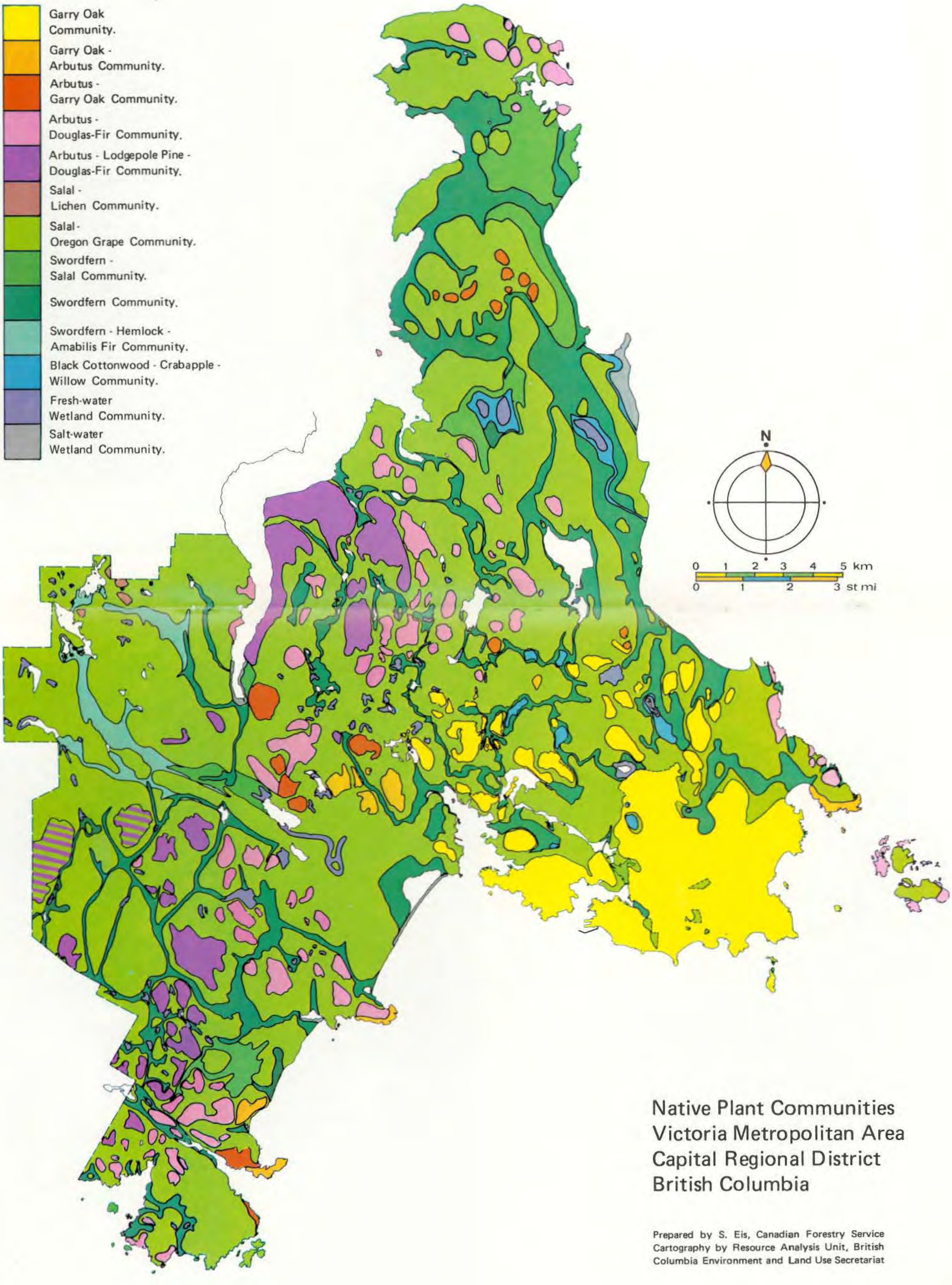
The gnarled and stunted oak of the **Scrub Oak - Rock Outcrop Type** root in shallow soils and rock crevices of hilltops (Fig. 6). Rocky ledges are commonly fringed by licorice fern *(Polypodium vulgare)* and lichens. Yellow stonecrop *(Sedum spathulifolium)*, pink seablush *(Plectritis congesta)*, wild onion *(Allium cernuum)* and larkspur *(Delphinium menziesii)* add to the colorful display of flowering bulbs.

Fig. 5. Garry oak parkland in dry, southeastern coastal lowlands. Shooting star and easter lily make a bright carpet on the ground before oak trees leaf out. Mowing maintains area free from shrubs but is delayed until leaves have provided bulbs with enough food to last wildflowers until new leaves come up the next spring.

Fig. 6. Scrubby, gnarled Garry oak on dry, rocky hillside. In spring, patches of shallow soils among rock outcrops are alive with wildflowers.



- Garry Oak Community.
- Garry Oak - Arbutus Community.
- Arbutus - Garry Oak Community.
- Arbutus - Douglas-Fir Community.
- Arbutus - Lodgepole Pine - Douglas-Fir Community.
- Salal - Lichen Community.
- Salal - Oregon Grape Community.
- Swordfern - Salal Community.
- Swordfern Community.
- Swordfern - Hemlock - Amabilis Fir Community.
- Black Cottonwood - Crabapple - Willow Community.
- Fresh-water Wetland Community.
- Salt-water Wetland Community.



Native Plant Communities
Victoria Metropolitan Area
Capital Regional District
British Columbia

Prepared by S. Eis, Canadian Forestry Service
Cartography by Resource Analysis Unit, British Columbia Environment and Land Use Secretariat

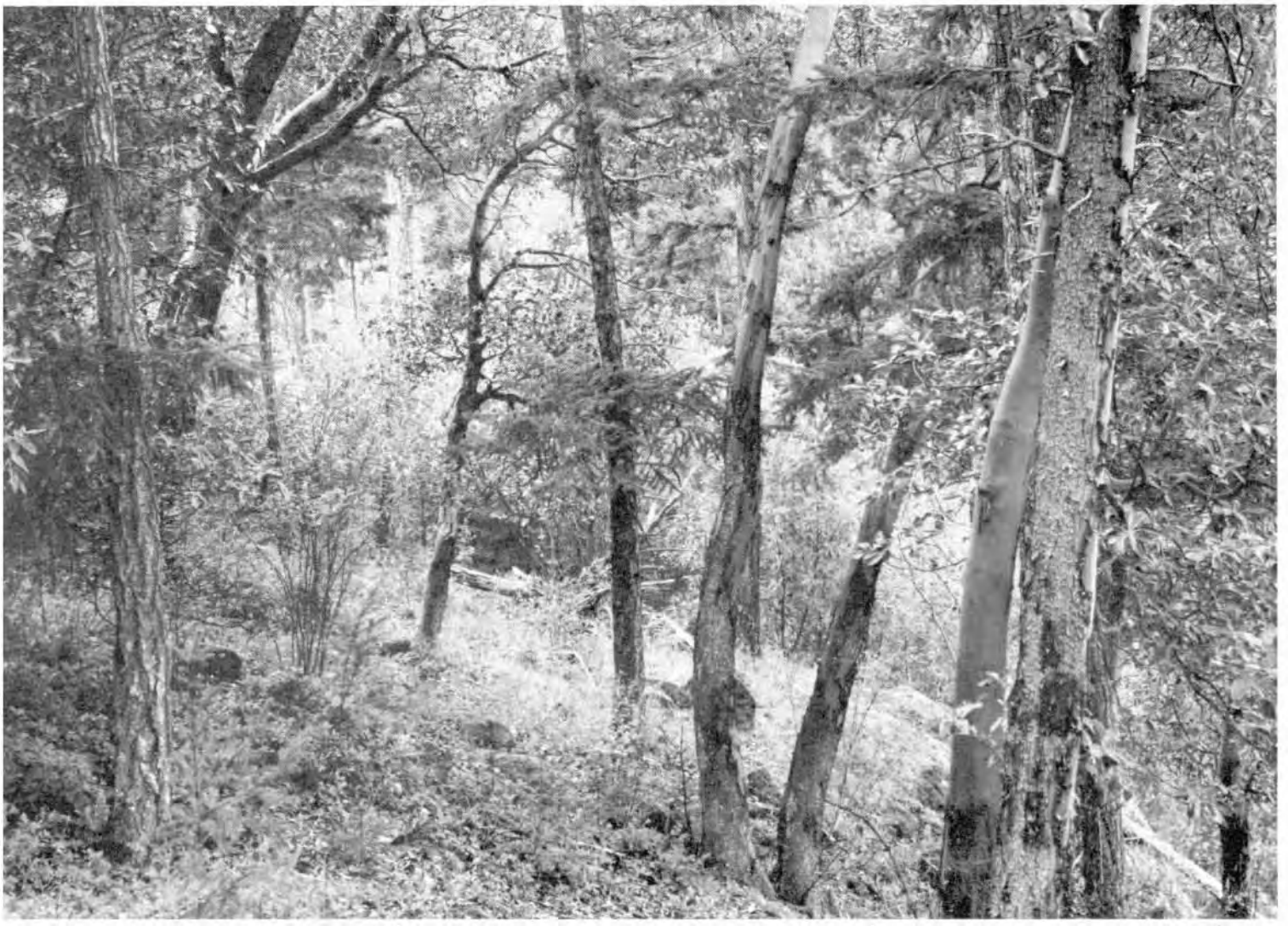
Arbutus Communities

Since arbutus is not shade tolerant, it is common in rock-outcrop soils where drought keeps conifers from growing dense enough to shade arbutus out. Its frequency in less extreme sites depends on whether competing conifers have been removed, for example by logging, or whether they have grown to a size where arbutus is overtopped and crowded out.

Arbutus commonly grows with Garry oak except in the driest parts of the Victoria Metropolitan Area. Mixed stands of oak and arbutus are designated the **Garry Oak - Arbutus** or the **Arbutus - Garry Oak Community** according to the proportion of each species present. Groundcover in these communities includes many of the colorful flowers present in the Garry Oak Community, as well as a scattering of shrubs such as snowberry, ocean spray *(Holodiscus discolor)* and Scotch broom *(Cytisus scoparius)*. Scotch broom, an aggressive, imported weed, unfortunately may become so dense that native wildflowers are suppressed. Some Douglas-fir is, or was, present in most Garry Oak - Arbutus and Arbutus - Garry Oak units mapped.

The **Arbutus - Douglas-Fir Community** occurs in coarse-textured, rocky soils (Fig. 7). Shrubs such as ocean spray, wild rose *(Rosa gymnocarpa)*, Oregon grape *(Berberis nervosa* and *B. aquifolium)*, honeysuckle *(Lonicera ciliosa)* and snowberry are common, although shrub layers vary in density. Licorice fern and mosses (e.g. *Rhytidiadelphus triquetris* and *Dicranum scoparium)* cover rock outcrops and boulders strewn over the ground. Grasses (e.g. *Bromus vulgaris* and *Melica subulata)* are also common.

Fig. 7. Arbutus and Douglas-fir growing in coarse-textured soil developed from morainal and colluvial deposits. Sinuous, smooth-barked upper trunks of arbutus contrast with furrowed stems of Douglas fir. Ocean spray is a common shrub and spring flowers and grasses cover the ground.



The **Arbutus - Douglas-Fir - Lodgepole Pine Community** occurs on exposed ridges and hilltops in the Highland District and other western areas where moister and cooler climates favor lodgepole pine (Fig. 8). As it is intolerant of shade from other trees, lodgepole pine, like arbutus, commonly grows at the edge of rock outcrops and in soils that are sufficiently shallow to limit the size and competitiveness of Douglas-fir. Exposure to high winds distorts Douglas-fir crowns and periodic exceptionally dry summers kill ends of branches and tops of trees to further accentuate their ragged outlines (Fig. 8). Manzanita *(Arctostaphylos columbiana)* and kinnikinnick *(Arctostaphylos uva-ursi)* are common in these dry, exposed sites. Manzanita, a shrub with leathery, grey-green leaves and red stems, looks like a miniature arbutus. Kinnikinnick, or bearberry, is a creeping broad-leaf evergreen shrub with pink, heather-bell flowers and bright red berries that enliven the ground when other flowers have dried up. Grasses dry early in summer (Backcover, Fig. 7).

Fig. 8. On this hilltop, arbutus is the broadleaf tree to the left, with manzanita the tall shrub beside it. The ragged crown to the right belongs to a Douglas-fir. Lodgepole pine can be seen in the background. Wildflowers and grasses form a fragile cover for shallow soils that dry early in summer.

Salal - Oregon Grape Community

Salal *(Gaultheria shallon)* and Oregon grape are the most common shrubs in the Salal - Oregon Grape Community. In wetter, western areas, salal is the more vigorous of the two, reaching one meter in height to form a dense undergrowth. In drier areas, where salal is less aggressive, Oregon grape may form an almost continuous, prickly-leaved, low shrub layer (Fig. 9). Mosses (e.g. *Eurhynchium oreganum* and *Hylocomium splendens)* make a feathery carpet that is bright green in damp weather. Calypso *(Calypso bulbosa)*, rattlesnake orchid or plantain *(Goodyera oblongifolia)* and spotted coral-root *(Corallorhiza maculata)* make spots of color on the forest floor. Veteran Douglas-fir may reach considerable size (Fig. 10), although not as large as in the moister and more fertile soils of the Swordfern Community. In westerly areas, the presence of hemlock *(Tsuga heterophylla)* indicates a wetter climate, approaching that of the Coastal Western Hemlock Zone (Krajina 1965) or Southern Pacific Coast Section (Rowe 1972).

The Salal - Oregon Grape Community is the most widespread forest community in the Victoria Metropolitan Area. Stands occur on a variety of coarse-textured surficial materials that have developed into well-drained soils.

Salal - Lichen Community

Higher elevations in the Greater Victoria Watershed are too wet for arbutus to flourish in the face of competition offered by conifers. Ridges that elsewhere would be occupied by the Arbutus - Douglas-Fir - Lodgepole Pine Community, therefore, lack arbutus. Stunted salal and lichens cover shallow soils and exposed rocks. Such plant communities are designated the Salal - Lichen Community. Although common elsewhere on eastern Vancouver Island, in the Victoria Metropolitan Area, this community is restricted to a few locations in the Goldstream Watershed.

Fig. 9. Douglas-fir with a low shrub layer of Oregon grape growing in dry soil developed from coarse-textured morainal deposit.

Fig. 10. Dense stand of Douglas-fir with thick shrub layer of salal. Younger trees regenerated after a fire survived by large, thick-barked veteran trees.

Swordfern Communities

Swordfern *(Polystichum munitum)* is the most common and conspicuous ground cover plant in fertile soils that remain moist throughout the growing season (Fig. 11). Since summer rainfall in the Victoria Metropolitan Area is low, swordfern is plentiful only where soil moisture is augmented by water seeping down slopes or accumulating in hollows. Douglas-fir, western red cedar, and grand fir are the most common conifers in Swordfern Communities. Veteran trees reach larger sizes in the three swordfern units mapped than in any other type. Salmonberry *(Rubus spectabilis)* and red elderberry *(Sambucus racemosa)* are common shrubs. Trillium *(Trillim ovatum)*, coolwort *(Tiarella trifoliata)*, bedstraw *(Galium triflorum)* and other delicate herbaceous plants occur between swordfern clumps.

Red alder commonly replaces conifers removed by logging or fire. The tree canopy of areas mapped as Swordfern Community may, consequently, be composed of hardwoods, including bigleaf maple, rather than conifers (Backcover, Fig. 2). As the years go by, conifers that seeded in beneath such hardwood canopies will gradually overtop and replace alder and maple. Alder and maple are shorter lived than conifers, whose lifespans are measured in centuries. The thick bark of veteran Douglas-firs made this species resistant to damage by ground fires that periodically swept the Victoria Metropolitan Area during colonial and pre-European-settlement times. Some fire-scarred Douglas-fir veterans (Backcover, Fig. 4) may have seen a thousand summers go by.

In places where seepage from higher slopes adds to soil moisture during only the early part of the growing season, swordfern is less luxurient and salal is present among undergrowth plants. Veteran trees in stands of this **Swordfern - Salal Community** may be of considerable size, but heights are generally less than those reached by old giants in the Swordfern Community.

The **Swordfern - Hemlock - Amabilis Fir Community** is found at higher elevations in the Goldstream Watershed in depressions that remain wet year round. Elsewhere in the Victoria Metropolitan Area, hemlock and amabilis fir are infrequent trees. They are common in wetter climates at higher elevations on the west coast and at the northern end of Vancouver Island.

Black Cottonwood - Crabapple - Willow Community

Bottomlands with heavy-textured clay soils that flood in winter are, or were, covered by a variety of shrubs

Fig. 11. Swordfern covers much of the ground where soils are kept moist and fertile throughout the year by water seeping downslope. Large Douglas-fir and western red cedar are the common trees.

and lesser plants that have been treated as one map unit, the Black Cottonwood - Crabapple - Willow Community. Only fragments remain in an undisturbed state because such land includes some of the most fertile agricultural soil on the Saanich Peninsula. Tall black cottonwood trees in widely scattered areas indicate places where this community used to occur. Red osier dogwood *(Cornus stolonifera)*, crabapple *(Pyrus fusca)*, cascara *(Rhamnus purshiana)*, black twinberry *(Lonicera involucrata)* and willows *(Salix* spp.*)* are among the shrubs that form dense thickets in young stands. Herbaceous plants in little disturbed areas include wild lily-of-the-valley *(Maianthemum dilatatum)*, hedgenettle *(Stachys cooleyae)*, fringe-cup *(Tellima grandiflora)* and sedge *(Carex obnupta)*. Grazing has caused replacement of native herbs by introduced grasses and weeds in most of the remaining examples of this community.

Wetland Communities

The various communities growing in areas that remain wet throughout the year are not differentiated beyond designation as **Fresh-Water** or **Salt-Water Wetland Communities.**

Fresh-Water Wetland Communities occur near ponds and lakes, along streams and in boggy areas. Skunk cabbage or yellow arum *(Lysichitum americanum)* and maidenhair fern *(Athyrium filix-femina)* are common in black muck soils kept moist by moving water (Fig. 12). Salmonberry and stink currant *(Ribes bracteosum)* are typical shrubs in such places. Shade in summer is supplied by a canopy of red alder and by willows *(Salix* spp.*)*. Sedge and hardhack *(Spiraea douglasii)* communities are other wetland types adjacent to streams and ponds.

Peatmoss *(Sphagnum* spp.*)* grows in the stagnant water of bogs. Lodgepole pine is the only conifer commonly growing in such wet, acid conditions. Other woody plants common in peatbogs include swamp birch *(Betula pumila)* and pink-flowered swamp laurel *(Kalmia polifolia)*. Labrador tea *(Ledum groenlandicum)* occurs in Rithet's Bog.

Salt-Water Wetland Communities occur on the landward side of beaches in low lying areas that are periodically inundated by high tides, on flats bordering estuaries and at the edge of lagoons (Backcover, Fig. 1). Salt-water tolerant sedges (e.g. *Carex lyngbyei)*, bulrushes *(Scirpus robustus)* and glasswort *(Salicornia virginica)* are characteristic plants of various habitats that differ according to frequency and depth of inundation by salt-water. Distinctive grasses (e.g. *Hordeum brachyantherum*, *Distichlis spicata* and *Poa macrantha)*, rushes (e.g. *Juncus effusus* and *J. filiformis)*, and salt-tolerant herbs such as orache *(Atriplex patula)* and goosefoot *(Chenopodium rubrum)* are among the plants occurring in saline soils. Soils affected by salt-water with any regularity are treeless.

Fig. 12. Skunk cabbage and maidenhair fern grow in black muck soils where streams spread out. Alder and willow are common.

Land-Use Interpretations

Much of the individuality and character of a landscape is provided by its natural vegetation. Wholesale removal of native plants leaves neighborhoods without such distinctiveness. The diversity and attractiveness of native plants in the Victoria Metropolitan Area gives considerable scope for maintaining the "livability" that first attracted settlers to the vicinity of Fort Victoria.

The following suggestions for use of native plant communities are made on the basis of observations in the Capital Regional District and experience elsewhere (McHarg 1969). Because some plant communities are rare, special effort to preserve remaining examples in a near natural state may be warranted. Land-use interpretations given in this report must be considered tentative and subjective until studies are undertaken to find out how best use can be made of local plant communities in urban and nearby areas.

Garry Oak Community

The uniqueness and scarcity of oak parklands, even in a semi-natural state, recommends special effort to conserve remaining stands. Oak parklands make attractive greenbelts[11], although precautions are required if wildflowers are to be preserved. Footpaths should be designated and adhered to, and mowing delayed until leaves of wildflowers have withered. Liming and fertilizing grassy areas should be avoided. Removal of Scotch broom is desirable because it tends to shade out low-growing wildflowers. Plantings of tall-growing, exotic conifers in institutional grounds or adjacent to residences reduce the naturalness of Garry oak landscapes. Very low density or cluster development, leaving extensive areas with trees, is needed to preserve the essential appearance of oak parkland if construction of buildings is considered.

Scrub oaks among rock outcrops make scenic landscapes suitable, with precautions, for greenbelt. Unless trails are maintained, carrying capacity[12] is limited because shallow soils and the fragile vegetation of rock outcrops are easily damaged by trampling. Protection from grazing is necessary to ensure the natural abundance of wildflowers. Any soil disturbance encourages encroachment by Scotch broom to the detriment of wildflowers. Although scrub oak areas make attractive homesites, servicing costs may be high in rocky ground and reservation of the limited remaining sites for greenbelt seems recommendable.

[11]Greenbelt in this report means parks, golf courses, woodlots, institutional and other uses that provide green open space. Buildings, if present, should be unobtrusive so that the open space character of landscapes designated as greenbelt is maintained.

[12]Carrying capacity is the amount of use (traffic) that an area may receive without being degraded into less attractive or useful condition. Carrying capacity in this report refers to use for extensive recreation.

Arbutus - Douglas-fir Community

While there is no immediate danger of losing all examples of this community, the number of undisturbed stands in natural condition is not unlimited. It is an attractive type for residential use, forming pleasing settings for houses. Development costs may be high where ground is rocky. Windfirmness after partial clearing usually is not a problem, except for trees growing in very shallow soils.

Landscapes of this type make desirable greenbelt. They provide pleasant opportunities for walking and hiking. Carrying capacity, however, is relatively low without designated footpaths because wildflowers and moss on rocks are easily damaged by trampling. Sufficient trees should be left in institutional grounds if the overall character of the natural community is to be maintained.

Salal - Oregon Grape Community

Being the most common plant community in the Victoria Metropolitan Area, without rare plants, use of this type for buildings seems appropriate. Soils of the Salal - Oregon Grape Community generally offer few physical constraints to building contruction. In its natural condition, the vegetation of this type makes less attractive settings for homesites than the vegetation of preceding communities. Where trees are tall and in dense stands, total clearing may be necessary because remaining trees may not be windfirm following partial opening up for small lot development.

Areas with large, mature trees make pleasing backgrounds for hiking and horseback riding. Trails, however, are essential to provide access through dense salal. With sufficient trails, carrying capacity is high because damage to shrubs is unlikely. The resilience of this type to heavy traffic makes it a useful buffer to reduce intensity of recreational use on more fragile areas. Although presently a common type, retention of a selection of stands with fine, old-growth trees would be an asset to the Victoria Metropolitan Area.

Under well-planned, multiple-use forest management, woodlots could produce periodic revenue and serve as windbreaks, sound-barriers and visual screening. Forest productivities for Douglas-fir range from 2 to 6 m^3/ha/yr (30 to 90 cu ft/ac/yr). Although low by coastal British Columbia standards, such productivity is average for commercial stands in many other parts of Canada. Woodlots and screens should be properly oriented and sufficiently large to be windfirm. Buffer strips of windfirm trees at the margin of woodlots may be desirable in some instances.

Swordfern Communities

Although once common on Vancouver Island and the Lower Mainland of British Columbia, logging, farm clearing and urban development have greatly reduced the acreage of virgin stands of Swordfern Communities. Any natural stands with mature trees still remaining, consequently, merit consideration for preservation because spectacular-sized trees and lush undergrowth make attractive greenbelt scenery. Swordfern Communities without dense shrub layers are easier to walk through than Salal Types. Carrying capacity for extensive recreational use without disturbance to sensitive groundcover plants is related to the provision of trails. Management of young stands as woodlots could be profitable because tree growth in Swordfern Communities is rapid. Forest productivities range from 5 to over 9 m^3/ha/yr (70 to 130 cu ft/ac/yr), competing with agricultural potential. Opportunity to use natural vegetation as a setting for residential development may be limited by the lack of windfirmness of large trees in moist sites. Clumps of swordfern may persist as attractive ground cover in shaded parts of gardens.

Black Cottonwood - Crabapple - Willow Community

Stands of this community are unsuitable for residential development because of seasonal flooding and high agricultural potential. In their original form, generally dense undergrowth provides cover for wildlife. The remaining examples of this community add to the diversity and interest of landscapes, and hence merit consideration for preservation. When cleared for agriculture, these sites may form temporary winter ponds used by waterfowl. During occasional winters, ice is thick enough for skating.

Wetland Communities

Wet and unstable soils make wetlands unsuitable for residential development. Nature trails need raised or floating walkways so that viewing the interesting diversity of plants characteristic of wetlands is not restricted when water is high. Only two of the seven large peat bogs formerly present on the Saanich Peninsula remain. They merit consideration for preservation because of the rare plants they contain and because of their scientific interest. Bogs and marshes may be valuable moderators of stream flow following heavy storms. They add to the diversity of landscapes and are suitable inclusions in greenbelts. Salt-water wetlands may be important feeding grounds for migrating waterfowl, and estuaries are significant for the maintenance of fisheries.

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1. Salt-water Wetland Community bordered by veteran Douglas fir, Witty's Lagoon.
2. Grove of red alder in Swordfern Community, Goldstream Park.
3. Arbutus (Madrona).
4. Veteran Douglas fir in Swordfern Community.
5. Camas.
6. Skunk Cabbage (Yellow Arum).
7. Sun-baked, hilltop Arbutus - Lodgepole Pine - Douglas Fir Community, Highland District.