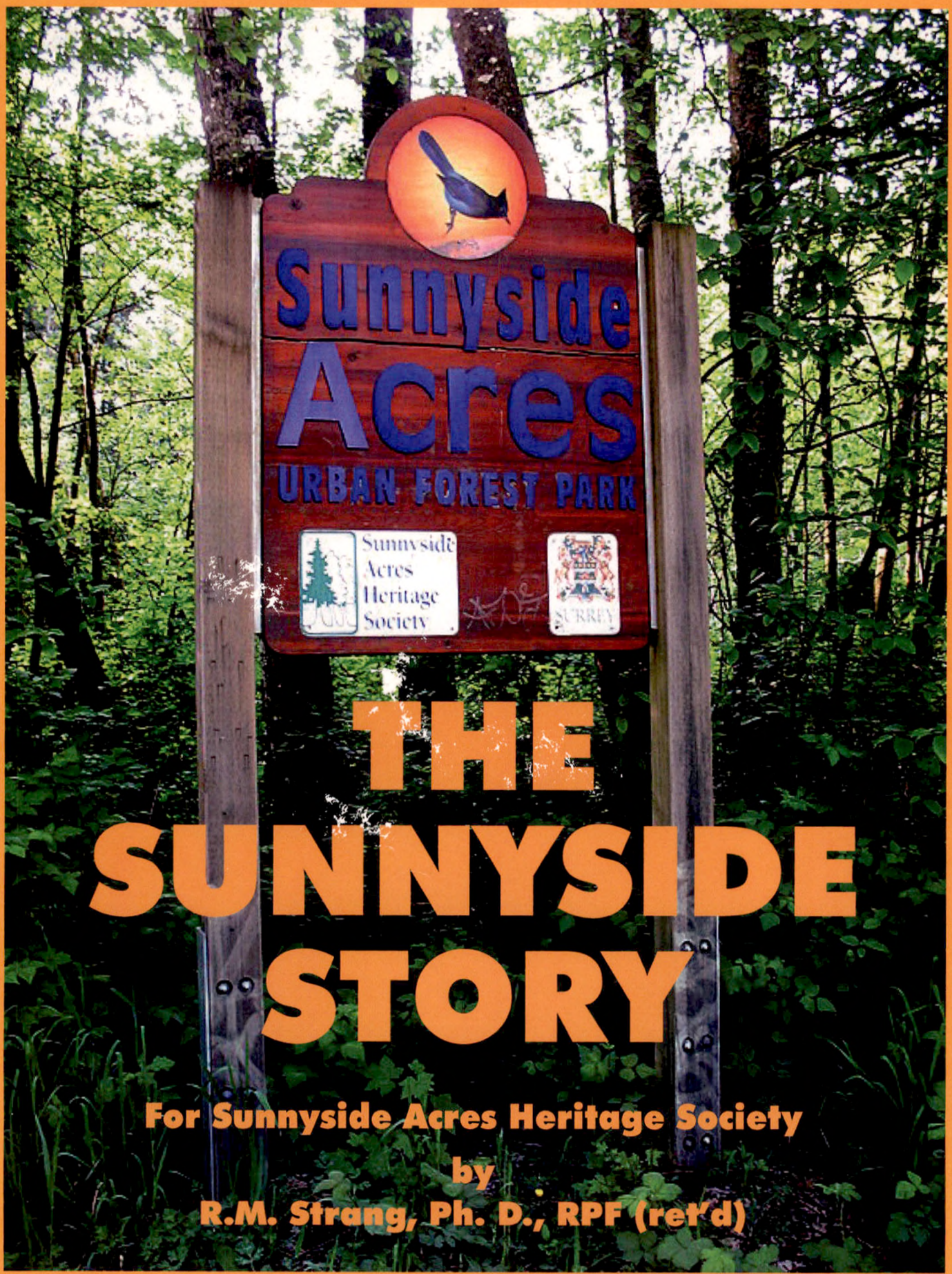

THE SUNNYSIDE STORY

For Sunnyside Acres Heritage Society

by

R.M. Strang, Ph. D., RPF (ret'd)

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To Paula & Roger - fellow foresters and good friend

Roy

ACKNOWLEDGEMENTS

From The Author

My thanks go to my Sunnyside colleagues, especially Dr. Diana Wegner for much constructive editorial input and Roger Phillips for most helpful comments and suggestions, and to Frank Rader, and my wife, Alison, for computer guidance.

From The Society

The Sunnyside Acres Heritage Society appreciates the support it has enjoyed from the City of Surrey. Since it was constituted in 1988, the Society has benefited from the happiest of relations with staff in the Parks, Recreation and Culture Department (PRCD) of the City of Surrey, which is the legal owner of the Forest. Managers in the Parks Division have always been most supportive and helpful; field staff unfailingly efficient, conscientious and hard-working. The Society looks forward to continuing this productive liaison.

The society is very grateful for the financial contributions which made it possible to publish a limited number of copies of this booklet. We thank Gordon Hogg (M.L.A.), the City of Surrey's Grants Program and two anonomous donors most sincerely. The booklet is also available electronically at the Society's web site <www.sunnysideacres.org>

This URL now belongs to a Mobile Home Park in Illinois

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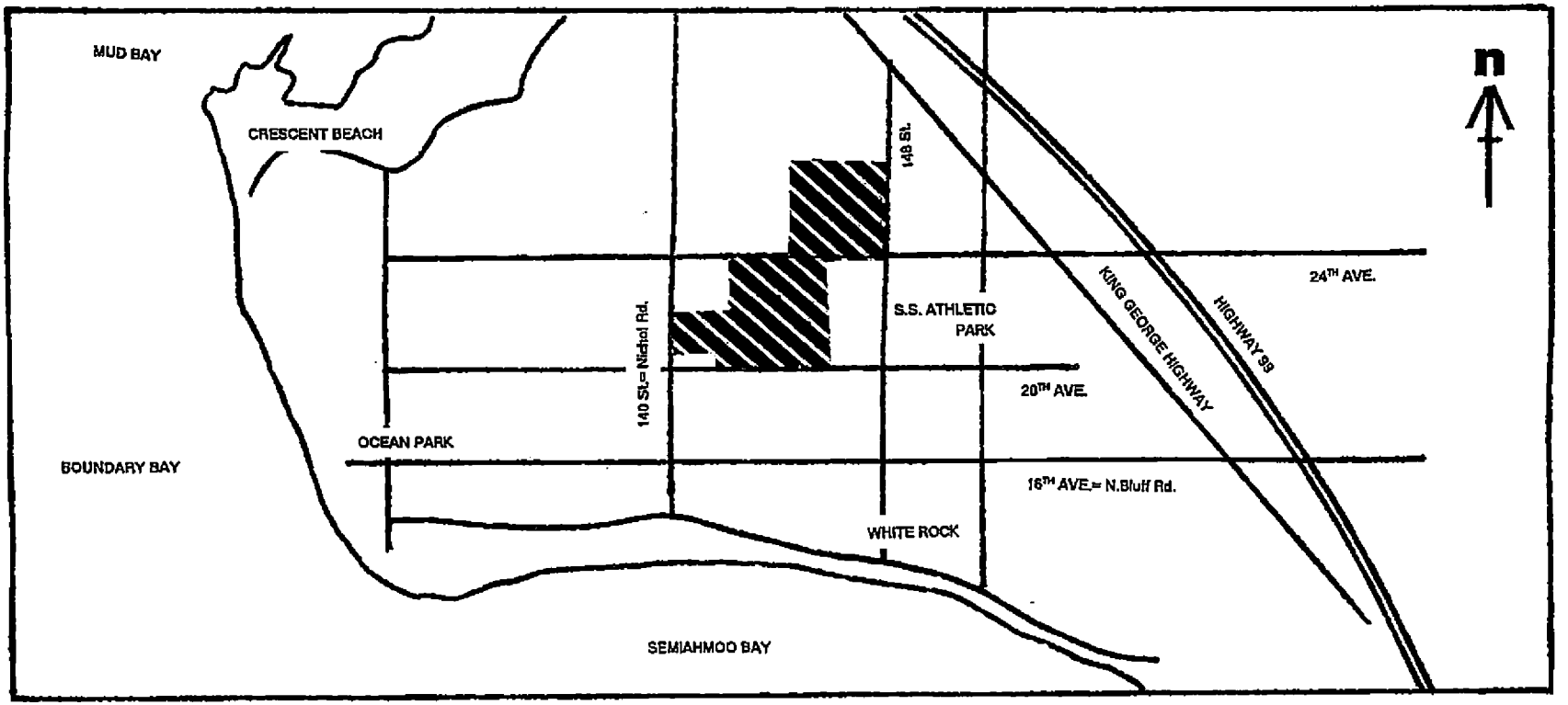
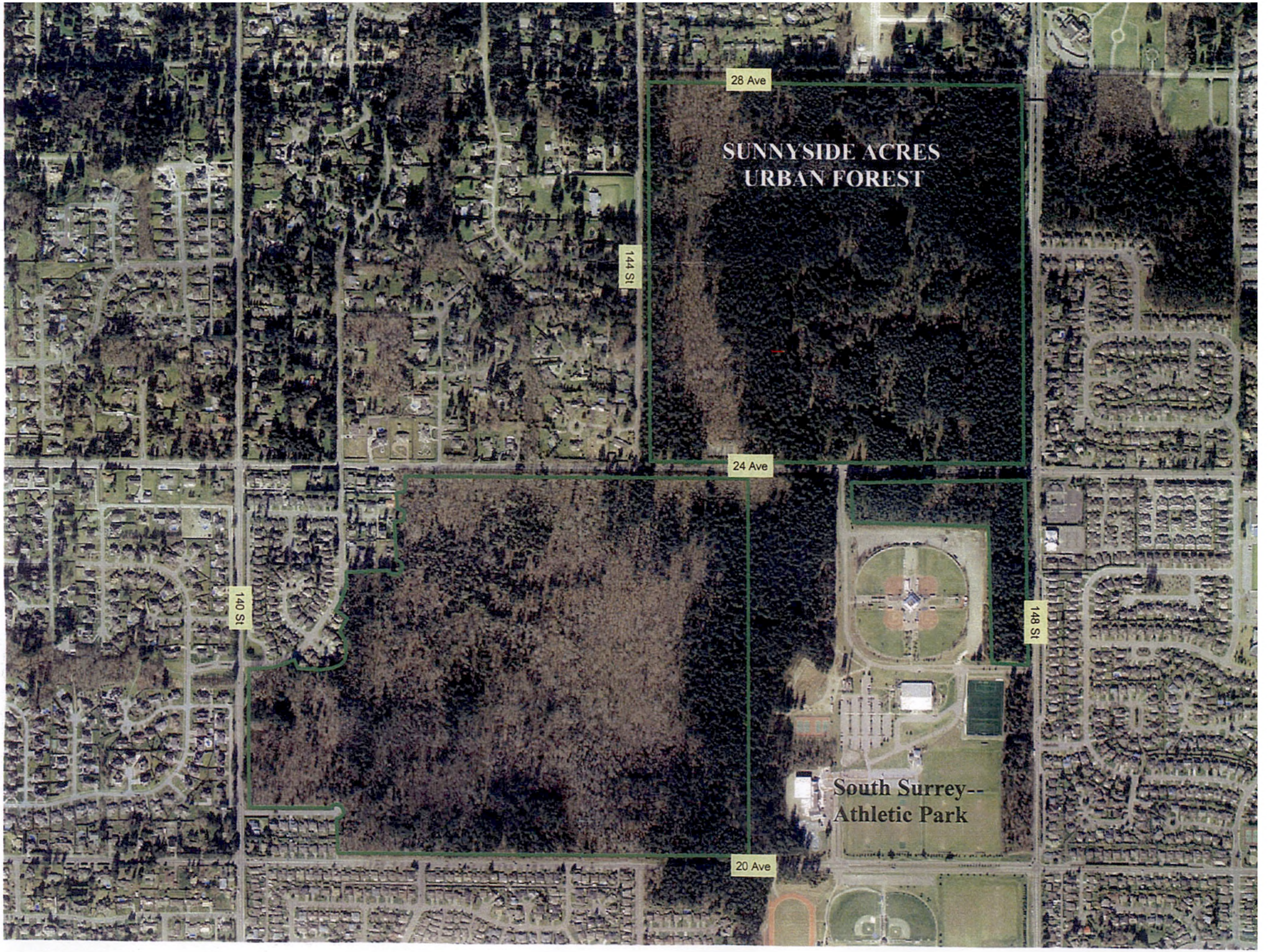
Location of SUNNYSIDE ACRES URBAN FOREST



NB: The length of the forest edges is 5 km


28 Ave
SUNNYSIDE ACRES
URBAN FOREST
144 St
24 Ave
140 St
148 St
South Surrey--
Athletic Park
20 Ave

HISTORY AND DESCRIPTION OF SUNNYSIDE ACRES URBAN FOREST

INTRODUCTION

In 1988, in response to strongly expressed community wishes, the Council of the City of Surrey dedicated Sunnyside Acres as an Urban Forest (By-law 9800 pursuant to Section 533 of the Municipal Act, Chapter 290, R.S.B.C. 1979) (Appendix 1).

The Policy Manual of the Parks, Recreation and Culture Commission sets out the purpose of an Urban Forest as follows:

> *Urban Forest Parks shall be set aside in perpetuity for their intrinsic and heritage values to provide long-term non-consumptive enjoyment and benefits to the general public.*

The Forest is also a significant wildlife refuge in an increasingly urbanized setting.

> *Intrinsic values include, but are not limited, to: air quality, community values, education, forest biophysics, recreation, and spiritual and human experiences.*

The following account explains why and how the Urban Forest came into being and gives a lay description of its biology and make-up. Further details are presented in the appendices for those wanting more specific or technical information.

HISTORY OF THE FOREST

From Old Growth to Secondary Growth

One hundred and fifty years ago or more, the low ridge between Mud Bay and Semiahmoo Bay was covered by mature woodland or old-growth forest (North et al., 1979). The section of forest that eventually became Sunnyside Acres Urban Forest lies on the Semiahmoo Peninsula in South Surrey (see maps 1 and 2). The 19th century forest probably comprised ancient hemlock, western red cedar and Douglas-fir, with alder in low-lying seepage areas. There would have been an irregular understorey of shrubs, ferns and ground vegetation with an abundance of bird and animal life but no Himalayan blackberry, holly or ivy which are all recent introductions. The Semiahmoo Trail or wagon road passed through the north-east corner of the Forest facilitating travel between Blaine and New Westminster for early settlers. It has now been dedicated as a Heritage Trail (Dowle, 2009).

The forest of the Sunnyside area was logged for approximately 30 years, from the 1880s to about 1920. Initially, oxen hauled felled logs on three major skid roads to the Nicomekl River where there were three lumber mills and a shingle mill. Horses replaced oxen around 1890 until they in turn were supplanted by donkey engines and light rail lines. Campbell River Mills laid out a railway into the Acres area from the east in 1887 and another from Blackie Spit via Crescent Beach and 20th Avenue to the area near today's Dogwood Park. There was also the Royal City Logging Ditch, one-quarter mile west of the Coast Meridian Road, which used a system of floodgates and retention ponds to float logs down to the Nicomekl until 1891. Written accounts refer mostly to Douglas-fir but cedar must also have been harvested to feed local sawmills and for shakes and shingles; residual cedar stumps were still visible 100 years later with their characteristic notches into which fallers inserted their springboards.

Photo 1. Old cedar stump showing faller's notch and charring.

Natural regeneration, most probably of alder and then Douglas-fir, would have followed the years of logging and patch burning. Local anecdotal evidence suggests the last fire burned in 1929. Some Douglas-firs survived the fire thanks to their thick bark, which serves as an insulator.

There is no record of organised activities in the young forest as it grew back though locals probably hunted there and alder was taken for firewood, some being shipped to Vancouver. Water is said to have been drawn from wells in the north-eastern portion. Of the wildlife in the Forest, locals reported sightings of cougar as late as the nineteen forties (Strachan, 1995). In the sixties and seventies trails were developed by local horse riders and eventually became the basis for today's pathways.

Saving and Protecting the Urban Forest

Save Our Sunnyside Society

For years the City of Surrey classified the forest as "undesignated" pending a decision on development. Much of the area had reverted to the City during the depression years following default on taxes. Suggestions for use included an airstrip, but the advent of jet-powered aircraft with their requirement for long runways contributed to the decision not to proceed. Other suggestions

included underground gas or water storage, golf courses and housing, though none of these ever materialised. The White Rock/South Surrey Naturalists lobbied for preservation in the seventies but without tangible results. Probably the first formal proposal came in 1973 from the White Rock Chamber of Commerce who recommended the Acres be developed as a recreational area. No action resulted and that proposal was followed by another to make the Acres into a demonstration forest with the products and proceeds accruing to the City. This was politely received by the mayor, Don Ross, but again no action resulted.

In 1986 Mayor Don Ross and Council convened a public meeting to discuss the area's future. A number of locals, quite independently of one another, felt that the forest should be preserved intact as it was the only remaining sizable tract of natural second-growth forest in the lower mainland. As a result of this meeting, these locals formed the Save Our Sunnyside Society. Led by the late Wally Ross, the Society (SOS) lobbied for preservation of the forest. Wally was joined by Gitta Becker, Roy Strang, the late Chris George, the late Anne Green, the late Sharon Beech and the late Joe Nagel to form the nucleus of SOS. Over the years, many others have participated with intermittent help.

Formally constituted as a Society, SOS set out on a vigorous campaign to generate public support (membership eventually exceeded 2000) and to raise needed funds. Letters were written to the local Peace Arch News which published an explanation of the values at risk (Appendix 2).

SOS developed a Management Plan listing trees, shrubs and birds known to occur in the Forest, and gave a detailed presentation before City Council. Knowledgeable Society volunteers also led guided walks through the Forest.

Photo 2. Guided walk in the Forest.

In addition, the society printed an illustrated map and descriptive brochure, prepared a photo display, and organized garbage clean-up days (Appendix 3).

Photo 3. Garbage clean-up by SOS members.

J. Nagel, E. Mann, J. Bekker, G. Bekker, J. Morassutti, E. Tuomaala

With help from SOS members, a student mapped the forest vegetation and produced a forest cover type map. All this took time, effort and money. From casinos, garage sales and memberships SOS raised and spent just over $39,000 to finance its campaign and to fund the several activities. The local newspaper was supportive throughout.

Not suprisingly, there was strong opposition from would-be developers, their allies, and a vocal golfing lobby. SOS members were careful to be factual and accurate in their presentations and statements, never using confrontational tactics or hysterical hyperbole. Indeed, one Council opponent who openly favoured development conceded that "these people know what they're talking about." One argument in favour of development and against preservation was that revenues were being lost from this "waste land". The effective counter was to contrast servicing costs and taxes in urban areas unfavourably against those levied in rural areas (Appendix 2).

The campaign climaxed in a referendum attached to the 1988 municipal election. Voters were asked to choose between development and preservation. A voter turn-out of more than 40% gave an overwhelming 86% vote for preservation – a very gratifying result for SOS members. It must be conceded that the timing of the vote worked in their favour – the rapid pace

of development in South Surrey at the time was disturbing to many residents and the referendum provided an opportunity to send a message to Council. It was much too significant to be ignored and Council proceeded to formal dedication in December 1988. Though it is technically possible to reverse a dedication, such a step is highly unlikely now and would probably be politically very risky.

As a dedicated Urban Forest, it was set aside for quiet enjoyment and appreciation by the community. The over-riding management principle now is minimal disturbance or interference with natural change, or succession compatible with public safety.

Ongoing Stewardship

Having succeeded in its objective, SOS disbanded and was reborn as the Sunnyside Acres Heritage Society (SAHS). The reconstituted group continued fund-raising, offering guided walks in the Forest, organizing garbage clean-ups, and publicizing the Acres. Local scouts, cubs and some school groups help with garbage clean-up and occasional tree planting. In 1993 the Society was happy to share with the City the costs of creating a parking lot, erecting a small kiosk where a map and photographs are displayed, and surfacing major trails to improve footing and to minimise erosion (Appendix 3)

Photo 4. Information kiosk and stem analysis display.

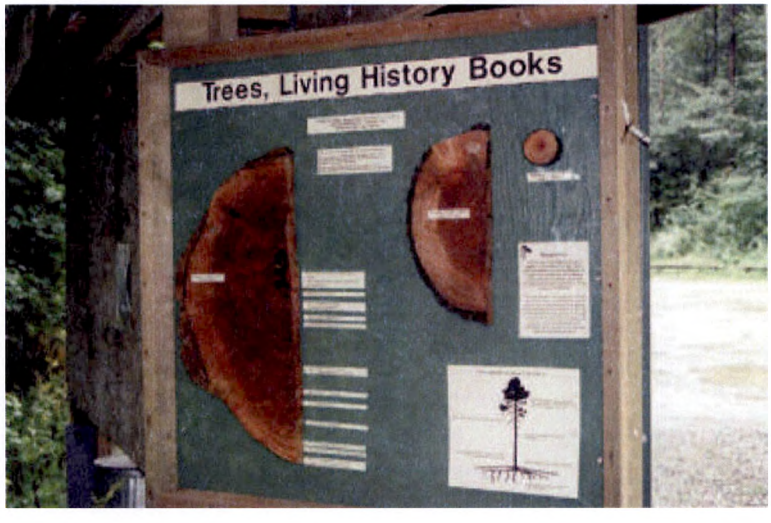


Photo 5. Newly surfaced trail.

After the SOS campaign, another significant factor came to light: the Forest is the last stand over 100 years old of the native forest which once covered much of the Lower Mainland. (Technically, it is in the transition zone between two major 'biogeoclimatic regions', the Coastal Douglas-fir [CDF] and the Coastal Western Hemlock [CWH]). The only other example, in Lighthouse Park in West Vancouver, is much younger (Appendix 4).

Forestry students from B.C. Institute of Technology carried out a stem analysis on one mature Douglas-fir that showed an age of 97 years at stump height and a uniform growth rate indicating that growing conditions had not varied much during the tree's life. We can assume that this tree became

established soon after logging and survived subsequent fires. (The data and representative stem sections are on display in the information kiosk.)

The Root-Rot Dilemma

An indigenous fungus, laminated root rot (*Phellinus sulphurascens*), is killing Douglas-fir and hemlock in parts of the Forest. To ascertain the rate of spread of the fungus and to determine which shrub species colonize the area after the conifer overstorey has died off, senior biology students from nearby Semiahmoo Secondary School teamed with the Society in a long-term survey study—and, incidentally, were introduced to simple field ecology methods. This educational project, however, was overtaken by events. As the root rot spread and increasing numbers of Douglas-fir and hemlock died, they were replaced by a dense growth of shrubs. It became apparent that a management decision and action were imperative. Quite apart from other considerations, the increasing number of dead and dying trees close to roads and trails posed an unacceptable hazard.

Photo 6. Douglas-fir succumbing to laminated root-rot.

A lengthy debate ensured, with strongly-held views and opinions from both management and public participants. A consultant's report clarified the issue, set out five options and identified a preference to fell and girdle infected trees in an effort to create a quarantine belt to contain the fungus. While a majority agreed with the consultant the decision was not at all unanimous--the local community was divided with many but, by no means all, accepting the consultant's recommendation. After a searching discussion, the Parks, Recreation and Culture Commission, PRCC and Parks Department staff endorsed the recommendation to create a buffer strip by felling or girdling infected trees. Callus development on cut stumps draws its energy from contact with roots of adjacent trees, thus confirming that root grafting takes place and facilitates spread of the fungus.

Photo 7. Callus formation on cut stump, 1999 and 2008.

In the late winters of 2003 and 2004, the Parks Division organized and supervised an operation that involved the clearing of ten-metre-wide containment strips around the diseased areas and replanting with deciduous species which do not support the fungus. (In clearing the major containment belt in 2004, 693.2 cubic metres of logs were extracted, valued at $93.82/m3.) Natural regeneration of western red cedar could be sustained in the containment strip since evidence is accumulating that it too is resistant to the fungus (Lucas, 2008). Unfortunately, there is no guarantee that this treatment will be successful in containing the fungus – it was applied as the "least bad option," and is, in effect, a long-term experiment. Effects continue to be monitored.

Because laminated root rot is endemic up and down the west coast from Oregon to B.C.'s mid-coast, any attempt to contain it is at odds with the basic management principle of leaving the Forest to develop naturally. On the other hand, it must also be recognised that earlier removal of alder and birch for firewood (some of which was shipped to Vancouver) had hastened the re-establishment of Douglas-fir. It began to grow before root systems of the previous conifer stand had decayed and reduced the prevalence of the fungus. The eventual decision to clear containment belts in the hope of preventing the fungus from spreading was taken because of the real risk that all of the Douglas-fir component would succumb in a relatively short time. Were the fungus to spread unchecked, the Forest would become a long-lasting brushfield (Appendix 5). To restore a forest cover, since 2006 more than 400 Society members and volunteers supported by Parks staff have planted 3000 native deciduous trees and shrubs in the containment or quarantine belt. It is evident that, once a tree over-storey is removed, a very vigorous stand of shrubs takes over – huckleberries, salal and sword fern predominate. This shrub layer is so dense both above and below ground that it is very difficult for tree seedlings to become established against such competition.

The philosophical debate generated by the root rot dilemma is mirrored in the problem of dealing with the alien holly and English ivy, both of which are now naturalized in this region. They are introduced into the Forest almost certainly from adjacent gardens where birds ingest the seeds and then defecate amongst the trees, a completely natural process. Holly is benign but ivy is damaging and so management is faced with two conundrums: should naturalized, invasive species be accepted as components of the Forest, and, if not, how can they be eradicated or at least controlled (Appendix 6).

The Sunnyside Urban Forest Advisory Committee

In 1997 the City created a new advisory body, Sunnyside Acres Urban Forest Advisory Committee, which reports to the PRCC. The 11-member committee has representation from:

The Association of B.C. Forestry Professionals or a profession with comparable or equivalent expertise (such as a Registered Professional Biologist)
A recognized bicycle association (such as SORCE)
PRCC (non-voting)
SAHS members (3)
Surrey School District #36
Western Canada Wilderness Committee
White Rock/South Surrey Naturalists
The youth community
Member-at-Large

The Advisory Committee has a much wider representation than the Society but has a complementary role. With three of the eleven seats on this Committee, the Society negotiates its priorities with other groups which may have different perspectives and bring other concerns that can also bear on management decisions.

Some of these differing views became apparent in a controversy over mountain bike use in the Forest, which was compounded by the lack of a definition of the boundary between the Urban Forest and the Mountain Bike

Park. Now that the Bike Park has been formally included with the dedicated area of the Forest, the Advisory Committee's role is to ensure that mountain bike riding is confined to the approved area. Unregulated use of wetter trails in the Forest by off-track or single-track cyclists has resulted in significant soil degradation, most notably around the headwaters of Elgin Creek.

Photo 8. Degradation of an unsanctioned trail by overuse in wet conditions (Anon.).

The Society hopes that, with education, supervision and encouragement of activity in the approved area, this problem will be minimised if not completely resolved. Indeed, the activity and advocacy of SORCE have gone a long way to achieving this desirable end.

Society Projects and Events

With the creation of the Advisory Committee, the Society has assumed a reduced, watchdog function but it has remained actively engaged in stewarding the Forest and has initiated a number of projects.

A particularly exciting project has been the creation of a barrier-free trail accessible to any in wheel chairs or whose sight is impaired. The project was undertaken jointly by the City and the Society, in consultation with a local firm of landscape architects and designers (Phillips, Winori and Long Inc.). and partially funded by the TD Bank's Friends of the Environment Foundation. The trail was named for the late Wally Ross and opened by

Mayor Doug MacCallum in summer 1997. It enables the physically-challenged to experience and enjoy the forest along an easy, obstacle-free 1km circuit, starting and ending at the parking lot.

Photo 9. Obstacle-free trail named for Wally Ross.

Another important initiative has been a Fire Management Plan, which is now in place. It was drafted by two Society members and, with input from the City's Fire Department, refined by Parks Division staff. It stipulates manual ground fire suppression, so as to preclude incursion of heavy earth-moving vehicles which can cause major soil disturbance (Appendix 7). Aerial attack will only be deployed if manual efforts at suppression are insufficient.

In 1998 the Society held an Open House to celebrate the tenth anniversary of the Forest's dedication (Appendix 8). The Mayor, Doug McCallum, and the chairman of the PRCC, Shaun Wilson, congratulated the Society; Jim Green, widower of the late Anne Green, cut a celebratory cake. Anne had been a zealous worker for the Society until illness prevented her from continuing.

Photo 10. Jim Green cutting the 10th anniversary cake (Anon.).

In 1999 the Society and the Parks Department assisted the BC and Yukon Heart and Stroke Foundation in its campaign to encourage walking for health. A series of direction and distance markers have been installed along the main trails with funding assistance from the Surrey Foundation.

Photo 11. Heart and Stroke Foundation trail marker.

In January, 2003, the Society had the pleasure of conducting Her Honour, the Lieutenant-Governor, Iona Campangolo, at her request, on a tour of the Forest.

Photo 12. Visit to the Forest of Her Honour, the Lieutenant-Governor of BC. (J. Meagher)

A year later, January 2004, the Society installed a memorial bench recognizing the contributions of Chris George and Joe Nagel, both deceased. The name of the late Sharon Beech will also be added.

In 2005 the Society sponsored a photography competition with support from local businesses. One hundred and two photographs were submitted by 29 exhibitors and the best were used in a 2006 Sunnyside Acres calendar. It proved to be very successful, both artistically and financially, and was recognised with a Heritage Award by Surrey's Heritage Commission. That year the Society also organized a major clean-up effort by community volunteers. With sponsorship from Starbucks, it was successful in removing truck loads of garbage and in raising significant funds for the Society.

In 2006 Surrey's Parks Division used input from Society members to develop a self-guiding tour of the Forest. The brochure describes eleven interesting or unusual ecological features each identified by a numbered marker. Also in 2006 the Society volunteers, with support from Starbucks again, removed large amounts of invasive weeds and replanted the sites with native plants.

In May of 2008, the Society celebrated the 20th anniversary of its successful campaign to save the Forest, which culminated in its dedication as an Urban Forest. At the event Roy Strang was recognized for his stewardship and

advocacy for Sunnyside and presented with a plaque that was then affixed to a specially dedicated bench in the Acres. The plaque reads: "Honouring Roy Strang, . . . A true friend of the Forest." He was also made a life member of the Sunnyside Acres Heritage Society (Appendix 9).

Photo 13. Twentieth anniversary celebratio n and presentation to Roy Strang by Owen Croy and Ron Meadley (D. Wegner).

Sharing the Vision with Surrey's Parks Division

Although the make-up of the Forest will change with time in the natural process of plant succession, it will remain a forest. Surrey's Parks Division and the Society work together as stewards of the Forest developing and promoting a vision of the Forest that conforms to the Policy Manual's stipulation that it is "set aside in perpetuity." The two agencies enjoy a productive and harmonious relationship.

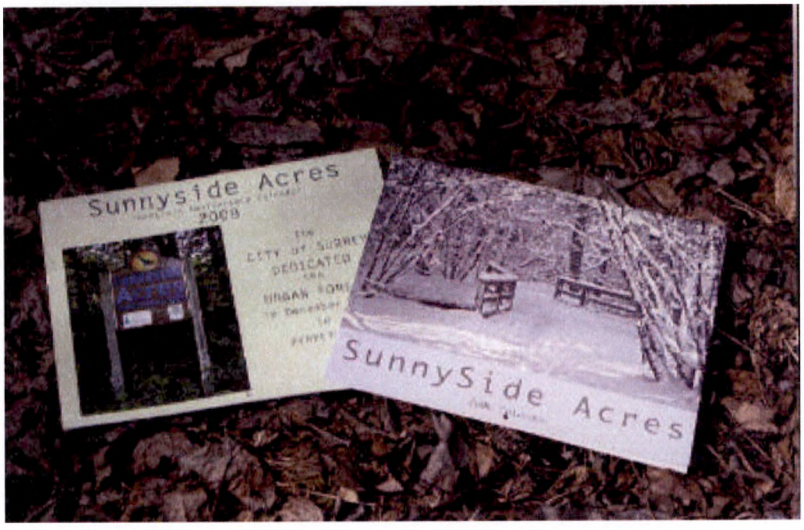
The Parks Division manages trails and trees and runs student programs that help steward Sunnyside Acres. The Division is responsible for trail maintenance and for felling any trees which threaten to fall near trails, so-called "hazard trees." Since 2001, the City has utilized summer students in a Surrey Natural Areas Program (SNAP), initially four, now twelve each summer. There are Habitat Restoration, Environmental Education and Environmental Outreach teams which help with closures of unauthorized trails and removal of invasive alien plants. A newer summer program, EcoRangers, has proved to be a successful addition; students and others patrol the Forest giving advice and guidance to visitors, ensuring they keep to authorized trails, leash their dogs, and remain alert to fire danger during spells of hot weather.

These programs have been very successful; they provide valuable environmental work experience to students and deploy an extra, enthusiastic workforce.

Awards

In addition to the Heritage Award for the Sunnyside calendar, the Society was honoured in 1988 with an Environmental Achievement Award by the City of Surrey. It also received the Friends of Heritage 1999 Award from the City's Heritage Advisory Committee.

Photo 14. Sunnyside calendars, 2006 and 2008 (A. Lockley).



Challenges to the Forest

Although the status of the Forest seems secure, it cannot be said that there is no longer any threat. Root-rot, fire, and the actions of some visitors are ongoing issues. Development of root rot infection in the Douglas-fir component remains uncertain. While steps have been taken to contain the root rot fungus, success is not guaranteed. Although it is hoped containment will be successful, the possibility remains that the Douglas-fir component of the Forest will, within a few years, be converted to a persistent brushfield which will have very different characteristics and afford a very different habitat. In addition, Douglas-fir beetle has recently been detected in a few trees weakened by root-rot. More recently, detailed inventory has revealed a small tract in the Forest occupied mostly by black cottonwood trees that is officially 'red-listed'; this listing means that the stand is extremely rare and endangered so that it should be specially monitored and protected.

Wildfire is an ever-present possibility, aggravated by the thoughtlessness of those few visitors who smoke and discard cigarette butts and matches during weeks of hot, dry weather. The worse threat, summer bonfires, is relatively

unlikely although five occurrences have been noted since the Forest was dedicated.

Another threat is posed by a few walkers and mountain bike riders who persist in creating new paths where none are wanted, instead of keeping to authorized trails. This is potentially most damaging in the environmentally-sensitive south-western section where Elgin Creek rises. The Society is using education and community outreach to prevent the Forest from becoming a network of criss-crossing trails and disturbed habitat. (This problem is by no means unique to Sunnyside.)

Perhaps the most insidious threat is small, apparently insignificant encroachment along the margins. In one instance, BC Hydro staff, clearing the right-of-way, unwittingly extended their work over the boundary and into the Forest just at bird nesting time. Other encroachments develop when residents living beside the Forest use it as a dumping ground for their garden waste. Each time they go a step or two deeper into the Forest and introduce invasive exotic plants such as lamium and Himalayan blackberry. These damaging additions to the Forest's plant community are, unfortunately, now being paralleled in the faunal composition. Misguided residents have been seen catching and releasing grey squirrels into the Forest where they are a danger to the smaller, native Douglas squirrel. This practice is as unwise as it is illegal.

Alone, these encroachments seem inconsequential; collectively, they threaten the Forest's integrity. If, as is likely at some time in the future, 24th Avenue is widened to four lanes, it will be essential to make adequate provision for animal and pedestrian crossing to avoid splitting the Forest into two smaller, disassociated segments.

As the population on the Semiahmoo Peninsula has increased it has exerted increasing pressure on the Forest environment and its values as a social and wildlife refuge. The best safeguard is for the community at large to recognize and value the unique and irreplaceable qualities of 'their' Forest, to support its preservation and to insist that it be kept as a natural forest-in-being in perpetuity. The Society believes its active stewardship and vigilance, in collaboration with the Parks Division's support, will continue to be an educational force and motivate the community to respect and protect the Forest's intrinsic and life-supporting values.

BIOLOGICAL DESCRIPTION OF THE FOREST

Climate

The Forest has a relatively mild climate. Long-term mean annual temperatures average about 10° C while winter means are near or slightly above freezing. Temperature extremes are not severe, with the highest on record at 36° C and the lowest at -15° C. On average there are more than 200 frost-free days annually and over 1,900 hours of sunshine.

Precipitation falls mostly as rain with a distinct winter peak. Between1938 and 2004 there were 15 summers when no rain fell for 30 days or more, the longest dry period being 58 days in1951. In 1958 there was a 62 day spell with only a small amount of rain (7.0mm) on one day. These data indicate that, on average, one summer in four will have 30 or more consecutive days without measurable rainfall; dry spells of 3 weeks or more are quite common (Appendix 10).This is obviously relevant to concerns for fire protection.

Winds blow mostly from the south-west where the Forest is exposed. Breakage and up-rooting of trees is clear evidence of strong winter winds, another management factor. (No area-specific wind speed data are available; storms with wind speeds exceeding 100 km/hr have been recorded from time to time.)

Topography and Soil

The Forest occupies a low ridge 120m above sea level in the centre of the Semiahmoo Peninsula, with gentle slopes to the north and west. There are no steep slopes to inhibit access or management.

Four similar soil types have been mapped: Bose, Boosey, Sunshine, and Heron (Appendix 11). None is good agricultural soil and all are underlain by glacial till so compacted as to be virtually impervious and impenetrable. Only the best-drained of the four types, the smallest in extent, is rated as "good" for recreational use and the other three are rated "poor" because of inadequate drainage. All are good forest soils with potential productivity more than 10 cubic metres/hectare/year (>10m/ha/a), in contrast to the provincial average which is <3m/ha/a. (Luttmerding, 1980; Peepre,1987).

Photo 15. Soil profile showing compacted glacial pan.

Disturbed 'A' & 'B' horizon

'C' horizon, compacted glacial till

The headwaters of Elgin and Anderson Creeks rise in the deciduous forest south of 24th Avenue. Elgin Creek supports a coho salmon population in its lowest reaches above the confluence with the Nicomekl River. Low flows during summer are augmented by drawing water from the confined aquifer which lies at depth below the Forest.

Photo 16. Elgin Creek, a salmon-bearing stream (A. Lockley, A. Strang).

The smaller Anderson Creek also flows northwards into a storm drain system on 29th Avenue and then into the Nicomekl River upstream of Elgin Creek.

The Forest is characterised by an irregular mound-and-pit micro-relief. This develops when shallow-rooted trees are up-rooted by wind and drag up earth attached to the root mat, leaving a cold, wet hollow which is unfavourable to plant growth. This happens most often when the soil is saturated in late winter or early spring (Strang, 2001).

Photo 17. Upturned root mats showing the absence of tap roots (A. Lockley).

An interesting feature of the Forest is the very large grano-diorite glacial erratic boulder lying near the northern entrance off 148 Street.

Photo 18. A glacial erratic grano-diorite boulder.

Vegetation and Ecology

The vegetation is a recovering second-growth stand which has developed after logging at the turn of the nineteenth and twentieth centuries, with subsequent clearing and intermittent burning. Fire scars on one old Douglas-fir support these dates. Alder and birch were felled for firewood in the middle of the 20th century, some of it being shipped to Vancouver.

There are three predominant stand types, each reflecting soil type and past treatment. These are a deciduous type, a Douglas-fir type, and an intermediate mixed species type. The deciduous type is the most extensive, occupying two-thirds of the area. It is found on the wetter sites, mostly in the west and south-west portions. Red alder is the most common species with some birch, black cottonwood and big-leaf maple. The light canopy makes possible a vigorous understorey of elderberry, huckleberries, Oregon grape, sword fern and vine maple. Clumps of western Trillium are widespread while rattlesnake plantain occurs sparsely, somewhat outside its usual range. Indian pipe is rare.

Photo 19. Typical deciduous (mostly alder) stand.

The Douglas-fir type is irregular with a scattering of branchy veterans, which survived the fires, amongst quite dense post-fire stands. There is a vigorous shrub and fern understorey (Appendix 12). This is a seral or intermediate development stage towards the eventual climax. One authority (Klinka, 2001) states that the Forest is within the Coastal Douglas-fir moist maritime biogeoclimatic sub-zone (CDFmm). Another opinion is that it lies in the very dry Coastal Western Hemlock sub-zone (CWHxm) (Appendix 4).

Photo 20. Douglas-fir stand.

The widespread occurrence of cedar and hemlock regeneration and the absence of Douglas-fir regeneration support this latter view. It is perhaps safest to put it in a transition zone between the two having some characteristics of each. Climate data lend support to this: total precipitation is in the upper limit of the CDF range; summer rainfall averages near the bottom of the CWH bracket (Meidinger, et al., 2005).

Photo 21. Cedar and hemlock regeneration under Douglas-fir canopy.

The mixed species type is intermediate between the deciduous and Douglas-fir types and has some characteristics of each in varying proportions.

Fauna

The deciduous and mixed species types are prime wildlife habitat providing forage, thermal cover and concealment. The one small deer herd uses them almost exclusively, but coyotes, raccoons and Douglas squirrels range widely. Seventy-nine bird species have been identified and listed (Appendix 13).

Management

The basic management principle for the Forest is to leave it to nature, that is, to seek minimum interference as is compatible with safety while recognising the starting point for current recovery has been much disturbed. This disturbance is most noticeable in the pockets of laminated root rot fungus where the Douglas-fir and hemlock are succumbing. One could expect a significant re-colonisation by alder but it is largely absent because of firewood cutting, such that the affected areas are now occupied by a dense shrub community which inhibits tree seedling establishment. Fires in the 1920s and subsequent cutting for firewood have removed many of the potential seed trees and so succession following elimination of the conifers will be slow. In the wetter areas, now occupied by the deciduous type, cedar is coming in only very slowly; it will be a long time before it is a dominant species again.

The spacing of many large cedar stumps, still evident throughout the Forest, suggests how it may have looked prior to logging.

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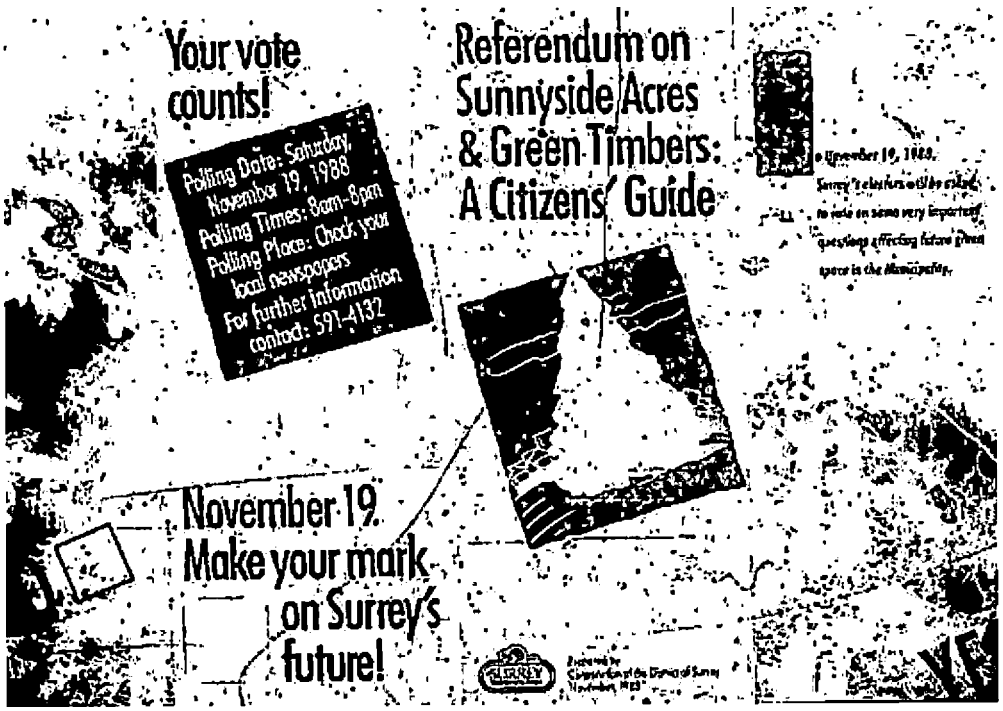
Appendices

1. Dedication of Sunnyside Acres
2. The case for preserving Sunnyside Acres
3. Welcome to Sunnyside Acres
4. Ecology of Sunnyside Acres Urban Forest
5. Laminated root-rot
6. The Holly and the Ivy
7. Sunnyside Acres Fire Management Plan
8. 10th anniversary celebration
9. 20th anniversary celebration
10. Climatic data for South Surrey
11. Soils of Sunnyside Acres Urban Forest
12. Nomenclature of plant species in Sunnyside Acres
13. Birds, mammals and amphibians of Sunnyside Acres

APPENDICES

Appendix 1. Dedication of Sunnyside Acres



What are you being asked in this referendum?

You will be asked two questions that may determine the future use of Sunnyside Acres and Green Timbers.

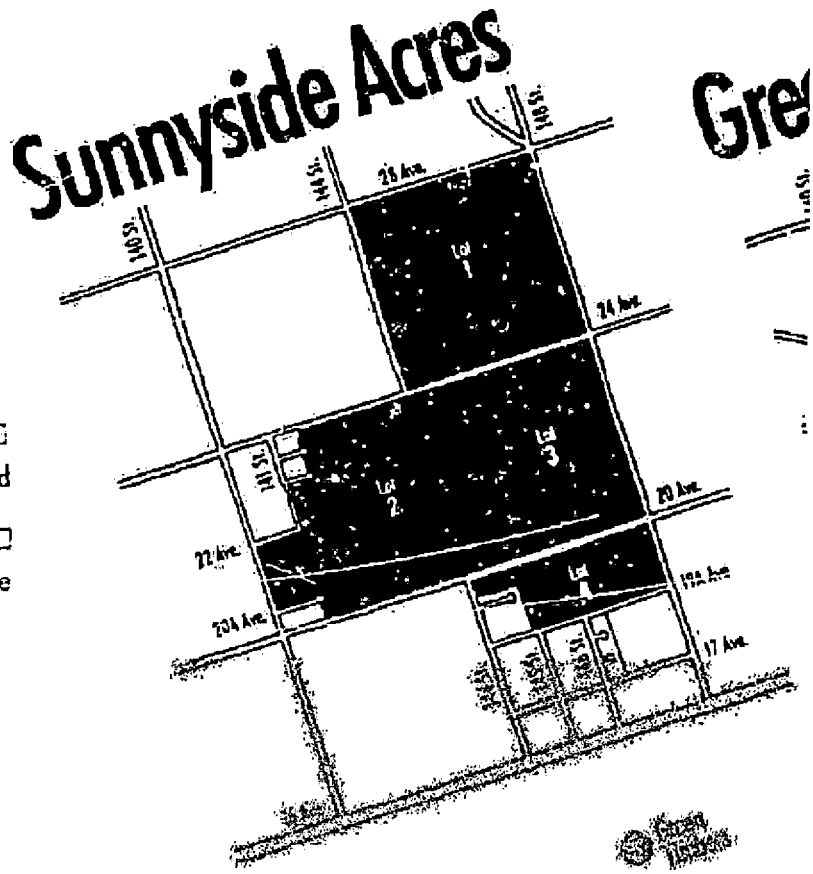
A. "Are you in favour of dedicating Lots 1 and 2 of Sunnyside Acres as Urban Forest Park and Lots 3 and 4 of Sunnyside Acres as Park?"

YES ☐ NO ☐

B. "Are you in favour of dedicating Lots 1, 2, 3, 4 and 5 of Green Timbers as Urban Forest Park?"

YES ☐ NO ☐

You are urged to answer both questions even if you live closer to one park than the other.



What is an Urban Forest Park?

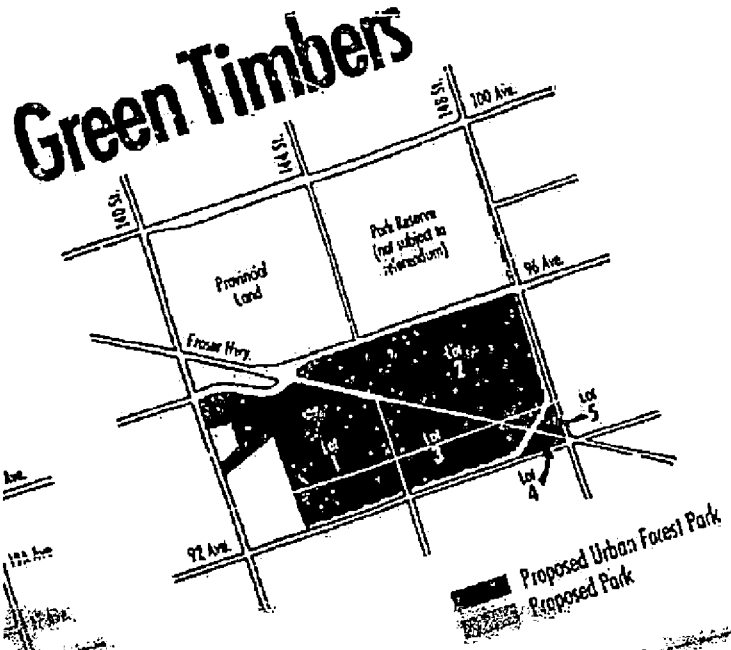
An Urban Forest Park is a large tract of wooded land located within a populous community and dedicated for the public's use and enjoyment, and to the maximum practicable extent consistent with the preservation of the native forest cover.

This category of park is new to Surrey and is proposed by your current Council as the preferred park intended to be developed primarily in its natural state.

How is an Urban Forest Park different from a Park?

An Urban Forest Park is intended to be other than active recreation, for preserving other than developing the forest. A Park on the other hand is intended for general recreation, and allows a wide range of active recreation.

Green Timbers



Why a referendum?

Council is holding this referendum to enable it to dedicate portions of Sunnyside Acres for Urban Forest Park and Park, and portions of Green Timbers for Urban Forest Park, in a manner that would make it very difficult to change the uses later. In order to pass the by-laws to this effect, the assent of electors in a referendum is needed.

What happens if the majority says yes?

If the majority of votes cast says yes, then Council can pass the by-laws to dedicate these Urban Forest Parks and Park, thereby rendering the uses virtually permanent.

What happens if the majority says no?

If the majority of votes cast says no, then Council cannot pass the by-laws. Council could still pass by-laws or resolutions designating the lands Urban Forest and Park, however, such uses could be more easily changed in the future to some other kind of park or to non-park uses.

Council could also decide to do nothing further at this time.

For example, an Urban Forest Park may allow:
- forest management activities, like selective tree clearing and/or replanting
- nature trails
- small-scale picnic facilities
- public parking
- rights-of-way for services, drainage facilities, etc.
- washrooms

but does not allow some traditional park uses like open fields and facilities (soccer fields, football, recreation buildings, etc.)
- golf courses
- non-active recreation open green space like play grounds, manmade water features, etc.

A Park on the other hand allows all of the above. Both Urban Forest Park and Park do not allow housing and commercial developments.

3. Public Information Program

In order for Surrey residents to be able to understand the purpose and implications of the two park dedications I would recommend the following program which will cost in the order of $20,000 and a timetable.

		Approximate Cost	Date
1.	Press release advising the public of the by-law(s) and voting procedures.		October 12
2.	Newspaper advertisements	$3,000	November 5, 9, 12, 16
3.	Brochure - production & printing - mailing	$7,500 $4,500	November 7
4.	Consultant cost	$3,000	
	Total approximate cost	$18,000±	

W. Vollrath
Municipal Clerk

WV/gjb/7852n

c.c. -- Parks & Recreation Administrator

SOME NOTES REGARDING DEDICATION, REFERENDA AND PASSAGE OF BY-LAWS

1. A municipal council may, by by-law, dedicate for public purpose property owned by the municipality.
(Section 533, Municipal Act of B.C.)

2. Such dedication requires the assent of the electors, except in the case of highway dedication or parcels of fewer than 5,000 square metres (1.236 acres).
(Section 533, Municipal Act of B.C.)

3. The assent of the electors shall be evidenced by ballot in the form of a question to be answered "Yes" or "No".
(Section 305, Municipal Act of B.C.)

4. Every proposed by-law must have three separate readings.
(Surrey By-Law # 4155, as amended.)

5. The assent of the electors must follow third reading but precede final adoption.
(Section 296, Municipal Act of B.C.)

6. Every proposed by-law or a synopsis thereof must be posted and published at least ten days before polling day.
(Section 303, Municipal Act of B.C.)

7. Polling day for a by-law having to do with the dedication of municipally-owned land must be not less than ten days and not more than one month after third reading.
(Section 302, Municipal Act of B.C.)

8. Generally speaking, a referendum ("assent of the electors") is conducted in the same manner as a municipal election
(Sections 301 and 305, Municipal Act of B.C.)

9. For reasons of cost and convenience, referenda are usually conducted at the same time and in the same places as municipal elections.
(Editorial Comment.)

10. Every proposed by-law must be typewritten or printed before presentation to Council.
(Surrey By-Law # 4155, as amended.)

Prepared for SOS Executive
August, 1988.

Third reading must be by October 31.
must wholeed - Oct 17 at earliest.

Of course, once land is dedicated it is extremely difficult to convert the same for any other use. For example, in Gavren v. Page 60 S.C.R. 181, in interpreting "dedication" as it applied to a public purpose, albeit not a park in this instance, it was said on p. 198:

> "dedication necessarily implies an unequivocal decision on the part of the owner of land to abandon this land to the public."

Essentially, "dedication" means the setting apart of land for public use or a deliberate appropriation of land by its owner for any general or public use, reserving no other rights than such as are compatible with the full exercise and enjoyment of the public uses to which the property has been devoted.

Generally, the dedication of land may impose reasonable conditions, restrictions and limitations, and compliance therewith is essential unless waived.

In Re Peck v. Galt (1881) 46 U.C.Q.B. 211 it was held that where land has been dedicated subject to a trust that it shall be used for a specific purpose, the terms of the trust must be observed and the land cannot be diverted to another use. Therefore, if the municipality attempted to alienate the land for another public purpose, such attempt may be restrained by injunction: Re Gemmill (1946) 2 D.L.R. 716 (Ont. C.A.).

In conclusion, the by-law to dedicated Sunnyside Acres should be framed to precisely reflect how Council envisions the said lands shall be used as it is extremely difficult to derogate from the same once dedicated.

ROBERT W. JACOBS
Municipal Solicitor

RWJ:mlg

c.c. Municipal Clerk ✓
Parks & Recreation Administrator
Municipal Engineer
Director of Planning & Development Services

THE CORPORATION OF THE DISTRICT OF SURREY

Timetable re Referendum

November 1987 Election

a)	Initial press release advising the public of program and voting procedure	Oct. 13
b)	Brochure - mailed to residents	Nov. 12
c)	Newspaper advertisements (last 2 weeks of campaign)	Nov. 7, 11, 14 & 18
d)	Radio advertisements (2 per day for 6 days)	Nov. 13 - 19
e)	Public information meeting News release advising public of information meeting to be placed the last week in October.	Nov. 3 or 5 Nov 2.

JUN 22 '90 11:51AM P.1/4

THE CORPORATION OF THE DISTRICT OF SURREY

BY-LAW NO. 9800

A by-law to authorize the dedication of certain lands as Urban Forest Park and Public Parks.

0546-501

WHEREAS it is deemed expedient to formally dedicate as urban forest park and park certain lands held by the Corporation of the District of Surrey for park purposes;

NOW THEREFORE the Municipal Council of The Corporation of the District of Surrey in open meeting assembled HEREBY ENACTS AS FOLLOWS:

1. For the purpose of this by-law, urban forest park means:

"A large tract of wooded land located within a populous community, dedicated for the public's use and enjoyment and to the management, conservation and enhancement of the native flora and fauna."

And this dedication will permit forest management, the construction of walking trails, picnic areas and washrooms, and parking areas to accommodate those individuals using the urban forest park.

2. The following described lands, owned by the Corporation of the District of Surrey and held for park are hereby dedicated as urban forest park.

Lot One (1) of the SW /14 Section 22, Township One (1), Plan _____, NWD; and

Lot Two of the NE 1/4, Section 16 and of the NW 1/4, Section 15, Township 1, Plan _____; NWD

As outlined on Schedule A to this By-law.

3. The following described lands, owned by the Corporation of the District of Surrey and held for park, pleasure and recreation and community uses are hereby dedicated as park:

Lot (3) of the NW 1/4, Section 22, Township One (1), Plan _____, NWD; and

Lot 4 of the SW 1/4, Section 15 and of the NW 1/4, Section 15, Township 1; Plan _____, NWD

As outlined on Schedule A to this By-law.

4. The Corporation of the District of Surrey maintains its right to enter upon and to have free and uninterupted access to any portion or portions of the hereinbefore described lands, or any of them for the purpose of installing, repairing, clearing and maintaining any public utilities or public works without limiting the generality of the foregoing now or hereafter installed upon any of the hereinbefore described lands.

The Corporation specifically maintains the right to construct a new water resevoir and make improvements to the water distribution system on a portion of Lot 3.

The Corporation also specifically maintains the right to widen and improve 28 Avenue, 148 Street, 24 Avenue, 144 Street, 23A Avenue, 23 Avenue, 140 Street, 20A Avenue, and 20 Avenue adjacent to the hereinbefore described lands in order to improve the road system as noted on Schedule A to this By-law.

5. The Mayor and Clerk are hereby authorized and empowered to sign any documents required by and to do any acts necessary and incidental to the carrying out of this By-law.

6. This By-law may be cited as "Sunnyside Acres Urban Forest Park and Park Dedication By-law, 1988, No. 9800."

PASSED THREE READINGS on the 17th day of October, 1988.

RECEIVED the assent of the electors on the 19th day of November, 1988.

RECONSIDERED AND FINALLY ADOPTED, signed by the Mayor and Clerk, and sealed with the Corporate Seal on the 21st day of November, 1988.

"R. J. ROSE" MAYOR

"M. VOLLRATH" CLERK

S. O. S.

1986 — '88

Appendix 2. The Case for Preserving Sunnyside Acres (Account published in the *Peace Arch News* (1986) during the Save Our Sunnyside campaign.

A great deal of ink has been spilled in the past three weeks and months about Sunnyside Acres. Perhaps not enough of the debate has explored the argument for preserving Sunnyside Acres as a natural woodland with a minimum of disturbance.

There are about half-a-dozen sound and inter-connected reasons for keeping the woodland in being; however, they are philosophical and conceptual rather than pragmatic or economic. Thus it is not difficult for the mercenary or short-sighted to put dollar values on possible alternatives and to pretend that their results demonstrate the so-called 'costs' of preservation.

Sunnyside Acres is a 480acre (approx. 200ha) tract of second-growth woodland typical of large areas of the Lower Mainland as it has developed following the early logging which founded industrial B.C. With time this woodland will grow through a series of phases until it reaches a stable climax state. In this eventual climax, 500 or more years hence, it will be largely a hemlock stand with an admixture of cedar, Douglas-fir, alder and maple. This will typify the stands utilised here by Indians and which greeted the first settlers; a heritage site in fact. There is no other sizeable tract anywhere in Surrey offering this same potential.

As the woodland develops and grows towards the climax it will provide an outdoor laboratory where naturalists, ecologists, teachers and students can observe, enjoy and record the slowly-changing scene. They will thus learn to understand our environment and, we hope, become better environmental stewards. If we allow this woodland to be "developed" we shall deprive our successors of an important element in their heritage and deny them the opportunity to learn to be better-informed managers of the environment.

This particular environment is home to at least 69 species of birds for all or part of the year. In this context, dead standing trees – a natural feature – are important because they provide sites for cavity-nesting birds, and some small rodents too. Besides the birds we know of 11 different mammal species and 6 species of amphibians or reptiles which live in these woods. No-one has begun to catalogue the insects or soil fauna. Amongst the many plants there is the rare rattlesnake plantain and the protected western Trillium. The whole is a microcosm of the Lower Mainland. Small, dispersed and isolated copses cannot provide the same integrity and even the 480a of Sunnyside Acres is none-too-large. Some ecologists believe that 600a is the minimum size for a self-sustaining unit.

As plants grow, they take up carbon dioxide and give off oxygen. The benefits of this process are not in doubt but, because of our lack of knowledge, we cannot yet put numbers on the quantities involved in very irregular, mixed stands such as Sunnyside, but they are substantial. Rainfall and soil water too are strongly affected by a forest in being. Trees, shrubs, ground vegetation and organic debris all combine to ensure that the 100cm or so of rain which fall on the area each year will slowly percolate into the ground and will not run off to the sea causing soil erosion as they flow. Removing the trees will remove their ameliorating effects on wind and rain. Replacing them with grass may continue to hold the soil in place but the leaf area contributing to gas exchange will be significantly lessened. And, if the grass constitutes a golf course, at least 20,000,000 gallons of irrigation water will be required each summer to keep it green. Paving or laying concrete on the area will result in massive run-off – 3acre/feet each year – carrying the pollutants from our automobile-dependent society into Mud Bay and beyond. If it is running off and being lost into the oceans, that water cannot contribute anything to ground-water storage.

Appendix 3. Welcome to Sunnyside Acres

Sunnyside Acres Urban Forest Park

Surrey's Sunnyside Acres Urban Forest Park is unique... one of the first such parks in Canada. The Acres was established in 1988 to preserve a natural habitat for native flora and fauna, a place where these can be appreciated in a quiet and undisturbed manner.

The Story of Sunnyside Acres began hundreds of years ago, when a mature forest stood on this land. This forest of giant cedar, hemlock and spruce, many hundreds of years old, was logged in the late 1890's. Some of the impressive stumps can still be seen today.

This is a place where all of us can appreciate the wealth of animal and plant life which inhabits our coastal forests. It is a place for reflection, a place for study, and a place where animals and plants find refuge.

This park belongs to us all. Please enjoy it while respecting the integrity of all of its inhabitants.

Coyote

(Canis latrans)

Smaller, and more lightly built than the wolf, the coyote stands about 60cm at the shoulder, weighs about 12kg - 14kg and is about 1m - 1.3m long. The fur is long and coarse and is generally grizzled buff above and whitish below with a bushy, black-tipped tail. The coyote bears its young (three to four pups) in dens. It feeds primarily on rodents, rabbits, insects and vegetable matter.
An intelligent animal with a reputation for cunning and swiftness.

Douglas Squirrel

(Tamiasciurus douglasii)

We are likely to hear this fellow before we see him. These often noisy animals (long, raspy, chattering sound) live primarily in the coniferous stands of the forest. About 30cm long, with an 11cm - 14cm tail, they are olive brown with buff undersparts. They have strong hind legs and well-developed bushy tails which help them balance as they practice acrobatics through the forest canopy. They habitually collect large stores of cones for winter use.

Black-tailed Deer

(Odocoileus hemionus columbianus)

Yes, we have deer in Sunnyside Acres. These graceful and gentle animals are a subspecies of the mule deer, standing 65cm - 95cm at the shoulders.
They are reddish brown in the summer, and greyish brown in the winter with a white belly. The tail is black on the entire upper surface. The male has antlers that fork twice above a short tine near the base. The females generally bear one to two young which are spotted at birth.

Downy Woodpecker

(Picoides pubescens)

The smallest of woodpeckers is found in the Acres and is about the size of a big sparrow. It has black wings mottled with white, a white back and underside, and black and white head. The male has a red patch on the back of his head. Woodpeckers depend on forests like Sunnyside Acres for their nests.... which are hollowed out of old or dying trees.

Dark-Eyed Junco

(Junco hyemalis)

The male has a black hood, the female's is dark grey. A white underside, grey back and beige to brown sides with blackish brown wings. White outer tail feathers are very noticeable. These sparrow-sized birds are most often seen feeding on the ground. In fall and winter they travel in flocks of up to 20 or more. They build their nests on the ground in early April and lay four or five white speckled eggs.

Bleeding Heart

(Dicentra formosa)

A jewel of a wildflower found throughout the damper areas of the Acres. Its delicately fringed leaves sweep upward and almost hide the drooping raw of pinkish 'hearts'. Each flower is a symmetrical masterpiece formed by the petals being held together near their tip. Matching their timid look at the world is the faint fragrant perfume. The bleeding heart blooms from May well into June.

Foam Flower

(Tiarella trifoliata)

Also called Laceflower

The fine erect stems carry only a single leaf but the plant is provided with a group of long-stemmed leaves growing from its base. Often masses of this delicate flower are found in favourable locations. The tiny white flowers dance on the ends of short wire-like branchlets grouped airily near the top of the stem. They have a prolonged blooming season during May to July.

Western Trillium

(Trillium ovatum)

Also known as 'Wake Robin'

There is no chance of confusing the Trillium with any other flower. Its stout stem carries three large, net-veined leaves which form a whorl to cradle the short-stemmed pure white flower. There are three petals from 2.5cm - 5cm long and six dark, fuzzy stamens in the centre. These beautiful flowers undergo a change to purple or pink as they age. They bloom from mid-April to the end of May. Did you know that an extremely rare Green-striped Trillium has been discovered in the Acres? Please don't pick. Trilliums are very delicate and almost impossible to transplant successfully.

There are dozens of beautiful flowers throughout the Acres... including the extremely rare 'Rattlesnake Plantain'. This flower is so rare and delicate its exact location must be kept secret at this time. However, all our flowers are very special so we ask that you do not pick or dig them. All the plants in the Acres are protected by law.

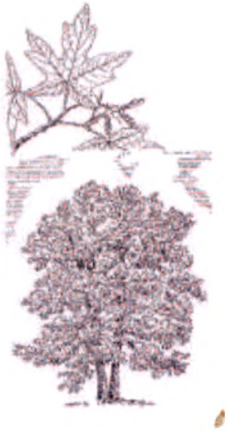
Vine Maple

(Acer circinatum)

A tree-like shrub of damp places. Very tolerant of shade and usually found growing under another tree. It seldom has a single trunk. More characteristically it is a bushy mass to 7m high from a number of stems 5cm - 10cm in diameter. The bark is pale green occasionally becoming dull brown. A circular leaf with 7 - 9 short lobes, like spread blunt fingers. Lobes are sharply toothed. The seeds, or maple 'wings' are spread almost in a straight line and are quite red when ripe. The wood is surprisingly heavy with a fine grain. Campers use green Vine Maple for pot hooks and reflectors around cooking fires as it is almost impossible to burn. Vine Maple has the most vividly coloured autumn foliage of any coastal tree or shrub.

Broadleaf Maple

(Acer macrophyllum)



A massive, bushy tree. In the open, it grows to 24m high with a trunk to 60cm thick, which soon branches into numerous upright limbs. In the Acres, it often grows straight with a loose crown of up-pointing branches surmounting a clear trunk. The bark is finely roughened on trees to 15cm in diameter, then becoming furrowed into narrow, horny ridges. It is drab, grey-brown in colour. The leaves are the largest of any tree in B.C. being on occasion up to 45cm long. In shape, they resemble the leaf on the Canadian flag.

The wood is fine-grained and fairly dense and is very valuable in B.C. for furniture.

Thick moss and licorice ferns often make their home on rough maple trunks.

Western Red Cedar

(Thuja plicata)

This is our Provincial Tree. It can often grow to over 45m in height and 180cm in diameter. The trunk tapers from a fluted base to a long spike-like top which is often dead. On mature trees, the branches are long and irregular and usually point downward. A yellowish green colour marks this tree from other dark green conifers. The scale-shaped leaves are pressed close to the twigs unlike the needle-like leaves of most B.C. conifers. The bark is thin and stringy and can be pulled off in long strips (please don't). The wood reddish and fragrant, splitting with remarkable ease into thin boards. It is very light. Native Indians used these cedars to build massive war canoes and lodges. The wood is so resistant to rot that fallen trees may remain sound after 100 years. One of the oldest cedars recorded, an 875 year old giant, measuring 411.5cm in diameter, was cut down in 1948 near Comox.

Douglas-fir

(Pseudotsuga menziesii)

Trees over 60m high and 185cm in diameter are seldom seen now, most having been logged. Certainly none exist in the Acres; perhaps in a couple hundred years from now. Young trees form a broad sloping pyramid. Old trees lose this form and develop heavy crooked limbs and have a flattened or irregular top. In the shade, lower branches drop off leaving a long clear trunk. The bark is smooth grey-brown with resin blisters on young trees. As the tree ages, the bark becomes thick and deeply fissured in to reddish brown ridges, preventing damage from fires. The wood is generally reddish but sometimes yellowish in colour. It splits cleanly and is very strong. Important for heavy construction and finishing.

This is one of the largest trees in Canada and is only exceeded by redwoods and spruces on the Pacific coast.

Hemlock

(Tsuga heterophylla)

A large tree thriving in dense shade. From 40cm - 50cm in diameter and 60m - 80m tall. Limbs are long and irregularly spaced.

The top-most twig (leader) droops in graceful fashion. Foliage on young trees is drooping, feathery and very attractive. The bark is about 2.5cm thick with flat scaly ridges and deep furrows on mature trees, and is dark rich brown in colour. The leaf is about 1.25cm long, flat and blunt with two fine white lines on under surface. The wood is used primarily for pulp and lumber. Hemlock is a prized ornamental in Great Britain. Young trees often start on top of stumps or fallen logs.

Western Red Huckleberry

(Vaccinium parvifolium)

There is no mistaking this lacey, bright green bush even though its bright red berries are often not present. It is very common in cool coastal forests such as Sunnyside Acres. Sometimes 1.8m in height, it grows in a compact upright form, with a mass of small oval leaves less than 2.5cm long. The twigs are as green as the leaves and sharply angled. Old stumps are a favourite site. The berries are delicious but please save them for the birds.

Thimbleberry

(Rubus parviflorus)

A widespread shrub, it is particularly noticeable because of its large 'maple' leaves often 20cm across. In the Acres, they are found growing in thick masses in dampish places along the edge of paths or clearings. Up to 1.2m in height, the thimbleberry stands erect, on thornless stalks with short, branching limbs. The stark white flowers, almost 5cm across, show up very dramatically from May to July. The berries are slightly 'thimble' shaped when picked. These are bright red and insipid to the taste although sought after by birds and bears during July and August.

Oregon Grape

(Berberis spp.)

Also called Mahonia, Holly Grape, Barberry

Mahonia or Oregon Grape is immediately distinguished by its evergreen, 'Holly'-like leaflets, for no other shrub in the Province bears any resemblance to it. There may be considerable variation between two of the three species, but the main characteristics, 'holly' leaf, bright yellow flowers, or waxy blue berries are standard features. The berries make fabulous jelly... if you can find enough of them (please don't try). We do have real Holly in the Acres but it is not native to B.C. Birds bring the seeds here from residential plantings outside the Acres.

Bracken Fern

(Pteridium aquilinum pubescens)

This is the most widespread and luxuriant fern in the Province. Coarse in growth and up to 2m high. Stems do not cluster from a compact base as with most ferns.
A line of spore cases follow around the margins of the leaves.

Polypody - Licorice Fern

(Polypody spp)

The thickish roots have a licorice flavour which accounts for one common name. (Please don't pick) Often found on mossy cliffs, logs and tree trunks. A sparse fern with fronds to 30cm long and 2cm - 7cm wide. Spores are large and round. Frond leaves are lobed to the midrib - a partial identifying feature. Species differ in the shape of the pinnae (small frond leaves). Those in Sunnyside Acres tend to be sharp and pointed, while those east of the Cascades are rounded.

Sword Fern

(Polystichum munitum)

Forms dark green, symmetrical sprays of fronds to 90cm long. Pinnules or side leaves are sharp-pointed and sharp-toothed. The underside is almost orange in colour from twin rows of spore cases. Fronds are shipped east in large quantities for florists' decorations.

Interesting Facts

13 different species of trees, 18 species of shrubs, and 79 species of flowers have been recorded in Sunnyside Acres thus far. It's a good thing the Acres wasn't destroyed because new species are still being found... most recently the Green-striped Trillium in the spring of 1991.

71 different species of birds inhabit Sunnyside Acres as far as we know. If you'd like a list, contact the Sunnyside Acres Heritage Society.

Besides birds, many other different animal species have been spotted in the Acres. Everything from the Black-tailed Deer to the Rough-skinned Newt. We suspect the Northern Alligator Lizard lives in the Acres. If you see one let us know.

Sunnyside Acres Urban Forest Park

Surrey's Sunnyside Acres Urban Forest Park is administered by the Surrey Parks and Recreation Department, under the authority of the Parks and Recreation Commission.

Sunnyside Acres Heritage Society
P.O. Box 75206
~~South Surrey, B.C. V4A 9N4~~
White Rock B.C. V4B 5L4

Surrey Parks and Recreation Commission
14245 - 56th Avenue,
Surrey, B.C. V3X 3A2

Thank-you to our sponsors;

Canada Trust Friends of the Environment & Surrey Foundation

Our thanks to C.P. Lyons for the use of some illustrations from his book 'Trees, Shrubs and Flowers to know in British Columbia'

This brochure is printed on recycled paper.

Table 3. Current or future rare plant communities in Sunnyside Acres Urban Forest according to the CDC.

ID #	*Scientific name*	Common name	Biogeoclimatic Ecosystem Classification Unit[1]	Provincial Ranking[3]	Structural Stage[2]
1	*Pseudotsuga menziesii / Gaultheria shallon*	Douglas-fir / salal	CDFmm/01	Red	7
2	*Thuja plicata - Pseudotsuga menziesii / Kindbergia oregana*	Western redcedar – Douglas-fir / Oregon beaked moss	CDFmm/05	Red	7
3	*Alnus rubra / Carex obnupta [Populus balsamifera* ssp. *trichocarpa]*	Red alder / slough sedge [black cottonwood]	CDFmm/14	Red	6
4	*Alnus rubra / Lysichiton americanum*	Red alder / skunk cabbage	CDFmm/11	Blue	7

[1] See Green and Klinka (1994)
[2] 7 indicates old growth forests, 6 indicates mature forests
[3] Red listed (rare and endangered) and blue listed (at risk or vulnerable) ecosystems

Plant community #1 is an old forest Douglas-fir stand growing on moderately dry sites with medium nutrients. This forest type is starting to express the characteristics of an older forest and will continue to develop into this endangered plant community.

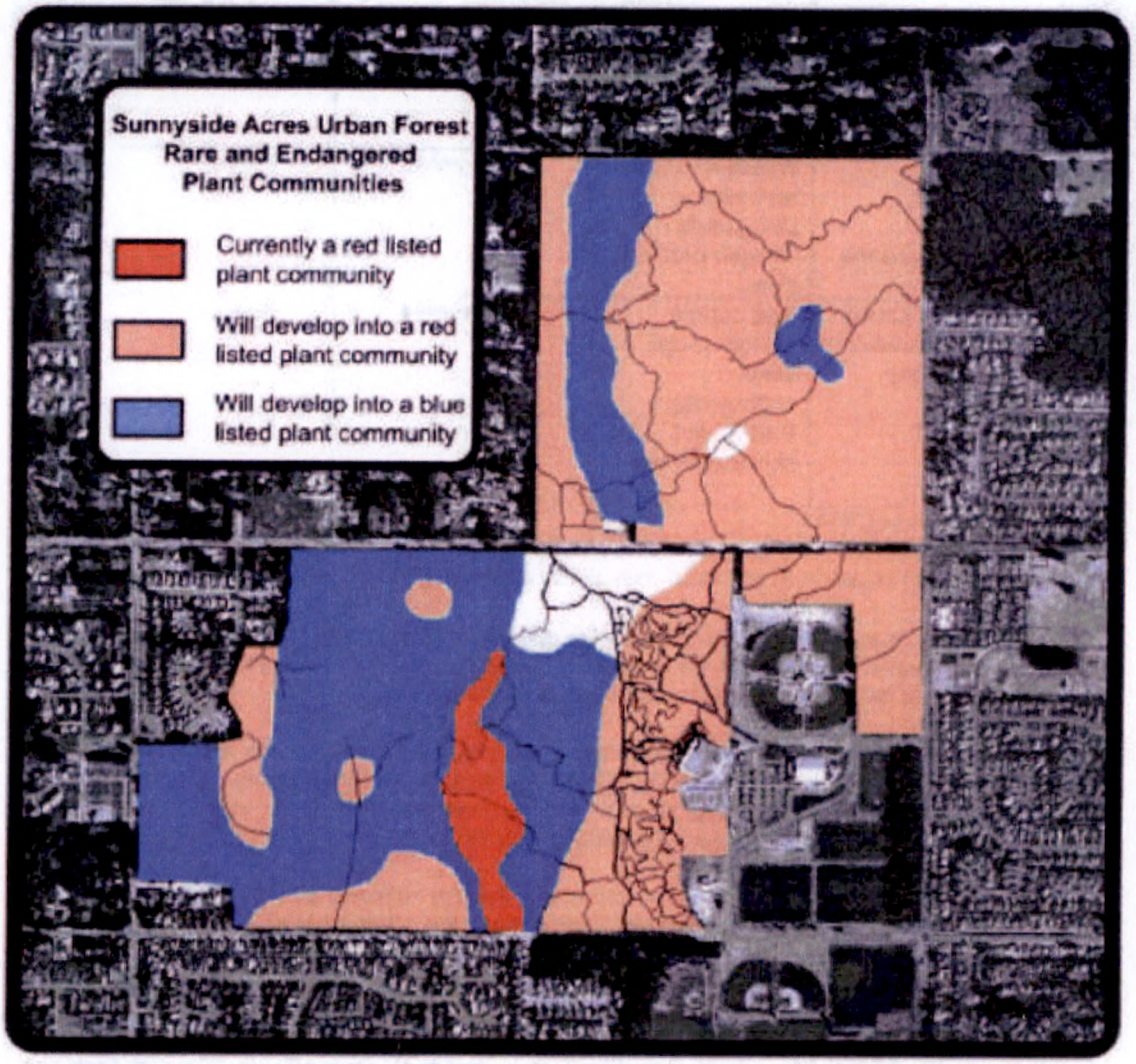
Plant community #2 is not as common in Sunnyside Acres, as it is a mix of old forest Douglas-fir and western redcedar that is located on slightly wetter sites with poor to medium nutrients. This forest type is starting to express the characteristics of an older forest and will continue to develop into this endangered plant community.

Plant community #3 are red alder and cottonwood dominated stands located on wet and rich ecotypes with a fluctuating water table. These sites are often located in riparian areas and therefore form critical habitat for many species. There is a distinct community of old cottonwood and red alder that follows a drainage system near 20th Avenue and 144th Street and running north. This area can currently be categorized as red-listed.

Plant community #4 are red alder dominated stands located on wet and rich ecotypes. These sites are often located in riparian areas and therefore form critical habitat for many species. This area will evolve into a blue-listed ecosystem.

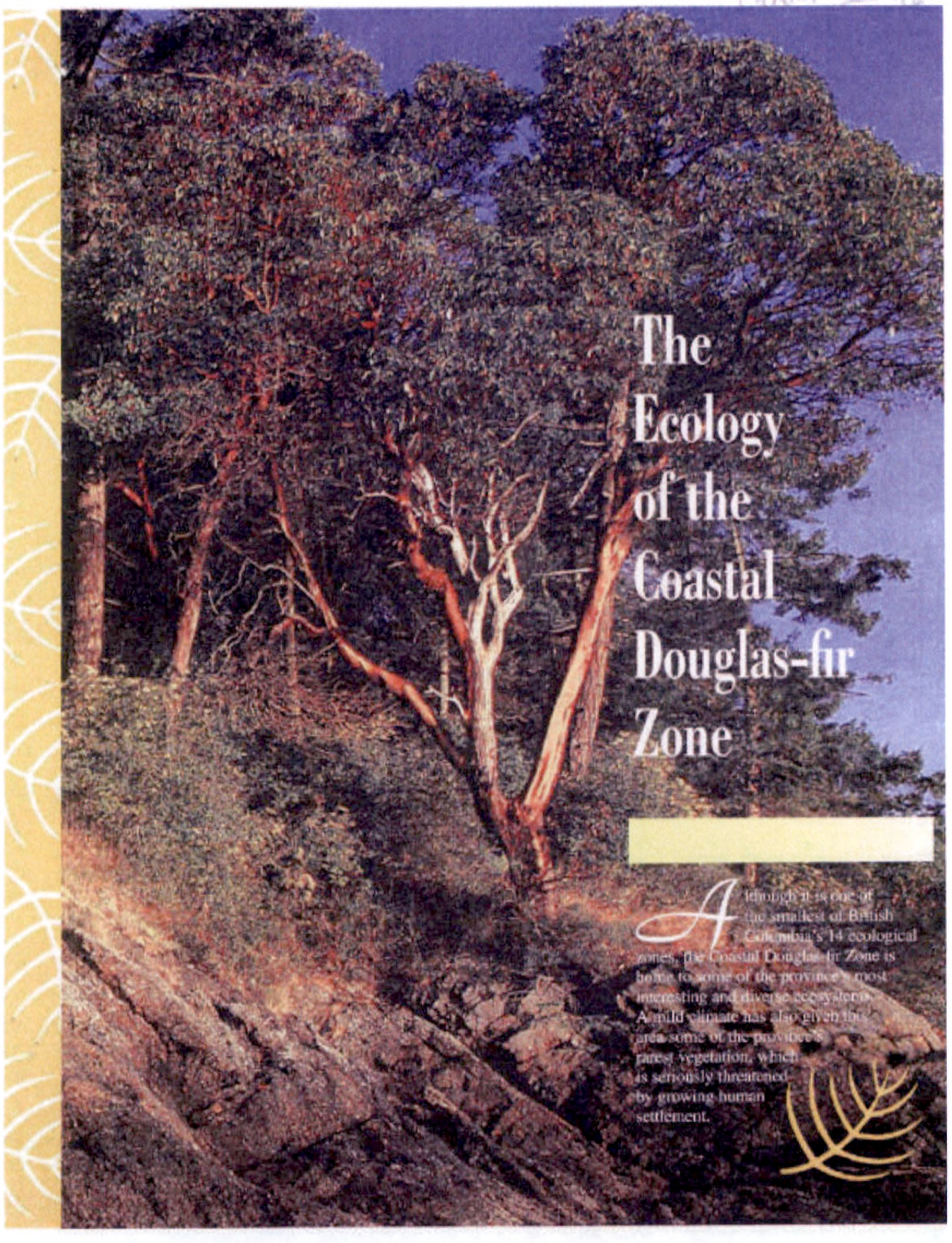
Rare Plant Species

The only rare plant species that has been confirmed in Sunnyside Acres Urban Forest to date is western trillium (*Trillium ovatum*). This species generally grows in rich ecosystems under the tree canopy. No other rare and endangered plant species have been confirmed, although the forests provide suitable habitat for a number of these species. Poison oak (*Toxicodendron diversilobum*) for example, is a blue-listed species that often grows on drier sites in the CDFmm subzone, and Smith's fairybells (*Prosartes smithii)* is a blue-listed species that grows on moist sites in these ecosystems.



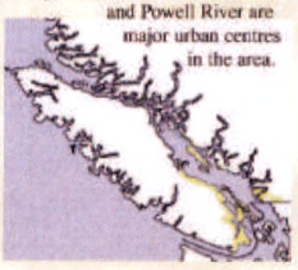
Current and future red listed (rare and endangered) and blue listed (at risk or vulnerable) ecosystems according to the Ministry of Sustainable Resource Management Conservation Data Centre (CDC).

Appendix 4. Ecology of Sunnyside Acres Urban Forest.



Location

The Coastal Douglas-fir Zone covers a small area of British Columbia's south coast, including a band of lower elevation along southeastern Vancouver Island, the Gulf Islands, and a fringe of mainland along Georgia Strait. Victoria, Nanaimo, and Powell River are major urban centres in the area.



Environment

This small corner of the province enjoys perhaps the finest climate in Canada. Sheltered by the rainshadow of the Vancouver Island and Olympic mountains and warmed by air from the Pacific, the area basks in a Mediterranean-like environment of warm, sunny summers and mild, wet winters. Unlike more exposed coastal areas such as the west coast of Vancouver Island, this zone experiences long dry summers, which are a major factor in its ecology.

Ecosystems

Alex Inselberg

Here the majestic Douglas-fir reigns supreme, occurring in a wide range of sites from dry rock outcrops to moist valley bottoms. In upland Douglas-fir forests, salal and Oregon grape are common understorey plants; in rock outcrop areas, arbutus, Garry oak, and occasionally lodgepole pine grow alongside Douglas-fir. Wild rose, snowberry, and ocean spray are well adapted to these open, dry ecosystems.

In moister forest areas, Douglas-fir, grand fir, western redcedar, bigleaf maple, and western flowering dogwood flourish together with understorey plants such as sword fern, salmonberry, and trillium. Skunk cabbage and red alder are typical of wet swampy areas, along with Indian plum, salmonberry, and red elderberry.

Alex Inselberg

White Fawn Lily
Erythronium oregonum

Cover photo: Alex Inselberg

Scene: Fogelson

Saanich Ecosystems

The Coastal Douglas-fir Zone is also home to a unique and sensitive group of ecosystems known collectively as saanich, meaning "place of fertile soil" in the language of the local aboriginal people. Most common on southeast Vancouver Island and the Gulf Islands, the saanich complex includes seaside parkland, dry forest, rock outcrop, and wetland habitats and contains many rare plants. Two common trees here, Garry oak and arbutus, are found nowhere else in Canada.

Shooting Star
Dodecatheon hendersonii

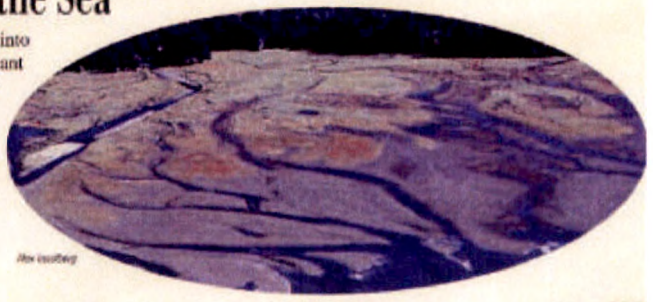
Garry oak parkland is perhaps the most unusual ecosystem in the saanich group. In dry sites with deep soils, Garry oaks form an open tree cover above a carpet of grasses and colourful spring flowers, including blue camas, shooting star, easter lily, chocolate lily, and satin flower. These habitats may also harbour rare, endangered plants such as golden Indian paintbrush and deltoid balsamroot.

Jim Pojar

Golden Paintbrush
Castilleja levisecta

Where Rivers Meet the Sea

Estuaries, where rivers and streams flow into the sea, are highly productive and important ecosystems, providing habitat for a wide variety of life. The nutrient-rich, protected waters of estuaries are an ideal environment for overwintering birds, for example, and serve as excellent nurseries for young fish.



Douglas-fir and Fire

Wildfires were once common in the Coastal Douglas-fir Zone and played an important role in shaping its ecosystems. For example, there is evidence that 300 or 400 years ago, large fires burned away much of the forest on Vancouver Island's east coast, from Victoria to Campbell River. Today, forest fires are suppressed and play a lesser role in the area's ecology.

One reason Douglas-fir dominate many of this zone's ecosystems is that they are well adapted to living with fire. Old Douglas-fir have thick, fire-resistant bark that protects them from all but the hottest flames. Many large old trees show areas of charred bark and fire scars at their base. After a fire, young Douglas-fir seedlings quickly colonize the blackened area. As fires kill off other, less fire-resistant species, they help establish and maintain the Douglas-fir as the dominant tree in the area.

Garry oak parklands are also well adapted to surviving fires.

Wildlife

Historically, the Coastal Douglas-fir Zone has teemed with animal life. Black-tailed deer, Roosevelt elk, black bear, cougar, and many other species freely roamed its forests and coasts. Today, humans are the dominant animal, and their cities, towns, industries, and agricultural operations have transformed this former wilderness.

Animals that conflict with human interests, such as bears, cougars, and elk, are being increasingly displaced by a growing human population.

Despite this expansion, many animal species continue to flourish here. Black-tailed deer and many smaller mammals are common. Some animals, such as raccoons, and barn swallows, have seized the advantages of cohabiting with people by feeding off gardens and garbage, or nesting in buildings. The remaining old forests still provide important habitat for native birds.

The coastline shelters many species of waterfowl, and the offshore islets are havens for colony-nesting species such as the glaucous-winged gull and Brandt's cormorant. This zone is home to the greatest diversity of wintering birds found anywhere in Canada.

Resources

Much of the Coastal Douglas-fir Zone has been developed as residential or industrial land. The most important industries are agriculture, small-scale forestry, pulp mills, and tourism. Because of the area's long dry summers, soil-water conservation is a significant management concern.

Logging History

When the first European settlers arrived in the area, old forests of massive Douglas-fir covered much of the land. Recognizing the economic value of these forests, the settlers soon launched a coastal logging industry.

The Douglas-fir was the most highly prized timber tree. In the early logging days it might take two men, using axes and crosscut saws, three or four hours to fell one of these giants. Oxen would then drag the log to a nearby beach, from where is was floated to the nearest sawmill. The introduction of steam donkeys, logging railways, chainsaws, and other technologies greatly enhanced production, allowing workers to cut many more trees and log in areas farther and farther from the water.

Today, very little old forest remains; most of it has been converted to farms, residences, or second-growth forests.

Exotic Invaders

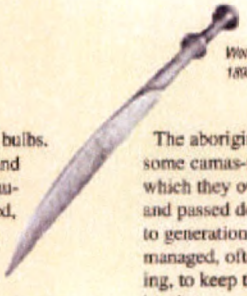
Travellers to a new land often bring something to remind them of home. When the reminder is a living plant or animal, it can create havoc with the local flora or fauna. Several exotic species introduced into the Coastal Douglas-fir Zone have had this unfortunate effect.

Scotch broom, for example, brought to Sooke in 1849 by a Scot named Captain Walter C. Grant, soon escaped captivity and spread rapidly. Today, the bright yellow flowers of this hardy plant are a familiar sight throughout the zone where it is considered a pest and a threat to native vegetation, including many rare plants from the saanich ecosystems.

Other well-known plant species introduced into this zone are gorse and purple loosestrife; animal species include starlings, house sparrows, bullfrogs, grey squirrels, and Norway rats.

Camas

The blue camas grows in Garry oak meadows and grassy bluffs on south-east Vancouver Island and the Gulf Islands. The bulbs are rich in carbo-hydrates and were a staple food for the area's aboriginal people. Every summer these people would travel to fields where camas grew in abundance and harvest the bulbs. These were steamed and often eaten in a communal feast. When cooked, the bulbs are soft and sweet and were sometimes used to sweeten other foods.

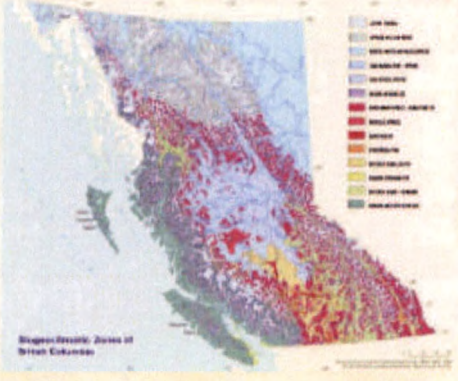


Women's spade
1893

The aboriginal people divided up some camas-rich areas into plots, which they owned individually and passed down from generation to generation. These beds were managed, often by controlled burning, to keep them free of weeds and brush.

The blue camas should not be confused with the closely related and poisonous death camas. Although the two species often grow together, fortunately they are easy to distinguish: the edible camas has blue flowers, while the flowers of the poisonous death camas are cream-coloured.

Salish type basket



The Coastal Douglas-fir Zone is just one of the fourteen biogeoclimatic or ecological zones within British Columbia. These zones are large geographic areas that share a similar climate within the province. Future brochures in this series will explore each zone.

BRITISH COLUMBIA

Ministry of Forests
March 1999

For further information contact:

B.C. Ministry of Forests
Research Branch
P.O. Box 9519 Stn Prov Govt
Victoria, B.C. V8W 9C2

Detail on British Columbia's Biogeoclimatic Zones is available in:

Ecosystems of British Columbia
Special Report Series #6
D. Meidinger and J. Pojar
Ministry of Forests Research Branch,
Victoria, B.C.

Text: Brian Egan
Design: Susan Ferguson
Basket & spade (DPN 17664, DPN 496) – Courtesy of the Royal British Columbia Museum, Victoria, B.C.

3. Soil Characteristics

Soils on zonal sites in the CDFmm subzone are typically Dystric, Sombric, or Melanic Brunisols, grading with increasing precipitation to weakly developed Humo-Ferric Podzols. Humus forms are typically Moders , grading with increasing precipitation into Mormoders and Mors (Nuszdorfer et al.1991). Cursory examination suggested that Moders, Mullmoders, and Mulls are the predominant humus form, and Sombric Brunisols are the predominant soils in the park.

Conclusion

Considering climatic, floristic, and soil characteristics of the Sunnyside Acres park, I conclude that the park is within the CDFmm subzone but close to its wetter limit.

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Krajina, V.J. 1959. Bioclimatic zones in British Columbia. Botanical Series No. 1, University of British Columbia, Vancouver, BC.

Nuszdorfer, F.C., K. Klinka, and D.A. Demarchi. 1991. Coastal Douglas-fir zone; Pp. 81-93 *in* D. Meidinger and J Pojar (compilers and editors) Ecosystems of British Columbia. Special Report Series 6, BC Ministry of Forests, Victoria BC.

ECOSYSTEMS IN BRITISH COLUMBIA AT RISK

Coastal Douglas-fir Ecosystems

Nearly every type of old-growth Douglas-fir forest on British Columbia's dry coastal plain is now rare or endangered.

BRITISH COLUMBIA
Ministry of Environment, Lands and Parks

Why are coastal Douglas-fir ecosystems at risk?

Towering Douglas-fir forests once dominated a narrow strip of low-lying land along the southeastern coast of Vancouver Island, the Gulf Islands, and parts of the Lower Mainland and Sunshine Coast. Now only fragments of these unique ecosystems remain in an old-growth state and we are in danger of losing what is left.

Since 1848, logging has been a major industry on Vancouver Island. The easily accessible Douglas-fir forests were the first to be cut. Proximity to the ocean (for transport) and gentle topography made logging these forests relatively easy in the days of oxen and axes. At about the same time that logging began, agriculture was also becoming a major industry. Early settlers took advantage of the fertile lowland soils and cleared the land of trees so they could raise crops and livestock.

Urban development has become a major threat to what remains of our old-growth coastal Douglas-fir forests.

As forestry, farming, mining and fishing brought more and more people to this coast, bustling cities spread across the land where bountiful forests had once grown. This trend continues today as the mild climate attracts winter-weary Canadians from the East. Urban development has become a major threat to what remains of our old-growth coastal Douglas-fir forests.

Another modern threat to these forests is the suppression of natural forest fires. Mature Douglas-fir trees have thick bark, which protects them from the low-intensity fires that used to occur here about every 100 to 300 years. Such fires maintained the dominance of Douglas-fir by controlling the growth of competing trees. They also prevented tinder-dry debris from building up on the forest floor, thus reducing the risk of high-intensity fires. Now that forest fires are suppressed, the Douglas-firs are in danger of being replaced by other conifers or killed by high-intensity fires that humans will not be able to control.

The understorey plants of these forests are also in danger of being overshadowed, not by natural competitors, but by invasive, non-native plants. Freed from the predators and competitors of their homelands, these plants invade forests and outcompete the native vegetation. Their names often give away their foreign ancestry: English ivy, Scotch broom, Himalayan blackberry, and Eurasian spurge-laurel. In this area, invasive plants tend to flourish where the soil is disturbed or where there is a great deal of light available, such as on rocky outcrops under a sparse forest canopy. The seeds of some species, like English holly, are transported deep into the forests by birds. Each year sees new plants imported to this region from all over the world. Which ones will be the next invaders?

What is their history?

British Columbia's spectacular landscape has been sculpted over the last two million years by repeated glaciations, the most recent of which occurred between about 30 000 and 10 000 years ago. The South Coast was one of the first areas to be deglaciated, and by studying accumulations of plant pollen in lake bottoms, scientists have established that forests were growing here more than 12 000 years ago.

The earliest forests after the last glaciation were dominated by pines, and included spruce, alders and ferns. Douglas-fir and western hemlock arrived next, around 10 000 to 11 000 years ago. Yellow-cedar and western redcedar became abundant only about 6000 years ago, and with their arrival began the magnificent wood carving and architecture of the coastal First Nations.

What is their status?

Scientists recognize six distinct old-growth forest types on the low coastal plain of southern British Columbia that are either dominated or co-dominated by Douglas-fir trees. All of them are currently on the province's list of rare and endangered ecosystems. Nine other types of old-growth Douglas-fir forests, growing on dry upland sites throughout the south coastal region, are also on this list, though they have not suffered the extreme devastation of the lowland types.

Only two such ecosystems, totalling one-half of one percent (about 1100 hectares) of the low coastal plain is covered by relatively undisturbed old forests.

Due to a lack of ecosystem mapping, it is difficult to determine how much area these forests once covered and how much is left in an old-growth state. One 1995 study estimated that only one-half of one percent (about 1100 hectares) of the low coastal plain is covered by relatively undisturbed old forests. This is far below what scientists consider to be the minimum area required for the continued survival of these forest types.

Only a small proportion of what is left in an old-growth state is contained within parks. Although no logging occurs in these "protected" sites they are still being degraded by fire suppression, non-native plant invasion and, in some cases, overuse.

Active management, such as weeding and prescribed burning, will be necessary if we wish to maintain the few parks we do have in a natural state.

Unlike most of British Columbia, much all of the land within the south coastal region is privately owned, which makes expanding the park system expensive and difficult. Citizens' groups have had some success in raising money to buy land for conservation, and governments are taking steps to create incentives for private landowners to preserve biodiversity on their land.

Even if efforts to protect all remaining old-growth stands are successful, additional areas of older second-growth forest will have to be protected and allowed to recover to an old-growth state in order to ensure adequate representation of these forest types in the future, and to provide a continuous network of wildlife habitat. This will create a margin of safety in the system so that if one old-growth stand is degraded, there will be other healthy old-growth stands nearby to take its place.

What are they?

It is difficult to know what Douglas-fir forests along British Columbia's dry coastal plain originally looked like since there are so few areas left in their natural state, but our understanding of the ecology of Douglas-fir can help us visualize these forests. Douglas-fir is a "keystone" species – a species that has a great influence on the whole ecosystem. When the canopy of Douglas-fir trees is removed, the understorey plants are exposed to the elements and quickly replaced by plants more suited to harsher conditions, thus changing the entire ecosystem. We know that wildfires once swept through the area on a regular basis, keeping competing trees in check and also damaging young Douglas-fir trees that had not yet built up thick, protective bark. This natural thinning of young Douglas-firs, along with the fact that this species does not grow very well in the shade, suggests that the forest canopy was relatively open. We can also infer that these open forests were dominated by gigantic "veteran" Douglas-firs, since a typical Douglas-fir can live more than 750 years in the absence of high-intensity fires or storms, and some have been known to live well over 1000 years.

A typical Douglas-fir can live more than 750 years in the absence of high-intensity fires or storms.

The mountains of Vancouver Island and the Olympic Peninsula create a "rainshadow" that shields this region from incoming rain clouds and results in a dry, mild climate compared to other coastal regions. While Douglas-fir trees are tolerant of a wide range of environmental conditions and grow in many parts of the province, many of the other plant species of the coastal Douglas-fir ecosystems are more specifically adapted to the summer droughts and winter rains that characterize this climate.

In total, there are about 100 species of plants – trees, shrubs, vines, herbs and mosses – in coastal Douglas-fir forests. Trees common to wetter areas of the West Coast, especially western redcedar and grand fir, can be found in these forests. Less prevalent are Garry oak and arbutus, which grow on drier sites. Our provincial emblem, the western flowering dogwood, can also be found in these forests.

The most common shrubs are: salal, which produces delicious berries; dull Oregon-grape, which is prized by gardeners locally and abroad; and the aptly named ocean-spray (shown on cover). Although these species are usually intermixed, each one dominates under different conditions: salal in moister sites; dull Oregon-grape in medium sites; and oceanspray in drier sites. Beautifully fragrant native roses also grow in these forests, but less abundantly. Most old-growth Douglas-fir forests have a sparse herb (non-woody plant) layer, within which sword fern and vanilla leaf are the most common species. Dry Douglas-fir–Garry oak forests are an exception to the general pattern. They grow on rocky, well-drained soils that cannot hold enough water to support shrubs throughout the summer, but do sustain a variety of grasses and colourful wildflowers. Douglas-fir–pine–arbutus forests are somewhat intermediate, with well-developed shrub *and* herb layers.

Oregon beaked moss is the most common member of the well-developed moss layer in all but the driest forests. The more

drought tolerant electrified cat's tail moss is the dominant moss in Douglas-fir–Garry oak forests, and the two moss species are co-dominant in Douglas-fir–pine–arbutus forests. A close look at the trunk and limbs of almost any tree will reveal not only mosses, but also a bewildering and beautiful variety of slow-growing lichens. These are symbiotic (mutually beneficial or dependent) organisms made up of a photosynthetic alga surrounded by a tough, protective fungus.

Mycorrhizal fungi also form symbiotic relationships with most forest plants. These fungi grow on plant roots and absorb sugars the plant produces by photosynthesis. In return, the plant gains access to water and nutrients that the fungi absorb from the soil through a network of filaments. The fruiting bodies of some of these fungi may be familiar to you: false truffles, chanterelles, and slippery jacks are all mycorrhizal. The importance of mycorrhizae cannot be overstated – plant growth is greatly increased in the presence of these fungi, and some plants cannot grow without their fungal partner. Mycorrhizal fungi are considered to be *the* keystone of coastal Douglas-fir forests.

Why are they important?

Although old-growth Douglas-fir forests are important for many practical reasons, the most important reason is that they are an essential part of the unique biodiversity of British Columbia. The intrinsic value of a naturally diverse environment is well recognized, and protecting these forests will help maintain the habitats of many plant and animal species.

Douglas-fir forests are home to many fascinating animals, some of whom have a close, though not exclusive, relationship with Douglas-fir trees. Red Squirrels harvest huge numbers of Douglas-fir cones and store them for the winter. They also often nest on large Douglas-fir branches or in cavities created by woodpeckers. Spaces behind the bark of large, dead and decaying Douglas-fir trees provide safe roosting places for many of the 10 species of bats in the region, while woodpecker cavities are sometimes used as bat nurseries. Many birds, including some owls and chickadees and two species of swallows, also use woodpecker cavities for nest sites. Mature Douglas-firs are particularly important for Bald Eagles as they need large trees to support their massive nests, which can weigh up to one tonne!

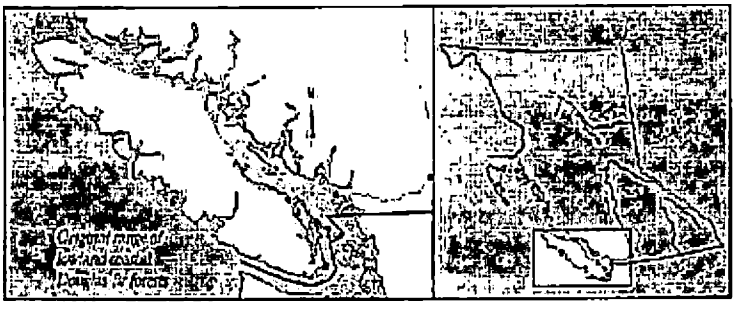
One study of the forest canopy found approximately 400 insect species, about 100 of which are exclusive to coastal old-growth Douglas-fir forests.

At the smaller end of the animal scale, numerous species of insects live high in the canopy of old-growth Douglas-fir forests. One study of the forest canopy found approximately 400 insect species, about 100 of which are exclusive to coastal old-growth Douglas-fir forests. Remarkably, about 50 of these were previously unknown to science.

Two provincially rare plant species and 10 provincially rare vertebrate animal species live in old-growth coastal Douglas-fir forests. These rare species include the rough-leaved aster, the Marbled Murrelet and the Sharptail Snake. The Marbled Murrelet is a small seabird that nests on the very wide and mossy branches of centuries-old trees, making it dependent on old-growth for its survival. Abundant large woody debris such as fallen tree trunks, a feature of old-growth forests, is required as shelter for the Sharptail Snake. Although not much is known about the status of other inhabitants of these forests – invertebrates, lichens and fungi – it is likely that some species in these groups are also rare. Preserving a continuous network of old-growth coastal Douglas-fir forests will help prevent the extinction of these species and provide movement corridors for the animals and plants that may have to colonize new areas to survive future climatic changes.

One very common species that benefits enormously from old-growth coastal Douglas-fir forests is *Homo sapiens*. In this densely populated and, hence, polluted area, forests do us great service in filtering contaminants out of the air every day.

The material and economic benefits of healthy, natural ecosystems must also be taken into account. At a very basic level, these forests provide the necessities of life: food, both plant and animal; medicinal plants; materials for shelter; and, of course, clean air and water. All of these can be taken without harming the forest. When European settlers arrived on Vancouver Island they encountered large populations of humans who had flourished here for thousands of



years without depleting the forests that supported them.

There are opportunities for economic development in "wildcrafting:" harvesting forest products such as edible mushrooms or herbs without damaging the integrity of the forest. Natural forests can also provide nurseries with stock for the propagation of native plants, a new and expanding industry in this province. Another benefit of preserving natural ecosystems is the preservation of traditional medicinal herbs, which are currently being investigated with the aim of developing new drugs.

THE OLD, FIRE-SCARRED "VETERAN" IS A REMINDER THAT NATURAL WILDFIRES WOULD HAVE KEPT THIS DOUGLAS-FIR SALAL FOREST MORE OPEN IN THE PAST. *Hans Roemer photo*

DELICIOUS SALAL BERRIES ARE THE FAVOURITES OF BOTH HUMANS AND WILDLIFE. *Hans Roemer photo*

Natural forests are crucial for scientific research into topics such as wildlife management and forestry. They are the "benchmarks" by which environmental management practices can be judged. They are also the reference point for the exciting new industry of eco-forestry, which strives to harvest high-quality wood without damaging the ecosystems that produce it.

A large industry that could benefit from the protection of old-growth coastal Douglas-fir forests is tourism, especially eco-tourism. Every year, tourists from around the world travel to the west coast of Vancouver Island to see the old-growth rainforests. If we protect the remaining old-growth Douglas-fir forests on the east coast of the Island, their tourism potential could also be developed.

Perhaps most importantly, these forests enrich people's personal lives. The proof of this is the ever-increasing use of local nature parks. The benefits that people derive from visiting these parks range from getting fresh air and exercise to enjoying the beauty of plants and animals, to deriving spiritual sustenance from direct contact with Nature. Countless psychologists, biologists, writers and religious scholars have observed and demonstrated the benefits of contact with Nature, and those benefits are priceless.

What can we do?

There is a great deal we can do as individuals to protect old-growth coastal Douglas-fir forests. What you are doing right now is the first step: learning about old-growth coastal Douglas-fir forests and why they need our help. If you live in the region where these forests grow, you can learn more by taking a guided walk in a local park or by teaching yourself how to identify plants and animals. Public libraries, the Internet and the specialized libraries of government agencies and environmental organizations are great sources of information about these forests and related topics. Joining a local naturalist group is another excellent way to learn more about Nature.

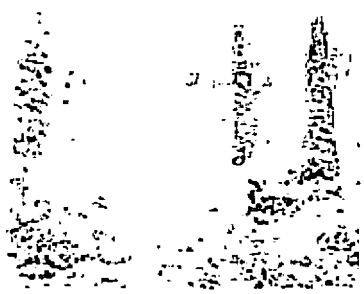
Discuss the importance of protecting old-growth coastal Douglas-fir forests with municipal, regional, provincial and federal agencies, and ask for their help. There are not many old-growth Douglas-fir forests left on public lands. Support government programs that create incentives for private landowners to protect the forests on their properties. Governments can also protect the few remnants that are on public lands. Improve the management of forests within parks and create new parks by buying private lands that support old-growth Douglas-fir forests.

Try to incorporate your newly acquired knowledge into your personal life. One way to do this is to pay attention to the rules, such as "stay on the trails" and "keep dogs on a leash," when visiting local parks. These regulations are intended not to diminish the enjoyment of visitors, but to protect the sensitive plants and animals in the parks. You can also get actively involved in protecting natural areas by participating in organized campaigns to rid your local parks of invasive non-native plants such as Scotch broom or Eurasian spurge-laurel.

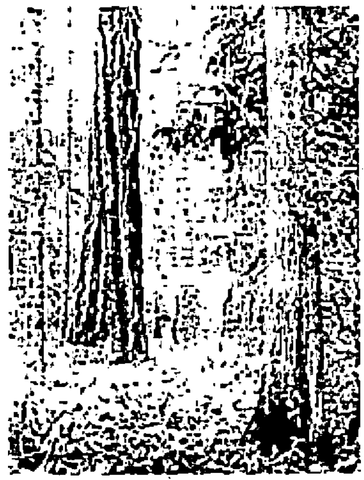
Another way to make a difference is to landscape your property with native plants, which can save water and provide habitats for wildlife even in an urban setting. You can collect seeds from wild plants (leaving most of the seeds behind for reproduction) or buy native plants from specialty nurseries, but please do not collect live plants from the wild. Joining the provincial government's Naturescape program is an easy way to get started.

If you are fortunate enough to have some old-growth Douglas-fir forest on your property, you have an opportunity to be an environmental hero and preserve a part of British

ALMOST ALL COASTAL LOWLAND DOUGLAS-FIR FORESTS HAVE BEEN LOGGED AND REPLACED BY YOUNGER [illegible] [illegible] photo



IVY IS A MAJOR THREAT TO NATIVE ECOSYSTEMS, MAKING TREES VULNERABLE TO DISEASE AND WINDTHROW, AND SMOTHERING UNDERSTOREY PLANTS.
Hans Roemer photo



MOISTER DOUGLAS-FIR FORESTS MAY HAVE WESTERN REDCEDAR, AND AN UNDERSTOREY DOMINATED BY DULL OREGON-GRAPE. [illegible]

DULL OREGON-GRAPE BERRIES ARE EDIBLE BUT NOT DELECTABLE.
[illegible]

Columbia's natural heritage. Many municipalities are moving toward reducing taxes on private land that is being managed for conservation. Governments and conservation organizations are also exploring other creative ways of protecting private land with less cost to the landowner.

Finally, you can support organizations that are working to protect old-growth coastal Douglas-fir forests by doing research, educating the public, lobbying governments or directly acquiring land for preservation.

We must all take responsibility for the environment around us, and recognize that we do have the power to make a positive difference. Every contribution is needed if we are to protect these magnificent forests!

FOR INFORMATION ON RARE ECOSYSTEMS & SPECIES, CONTACT:
B.C. Conservation Data Centre
PO Box 9344 Stn Prov Govt
Victoria, BC V8W 9M1
cdcdata@fwhdept.env.gov.bc.ca
www.elp.gov.bc.ca/wld/cdc

FOR INFORMATION ON HABITAT ACQUISITION AND LAND STEWARDSHIP PROGRAMS, CONTACT:
Habitat Conservation Trust Fund
PO Box 9354 Stn Prov Govt
Victoria, BC V8W 9M1
www.elp.gov.bc.ca/hctf

The Nature Trust of B.C.
808-100 Park Royal South
West Vancouver, BC V7T 1A2

FOR INFORMATION ON NATIVE PLANT LANDSCAPING, CONTACT:
Naturescape British Columbia
PO Box 9354 Stn Prov Govt
Victoria, BC V8W 9M1
www.elp.gov.bc.ca/hctf/nature [illegible]

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Sunnyside Acres: a rare ecosystem

The Sensitive Ecosystems Inventory (SEI) is a joint project between the Ministry of Environment Land and Parks (MOELP) and the Canadian Wildlife Service, with the purpose of identifying rare and unique terrestrial ecosystems and encouraging their preservation. The dry climate of South Surrey, its mature Douglas-fir, combined with extensive human development, make the forests of Sunnyside Acres similar to those studied by the SEI.

The SEI considers stands such as those in Sunnyside Acres as older forests, defined as stands of conifer forest (predominantly Douglas-fir) with an average tree age of 100 years or older. It was reported by this study that these older forests occupy only 2.6 % or 10, 605 ha of eastern Vancouver Island and the Gulf Islands, the majority of which currently exist in protected areas. Additionally, most of these forests measured less than 7 ha in size. The primary reason for the scarcity of this ecosystem type is due to extensive logging and development in these areas. These forests are considered sensitive not only because they are rare but also because they contain specific habitat features required by a rich diversity of plant and animal species.

The Ministry of Environment, Lands and Parks published a series of reports on ecosystems at risk. The *Coastal Douglas-fir Ecosystems* (Flynn, 1999) report underlines the importance of preserving mature and old growth Douglas-fir stands in the CDF subzone. It states that only an estimated 0.5 % of stands in this dry climate remain in an undisturbed old growth state and that almost every one of these stands is on the province's rare and endangered list. The report stresses the need to protect these remaining old growth stands as well as the remaining mature Douglas-fir stands.

The only other substantial stand of mature to old Douglas-fir located within the CDFmm is that of Lighthouse Park in West Vancouver. Other Douglas-fir stands do exist, such as those in the Pacific Spirit Park and the Delta watershed, but these stands are not located in the rare CDFmm subzone and are generally younger, between 60 and 80 years old.

Appendix B Natural Area Trail and Pathway Specifications

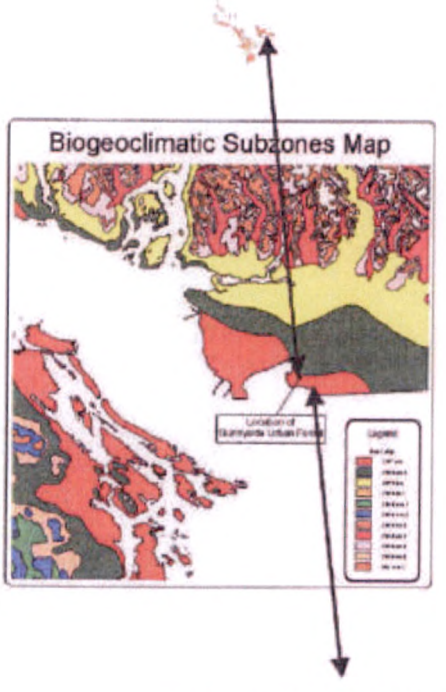
Table 9. Natural Area Trail and Pathway Specifications

Trail	Universal Access/ Barrier Free Trail	General Access and Recreation Trail	Recreational Nature Trail	Pathway	Equestrian Trail	Multi-use Pathway (as per Engineering Standards)	Nature Trail	Off Road Bicycle Trail	Unsanctioned Trail	Closed Trail
Trail Type CODE	1	2	3	4	5	6	7	8	9	10
PURPOSE	Unimpeded, relatively safe access for users of varying physical abilities. For transportation and low impact or passive recreational activities	Multi-access and medium and low impact recreational uses. Connective travel corridors. I.e. school-forest-residential area	Exploration, discovery and recreation based foot traffic and slow off-road bicycling.	Designed to bear weight of larger vehicles for service or emergency access to a site. Other uses are accommodated.	Horseback riding, other uses possible but not encouraged.	Designed to accommodate many alternative transportation. Refer to Urban Systems Document re: Multi-use Pathway Standards	Urban hiking, solitude, nature interpretation	Technical, off-road bicycling. Not recommended for pedestrians	Used for purposes that are inconsistent or contradictory to site objectives.	Closed due to negative environmental impacts or conflict with sanctioned uses
INTENDED USAGE RATE	Low-High Double Track or Single with pullouts	Medium-High 2-way traffic	Low-Medium Double or Single Track	Low-High (location dependant)	Medium-High (demand based)	Medium-High	Low Single track	Medium-High Single track-unidirectional Double track-bi-directional	Variable. If very high for legitimate uses, consider formalizing.	None
TREAD WIDTH	1.5m-2.5m	1.5m-2.5m.	1.0m-1.5m.	2.5m-4.0m.	0.5m -2.5m.	3.0m-4.0m	0.5m-1.0m.	0.3 m-1.2m.	Variable	None
SURVEILLANCE AREA WIDTH (BUFFER ACTION OF TRAIL)	1.0m-4.0m, each side	1.0m-4.0m. each side	1.0m-2.0m. each side	Line of sight maintained Obstructions cleared. 1.0m-4.0m each side.	Line of sight maintained Surveillance area provided (ex). Tread width +2x = min 2.5m	1.0m-2.0m. each side	None provided Line of sight maintained	0.5m-2.0m each side. Line of sight maintained Handle-bar clearance maintained.	Not applicable	Grown-up encouraged. Physical barriers maintained.
SURVEILLANCE AREA VERTICAL RANGE (ABOVE TRAIL SURFACE)	clear between 0.75m-1.8m.	clear between 0.75m-1.8m.	clear between 0.75m-1.8m.	clear between 0.75m-1.8m, on demand	on demand, as required for safety	clear between 0.75m-1.8m.	to maintain line of sight only	clear between 0.75m-1.8m.	Not applicable	Not applicable
SURFACE TYPE	Crushed rock, Wood shreds, Concrete, Asphalt No bumps, dips or other obstructions greater than 2cm	Crushed rock, Wood shreds, bark mulch.	Crushed rock, Wood shreds, bark mulch, native mineral soils.	Compacted crushed rock, soil cement, asphalt, concrete	Crushed rock, wood shreds, bark mulch.	Asphalt, concrete, compacted crushed rock	Crushed rock, Wood shreds, bark mulch, native mineral soils, log corduroy.	Crushed rock, Wood shreds, bark mulch, native mineral soils, log corduroy.	Native soils or log corduroy, planks and plywood	Coarse woody debris, rocks, native plants / trees/ grasses, native soils.
SUBGRADE (AS REQUIRED)	Crushed rock, Rip-rap, geotextiles, geo grids	Crushed rock, Rip-rap, geotextiles	Crushed rock, Rip-rap, geotextiles	Road mulch, rip-rap, geotex., geogrids	Crushed rock, Rip-rap, geotextiles, geo grids.	Road mulch, rip-rap, geotex., geogrids	Crushed rock, Rip-rap, geotextiles, logs	Crushed rock, Rip-rap, geotextiles, logs	Not applicable	Not applicable

Sunnyside Acres Urban Forest: A Rare Ecosystem

The protection of rare and endangered ecosystems such as Sunnyside Acres, is critical for conserving both genetic and species diversity in B.C. Rare ecosystems need to be conserved not only to ensure the natural state of these plant communities but also to provide habitat for the rare plant and animal species that rely on them.

On the coast of B.C. there are only a few ecosystems which receive a low level of precipitation. These ecosystems are generally located on the leeward side of mountains such as those on Vancouver Island and are classified as the CDFmm1 subzone by the Biogeoclimatic Ecosystem Classification System of British Columbia. As a result of urbanization and development, old forest stands in this subzone are considered rare and endangered. Most Douglas-fir forests similar to those found in Sunnyside Acres have been encroached upon by urbanization or have been harvested for their timber values.



The Ministry of Environment, Lands and Parks published a number of reports on ecosystems at risk. The "Coastal Douglas-fir Ecosystems" (Flynn 1999) report emphasizes the importance of preserving mature and old growth Douglas-fir stands in the CDF subzone. It states that only an estimated 0.5 % of this dry subzone remains in an undisturbed old growth state and that almost every one of these forests are on the provinces rare and endangered list. The report stresses the need to protect these remaining old growth forests as well as the remaining mature Douglas-fir trees.

"...additional areas of older second-growth forest [in the CDFmm subzone] will have to be protected and allowed to recover to an old-growth state to ensure the adequate representation of these forest types in the future, and to provide a continuous network of wildlife habitat..." (Flynn 1999)

These maps show the extent of the rare and endangered Coastal Douglas-fir Zone in British Columbia. Sunnyside Acres Urban Forest is a significant component of this rare ecosystem.

IDENTIFICATION OF BIOGEOCLIMATIC UNIT FOR THE SUNNYSIDE ACRES URBAN FOREST PARK

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University of British Columbia
Vancouver, BC V6T 1Z4

Introduction

The objective of this investigation was to identify precisely the biogeoclimatic unit – either the Moist Maritime Coastal Douglas-fir (CDFmm) or Very Dry Maritime Coastal Western Hemlock (CWHxm) subzone – for the park. According to the most recent biogeoclimatic map, the park is located within the CWHxm subzone, albeit very close to the boundary between the two subzones. As the boundaries between biogeoclimatic units nearly always represent a broad transition between two regional climates (except in places where a steep topographic gradient occurs), it is important to state whether the area of interest is clearly in one or transition between two biogeoclimatic units. If transition is visualized as a gradual change from one unit to another then we may recognize three segments: the first and last segments in which characteristics of one unit predominate over the other, and the middle segment in which characteristic of both units are about equal.

1. Climatic characteristics

According to the Ecological Program Staff of BC Ministry of Forest, the Surrey Sunnyside climatic station, which is located in the vicinity of the park, is within the CDF subzone. Table 1 presents mean annual precipitation and temperature data for a few selected stations that have been used to characterize climate of the CDFmm subzone. Victoria Lansdowne represents the driest limit, while Qualicum River represents the wettest limit of the subzone. Thus the park is located close to the wettest limit of the CDFmm subzone.

Table 1. Climatic data for selected stations located within the CDFmm subzone (BC Ministry of Forests, unpublished data).

Climatic station	Mean annual precipitation (mm)	Mean annual temperature (^{0}C)
Victoria Airport	873	9.5
Victoria Lansdowne	636	9.8
Saltspring Island	1,065	9.8
Qualicum River	1,317	9.2
White Rock	1,092	9.4
Surrey Sunnyside	1,237	9.5
Vancouver International Airport	1,112	9.8

2. Vegetation Characteristics

The ideal situation for this investigation would be to observe old-growth forest communities, particularly those on zonal (intermediate) sites. However, the extant communities are in mid-seral succession stages, and there are only few sites that can be considered zonal, i.e., intermediate in soil moisture and nutrient conditions, as 'wetter', nutrient-rich and -very rich sites predominate in the park. Therefore, I observed the floristic composition of forest communities and compiled a list of plant species during the visit to the park on May 31, 2001.

I identified the communities on zonal sites representing seral Douglas-fir – Salal association. These communities feature a well-develop shrub layer (containing *Gaultheria shallon, Mahonia nervosa, Vaccinium parvifolium, Rosa gymnocarpa, Lonicera ciliosa,* and *Symphoricarpos albus*), a poorly developed herb layer (including *Rubus ursinus* (abundant) and *Pteridium aquilinum*), and a very poorly developed moss layer (with scattered *Rhytidiadelphus triquetrus* and *Kindbegia oregana*). This association and its abbreviated description agree with Nuszdorfer et al. (1991) who described the same zonal association as characteristic of the CDFmm subzone.

Further support for the affinity of the park to the CDFmm subzone was obtained by interpreting diagnostic value of the plant species in the park (Table 2). I did not note significant occurrence of any species that are considered diagnostic for the CWHxm subzone. It can be concluded that all plants, except for *Dryopteris expansa,* have zonal diagnostic values or climatic indicator values allied with the CDFmm subzone.

Table 2. List of observed plant species in the park and their diagnostic value for the CDFmm and CWHxm subzones according to Krajina (1959). Species with no diagnostic values for either subzone are not listed.

Acer circinatum	More diagnostic for CWHxm than CDFmm; **very frequent**
Achlys triphylla	More diagnostic for CDFmm than CWHxm; **frequent**
Amelanchier alnifolia	More diagnostic for CDFmm than CWHxm; **infrequent**
Cornus nuttallii	More diagnostic for CDFmm than CWHxm; **frequent as a tall shrub and small tree**
Dryopteris expansa	Diagnostic for CWHxm; **frequent, especially on wetter sites, associates with decaying wood**
Holodiscus discolor	More diagnostic for CDFmm than CWHxm; **frequent**
Lonicera ciliosa	Diagnostic for CDFmm; **frequent, especially on intermediate sites**
Oemleria cerasiformis	More diagnostic for CDFmm than CWHxm; **frequent**
Pseudotsuga menziessi	Moderately shade-tolerant on intermediate sites in CDFmm, shade-intolerant on zonal sites in CWHxm **Observed to be moderately shade-tolerant**
Rhytidiadelphus triquetrus	More diagnostic for CDFmm than CWHxm; **infrequent**
Rosa gymncarpa	Diagnostic for CDFmm; **abundant, especially on intermediate sites**
Symphoricarpos albus	More diagnostic for CDFmm than CWHxm; **frequent**
Tolmiea menziesii	Diagnostic for CDFmm; **frequent on wetter sites**
Tsuga heterophylla	Rare in the CDFmm; frequent on intermediate zonal sites in CWHxm **Very infrequent; occurs on wetter sites and/or decaying wood; vigour is poor**

3. Soil Characteristics

Soils on zonal sites in the CDFmm subzone are typically Dystric, Sombric, or Melanic Brunisols, grading with increasing precipitation to weakly developed Humo-Ferric Podzols. Humus forms are typically Moders , grading with increasing precipitation into Mormoders and Mors (Nuszdorfer et al.1991). Cursory examination suggested that Moders, Mullmoders, and Mulls are the predominant humus form, and Sombric Brunisols are the predominant soils in the park.

Conclusion

Considering climatic, floristic, and soil characteristics of the Sunnyside Acres park, I conclude that the park is within the CDFmm subzone but close to its wetter limit.

Literature Cited

Krajina, V.J. 1959. Bioclimatic zones in British Columbia. Botanical Series No. 1, University of British Columbia, Vancouver, BC.

Nuszdorfer, F.C., K. Klinka, and D.A. Demarchi. 1991. Coastal Douglas-fir zone, Pp. 81-93 *in* D Meidinger and J Pojar (compilers and editors) Ecosystems of British Columbia. Special Report Series 6, BC Ministry of Forests, Victoria BC.

Appendix 5. Laminated root-rot.

Prepared for the Sunnyside Acres Urban Forest Advisory Committee
May 13, 2002.

Background

The City of Surrey has been exploring options to address the issue of Laminated Root Rot (*Phellinus weirii*) disease centers located in Sunnyside Acres Urban Forest. In December of 2000 a preliminary report was produced and presented to the Parks, Recreation and Culture Commission that examined the nature of this disease and outlined possible options for its management. After further review, a consultant delineated the disease centers in the spring of 2001 and performed a more detailed cost benefit analysis for each of the potential options.

Management options were developed and the Sunnyside Acres Urban Forest Advisory Committee and the Parks, Recreation and Culture Commission endorsed ***Option C-3: Buffer; Girdling and Removal of Trees*** in order to manage the root rot disease in Sunnyside Acres Urban Forest. Commission also instructed staff to conduct a public consultation process to gather feedback prior to the implementation of Option C-3.

In consultation with the Parks Committee of Commission, staff conducted two public open houses and a survey of residents living in south Surrey to gather feedback on the root rot management issue. The results of the public open houses and survey concluded that the majority were in support of the implementation of Management Option C-3, buffer creation through the girdling and removal of disease prone trees. On November 7th, 2001, Commission approved implementation of Option C-3.

On February 11th, 2002 the Sunnyside Acres Heritage Society resolved to open up the root management review process and the Urban Forest Advisory Committee requested further review of the management options in light of recent research on root rot.

On April 22, 2002, Roger Phillips, Roy Strang, Wayne Sakamoto, Greg Ward, and Trevor Cox meet with root rot researcher Rona Sturrock, from the Pacific Forestry Center, to discuss her research and its' implications in managing root rot at Sunnyside Acres Urban Forest.

Please refer to the attached, ***Root Rot in Sunnyside Acres Urban Forest Chronological Summary of Public Review and Decision-making Processes***, for a full accounting of the public review process for management of root rot disease in Sunnyside Acres Urban Forest.

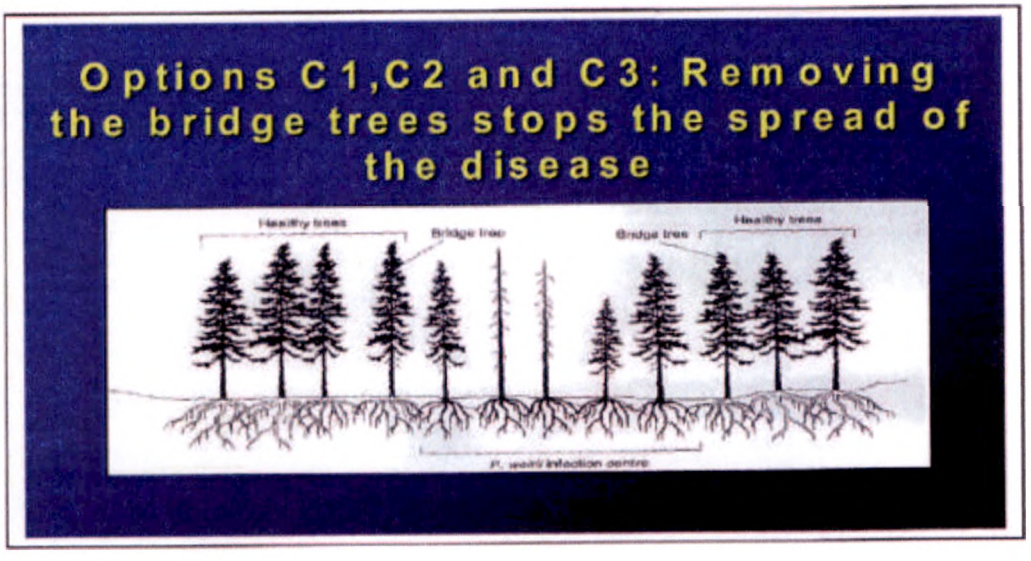
Recent Research and Root Rot Management Implications

The new root rot research from the Pacific Forestry Center focuses on determining whether the root rot fungi could translocate through dead roots. In the controlled study, the research results showed that once the roots are infected the disease translocated a very short distance in the dead wood (inches in a year). The research is inconclusive in terms of how far the disease will translocate in dead wood and how long the disease will live in dead wood. It should be noted the research has been conducted for only a few years. The researcher stated that the research is preliminary and requires many more years of research and study to determine how long the disease can live once it infects the dead wood and how far it may translocate through the dead wood. The researcher also noted that the translocation of the disease through dead wood is much inhibited by other pathogens that are more aggressive invaders of dead wood.

The research does not provide any substantial or compelling new information that would give just cause to change root rot management options for Sunnyside Acres Urban Forest. It is unfounded that the disease will translocate through dead wood material in the ten meter wide buffer that is created and infect live trees outside the buffer. In fact, given the remarks of the researcher during the meeting, it is unlikely that this will occur particularly since the buffer will be ten meters wide.

Conclusion

The selection of ***Root Rot Management Option C-3, Buffer Creation; Girdling and Removal of Trees*** was developed using the best information currently available for managing root disease. The City does not believe the recent research gives cause to change the approved root rot management option at this time.



Root Rot in Sunnyside Acres Urban Forest
Chronological Summary of Public Review and Decision-making Processes

1999: Parks, Recreation and Culture Commission requests Sunnyside Acres Urban Forest Advisory Committee to investigate the occurrence and effect of root rot on the forest.

Jan 24, 2000: Urban Forest Advisory Committee discusses issue and resolves to approach Dr.'s Kimmin and Klinka from UBC to request their assistance.
Roy Strang advises that the Heritage Society discussed the root rot issue at their most recent AGM.

April 12, 2000: Manager of Urban Forestry and Environmental Services informs the Advisory Committee that he has been requested to resolve the root rot issue.
Advisory Committee requests an extension to their plan to involve Kimmins and Klinka.

October, 2000: Manager of Urban Forestry and Environmental Services engages consultant to review root rot in Sunnyside Acres. Advisory Committee strikes a sub-committee to steer the process.

December 5, 2000: Consultant presents the sub-committee with information on root rot and possible management options.

January 4, 2001: Subcommittee meets again and resolves that the creation of a 'buffer' to stop the spread of the root rot is the preferred management option.

January 15, 2001: A motion (McLeod/Miller) recommending the third option (buffer creation) with possible limited planting was approved 5 to 1; Roger Phillips opposing as he felt the need for more information.

April 11, 2001: Parks, Recreation and Culture Commission receive staff report. Resolve 'that staff review Commission discussion and prepare other options for referral to the Parks sub-committee' of Commission.

May-June 2001: Consultant hire to prepare a cost-benefit analysis. The report was presented to the Park sub-committee on June 12, 2001.
Parks sub-committee supported the creation of a buffer to contain the root rot. Instead of removing all susceptible trees from the buffer area, as per original buffer option, it was decided that trees that would not fall and strike the road or trails could be girdled, causing death, but serve wildlife needs.

July 11, 2001: PRC Commission approves the 'option c-3: buffer: Girlding and Removal of Trees. They also 'instruct staff to conduct a public consultation process to gather feedback prior to the implementation of Option C-3.'

Parks staff consults with Parks sub-committee and it is decided to conduct two public open houses.

October 2, 2001: First public open house at Rotary Field House. Ads were placed in local newspapers, signs erected in the Forest to inform public.

Staff distribute 273 notices, about the second public open house, directly to residents living in the area.

October 11, 2001: Second public open house at Rotary Field house.

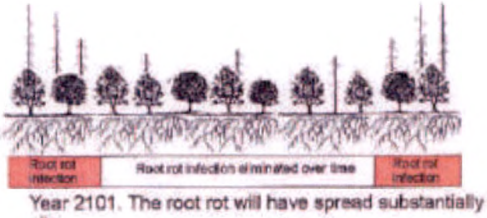
October, 2001:	Coincidental with collecting information from local residents about access and recreation issues in the Forest, a survey is conducted during October of residents living near the Forest to gather their opinion on how best to manage the root rot. 88% agreed that the City should work towards stopping the spread of the root rot disease.
October 29th, 2001:	Parks sub-committee reviews results of open houses and survey. 60% of public open house attendees support creating a buffer- option c-3, 28% preferred to leave the Forest alone, 12% did not have a clear opinion.
November 7th, 2001:	Parks, Recreation and Culture Commission approved the implementation of option c-3, buffer creation: girdling and removal of trees to manage the root rot disease.
February 4, 2002:	Sunnyside Acres Heritage Society at their annual AGM resolve to open up the root rot management review process due to 'new' information brought forward at the AGM by Roger Phillips.
February 11, 2002	Sunnyside Acres Urban Forest Advisory Committee discusses the root rot management issue and resolves 'that in light of newly emerging research on the spread of root rot, the management authority withhold action pending further consideration of the available options'.
April 22, 2002	Roger Phillips, Roy Strang, Wayne Sakamoto (staff), Greg Ward (staff), Trevor Cox (consultant) meet Rona Sturrock, root rot researcher, to discuss her research.
May 13, 2002	Advisory Committee meets and discusses information arising from meeting with Rona Sturrock and its' implications for managing root rot in Sunnyside Acres Urban Forest.

Sunnyside Acres Urban Forest Root Rot Disease Management

A Comparison of the Options

Option A - No Treatment of the Disease

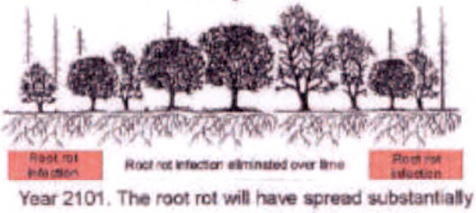
In 100 years



Year 2101. The root rot will have spread substantially and a predominantly deciduous stand will establish on the site.

Option B - No Treatment of the Disease. Implement a Planting Program

In 100 years



Year 2101. The root rot will have spread substantially and a planted deciduous forest will establish on the site.

Option C-1 and C-2 - Contain the Disease and Replant.

Create a disease free buffer by removing trees

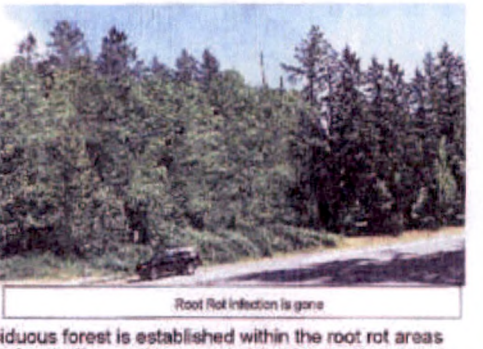
In 100 years

Year 2101. The root disease is contained and a maturing deciduous forest is established within the root rot areas while the endangered Douglas-fir forest is saved.

Option C-3 - Contain the Disease and Replant.

Create a disease free buffer by removing some trees using machinery and girdle others to create wildlife trees.

In 100 years



Year 2101. The root disease is contained and a maturing deciduous forest is established within the root rot areas while the endangered Douglas-fir forest is saved. The disease free buffer provides new habitat for small mammals and birds.

A Comparison of the Options

The following table summarizes the cost of implementing each option.

Management Options	Cost of implementation over 20 years	Cost of implementation over 20 years with volunteers
Option A – No treatment of the disease.	$110,400	N/A
Option B – No treatment of the disease. Implement a planting program.	$181,832	$161,112
Option C1 – Contain the disease and replant. Create a disease free buffer and remove trees using horses.	$345,783	$293,601
Option C2 – Contain the disease and replant. Create a disease free buffer and remove trees using machinery.	$17,252	-$1,090
Option C3 – Contain the disease and replant. Create a disease free buffer by removing some trees using machinery and girdle others to create wildlife trees.	$79,531	$65,011

A summary of impact rating

The following table measures the social, aesthetic, environmental and economic impacts of each management option. Each impact is rated from 1 to 5. 1 represents the least or most positive impact while 5 represents the highest or most negative impact. This method of analysis creates a standard from which each option can be compared.

	Option A No treatment of the disease	Option B No treatment of the disease. Implement a planting program	Option C-1 Contain the disease and replant. Create a disease free buffer and remove trees using horses.	Option C-2 Contain the disease and replant. Create a disease free buffer and remove trees using machinery.	Option C-3 Contain the disease and replant. Create a disease free buffer by removing some trees using machinery and girdle others to create wildlife trees.
Implementation costs	3	4	5	1	2
Aesthetic impact short term	1	1	5	5	5
Aesthetic impact long term	5	3	1	1	1
Initial Social Acceptance	1	1	3	5	3
Long term Social Acceptance	5	4	1	1	1
Preservation of the rare Douglas-fir stands	5	5	1	1	1
Total impact rating*	20	18	16	14	13

* The lower the number, the better the rating

The Preferred Option

Option C-3: Contain the Disease and Replant: Create a disease free buffer by removing some trees using machinery and girdle others to create wildlife trees.

- The spread of the disease would be stopped, thereby saving the habitat associated with the Douglas-fir forest.
- The girdled trees will provide important habitat for many small birds and mammals.
- Tree removal will take place only where root rot disease areas are within a trees length of roads or trails.
- The economic impacts of this option are low as the costs are offset through the sale of some of the trees removed from the buffer.
- The social and aesthetic impacts are moderate in the short term while the long term social, aesthetic and ecological impacts are low as this option retains the rare Douglas-fir trees and their associated habitat.

In 100 years

Root rot infection is gone

Root rot infection is gone

Year 2101. The root disease is contained and a maturing deciduous stand is established within the root rot areas while the endangered Douglas-fir forest is saved. The disease free buffer provides new habitat for small mammals and birds.

SURREY
CITY OF PARKS

Surrey Parks, Recreation and Culture
Commission Report

Business Arising

SUNNYSIDE ACRES ROOT ROT MANAGEMENT STRATEGY

FROM: Manager, Urban Forestry and Environmental Services

FILE: 0546-501

DATE: October 31, 2001

COMMISSION MEETING: November 7, 2001

RECOMMENDATION

That the Parks, Recreation and Culture Commission approve the implementation of root rot management Option C-3: Buffer; Girdling and Removal of Trees to manage the root rot disease in Sunnyside Acres Urban Forest.

BACKGROUND

Root rot disease management options for Sunnyside Acres Urban Forest were reviewed at the April 12, 2001 Parks, Recreation and Culture Commission meeting. At the meeting Commission passed the following resolution: *"that staff review Commission discussion and prepare other options for referral to the Parks Sub-committee".*

At the July 11, 2001 Commission meeting Commission passed the following resolutions:

1. *support in principle the implementation of Option C-3: Buffer; Girdling and Removal of Trees to manage the root rot disease in Sunnyside Acres Urban Forest.*
2. *instruct staff to conduct a public consultation process to gather feedback prior to the implementation of Option C-3.*

In consultation with the Parks Committee of Commission, staff conducted two public open houses and a survey of residents living in south Surrey to gather feedback on the root rot management issue.

At the open houses a series of storyboards comprehensively outlined the issue and were arranged for public viewing. Staff were on hand to answer any questions from individuals that attended the meeting. The storyboards are attached to this report as *Appendix I, Sunnyside Acres Urban Forest Root Rot Disease Management.* The public were invited to comment on the issue and a summary of the comments is attached to this report as Appendix *II, Sunnyside Acres Root Rot Open House 2001: Summary of Comments.* Approximately forty residents attended the open house meetings.

Forty-nine residents living in south Surrey were surveyed to assess their opinion on the importance of the Douglas-fir trees in Sunnyside Acres Urban Forest. The survey questions and results are attached to this report as *Appendix III, Sunnyside Acres Root Rot Management Survey Results.* The surveyor outlined the root rot issue with residents and took time to answer any questions.

DISCUSSION

We have received twenty-five written comments from the public regarding the issue of root rot management in Sunnyside Acres Urban Forest. Of the comments received, 60% support implementation of Option C-3, buffer creation through the girdling and removal of Douglas-fir trees, 28% prefer to leave the forest as is, and 12% did not clearly indicate a preferred management option.

The survey results clearly show support for saving the Douglas-fir trees and controlling the disease. When asked the question if 'the City should work towards stopping the spread of the disease in order to save the Douglas-fir trees?', 88% responded they agreed. When residents were asked if 'the Douglas-fir trees in Sunnyside Acres are an important part of the forest', 96% agreed. Interestingly, 44% indicated a willingness to volunteer to replant the forest.

October 29th, 2001 the Parks Committee reviewed the results of the public open houses and the survey, concluding that the results '*validate the public's agreement with implementing the creation of a buffer through the removal and girdling of Douglas-fir trees to arrest the spread of the root rot disease, Option C-3*'.

Should Commission approve the implementation of Option C-3, staff will prepare an implementation plan in consultation with the Park Committee and the Sunnyside Acres Urban Forest Advisory Committee. The implementation plan will include addressing the need to provide comprehensive information to the public prior to and during any field work, finding alternative funding sources and potential partnerships for conducting the work, as well as enlisting volunteers to assist with the re-planting of the forest.

CONCLUSION

The root rot disease in Sunnyside Acres Urban Forest, if left untreated, will continue to spread through the forest and will result in the loss of the rare stand of Douglas fir trees and their associated plant communities. Upon review of the public feedback received, the Parks Committee endorses the implementation of *Option C-3: Buffer; Girdling and Tree Removal.* It is recommended that Commission approve the implementation of Option C-3 to manage the root rot disease in Sunnyside Acres Urban Forest.

for Greg Ward, Manager
Urban Forestry and Environment Services

:gw
Attachments

GENERAL MANAGER'S COMMENTS

The General Manager supports the above recommendation.

Root Rot in Sunnyside Acres Urban Forest
Summary of Public Review and Decision-making Processes

1999: Parks, Recreation and Culture Commission requests Sunnyside Acres Urban Forest Advisory Committee to investigate the occurrence and effect of root rot on the forest.

Jan 24, 2000: Urban Forest Advisory Committee discusses issue and resolves to approach Dr.'s Kimmin and Klinka from UBC to request their assistance.
Roy Strang advises that the Heritage Society discussed the root rot issue at their most recent AGM.

April 12, 2000: Manager of Urban Forestry and Environmental Services informs the Advisory Committee that he has been requested to resolve the root rot issue.
Advisory Committee requests an extension to their plan to involve Kimmins and Klinka.

October, 2000: Manager of Urban Forestry and Environmental Services engages consultant to review root rot in Sunnyside Acres. Advisory Committee strikes a sub-committee to steer the process.

December 5, 2000: Consultant presents the sub-committee with information on root rot and possible management options.

January 4, 2001: Subcommittee meets again and resolves that the creation of a 'buffer' to stop the spread of the root rot is the preferred management option.

January 15, 2001: A motion (McLeod/Miller) recommending the third option (buffer creation) with possible limited planting was approved 5 to 1; Roger Phillips opposing as he felt the need for more information.

April 11, 2001: Parks, Recreation and Culture Commission receive staff report. Resolve 'that staff review Commission discussion and prepare other options for referral to the Parks sub-committee' of Commission.

May-June 2001: Consultant hire to prepare a cost-benefit analysis. The report was presented to the Park sub-committee on June 12, 2001.
Parks sub-committee supported the creation of a buffer to contain the root rot. Instead of removing all susceptible trees from the buffer area, as per original buffer option, it was decided that trees that would not fall and strike the road or trails could be girdled, causing death, but serve wildlife needs.

July 11, 2001: PRC Commission approves the 'option c-3: buffer: Girlding and Removal of Trees. They also 'instruct staff to conduct a public consultation process to gather feedback prior to the implementation of Option C-3.'

Parks staff consults with Parks sub-committee and it is decided to conduct two public open houses.

October 2, 2001: First public open house at Rotary Field House. Ads were placed in local newspapers, signs erected in the Forest to inform public.

Staff distribute 273 notices, about the second public open house, directly to residents living in the area.

October 11, 2001: Second public open house at Rotary Field house.

October, 2001:	Coincidental with collecting information from local residents about access and recreation issues in the Forest, a survey is conducted during October of residents living near the Forest to gather their opinion on how best to manage the root rot. 88% agreed that the City should work towards stopping the spread of the root rot disease.
October 29th, 2001:	Parks sub-committee reviews results of open houses and survey. 60% of public open house attendees support creating a buffer- option e-3, 28% preferred to leave the Forest alone, 12% did not have a clear opinion.
November 7th, 2001:	Parks, Recreation and Culture Commission approved the implementation of option e-3, buffer creation: girdling and removal of trees to manage the root rot disease.

Sunnyside Acres Urban Forest
Root Disease Assessment
Project 2006

By Jeff Fournier, BSF, RPF, MPM
Forest Health Consultant

Prepared for Nadia Chan
City of Surrey – Department of Parks, Recreation and Culture

February 2007

Executive Summary

Laminated root rot, caused by the pathogen Phellinus weirii, is significantly impacting the health, stability and structure of a number of Douglas-fir dominated forests in the urban parks of South Surrey. This root disease activity has resulted in significant alterations to the visual characteristics and the aesthetics of infected areas. Increasing prevalence of disease has resulted in an increased incidence of trees classified as hazardous to the safety of park users, park staff and proximal homes and structures. This in turn has presented an increasing challenge to the municipal staff and budgets. More importantly, the retention of the rare and endangered Coastal Douglas-fir ecosystems in the area are threatened by the activity of laminated root.

An aggressive hazard tree evaluation and management program has been implemented to address the short-term issues associated with dead and dying trees. In 2001 –2003 root disease management studies and mitigation actions were undertaken to control root disease spread and hazard tree creation. In 2003 and 2004, tree falling and removal treatments were initiated in the Sunnyside Acres Urban Forest to mitigate long-term laminated root rot spread.

In 2006, an evaluation was undertaken to confirm the effectiveness of past "bridge tree" tree removal actions and to recommend additional actions needed to mitigate spread of laminated root rot within susceptible stand types. The scope of the project was expanded to include the evaluation of the emerging impacts of Douglas-fir beetle (*Dendroctonus pseudotsugae* Hopkins) and to better clarify the range of management strategies needed to achieve long term disease management objectives.

This assessment provides:

- A detailed map of the locations of recently identified laminated root rot centers relative to the locations of previous buffer zone removal treated areas at Sunnyside Acres.
- A detailed listing of the trees within the newly identified laminated root rot centers that have been proposed for removal to mitigate disease spread.
- A basic literature review on the biology of Douglas-fir beetle and management strategies commonly used to mitigate impacts of the pests.
- A basic assessment of the past and potential future impacts of Douglas-fir beetle activity on the health of the Douglas-fir stands at Sunnyside Acres Urban Forest.
- Recommendations on forest health management strategies that could be undertaken to protect short and long-term health of the Douglas-fir stands Sunnyside Acres Urban Forest from laminated root rot and the Douglas-fir beetle.

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Introduction

A review of Douglas-fir stands within Sunnyside Acres Urban Forest was initiated in October of 2006 to verify, quantify and assess root disease pockets that were believed to be situated outside of the previously identified laminated root rot pockets and established buffer zone treatments. The locations of each disease center, complete with a 10 meter buffer zone, were carefully delineated. The physical attributes and disease status of each tree within the marked areas was recorded. Park staff requested that three treatments options were to be provided along with information on proposed tree cutting and or salvaging activities and the potential impacts of those options.

During a preliminary on-site inspection of the park, it became apparent that the objectives of the review needed to be modified to account for 1) a review of the past disease management activities undertaken in the park, 2) the apparent increasing importance of the Douglas-fir Bark Beetle (*Dendroctonus pseudotsugae* Hopkins) on the Douglas-fir trees in the park and 3) the need to develop treatments plans and activities to ensure the success of past and proposed strategies designed to achieve long term tree health.

Previous Studies and Previous Treatment Activities

Information from two previous studies in Sunnyside Acres Urban Forest by B. A. Blackwell and Associates (December 2000) and Diamond Head Consulting (May 2001) provided direction and context for the disease management activities that were undertaken at that park. These studies, as well as that of Fournier (2004), provide detailed background information on the basic biology, identification, impact and control of laminated root rot.

In 2003 and 2004, treatments were initiated in the Sunnyside Acres Urban Forest to mitigate long-term laminated root rot spread. Specifically, disease susceptible trees were felled for a distance of 10 meters beyond the outer edge of the root disease centers to reduce or prevent disease transmission between the infected and health portions of the stands. The felling of these "bridge trees" in these "buffer zones" is expected to slow or halt the outward spread of the root disease centers. The principle behind this approach is that over time, dying and then dead root systems of the felled trees become increasingly less capable of the spreading and retaining *Phellinus weirii*, the causal agent of laminated root rot.

These buffer remove treatments were conducted in accordance with a modified version of Option C (2) – Buffer Removal and Stand Re-Establishment process as described in the May 2001 Diamond Head Consulting Report. With the changes to Option C (2), tree removals were limited to the buffer zones immediately surrounding the peripheries of the disease centers. It remains unclear if any of the buffers were planted with laminated root rot immune or resistant trees and if any associated follow-up activities in the originally proposed Option C were ever implemented.

Douglas-fir Bark Beetle Management

The relative importance of the Douglas-fir bark beetle in the maintenance of Douglas-fir stand health and sustainability appears to be an emerging issue in Surrey parks as well as other local Douglas-fir dominated ecosystems. Historically, significant impacts by Douglas-fir beetle in coastal British Columbia forests have been sporadic and largely associated wind throw, fires or other events that create recently killed host material. With such events, the ready availability of host material allows bark beetle levels to rapidly expand and spread into adjacent healthy standing timber. Typically, such outbreaks have been relatively short term (1-3 years) and have localized impacts.

At Sunnyside Acres Urban Forest (Sunnyside Park), there appears to have been an ongoing low level activity by the Douglas-fir bark beetle largely associated with root rot infected trees and wind thrown timber. However, in recent years it was observed that patches of bark beetle killed timber have arisen in the park. Considering the atypical summer drought-like climatic conditions experienced in the last few years, it is possible that otherwise healthy Douglas-fir stands may become significantly more susceptible Douglas-fir beetle attacks.

In order to maintain the health of Douglas-fir stands in the Sunnyside Park, it is essential that park management activities give consideration be given to Douglas-fir beetle population dynamics and management strategies. To assist in the management of this pest, basic information on Douglas-fir beetle biology, population dynamics and management strategies have been provided (Appendix 1).

Data Collection and Observations

Combinations of above- and below-ground symptoms were utilized to determine if suspect areas and individual trees were afflicted with laminated root rot. The characteristic above-ground symptoms that were utilized include the presence of dead or dying trees, decayed root systems on wind fall trees and hollow stumps. Within each area suspected of having root rot, soil excavations were conducted to allow inspection of root collars of potentially infected the trees (Figure 1). In trees with well advanced above-ground symptoms, shallow excavations were usually sufficient to determine disease presence. However, in trees with less pronounced symptoms, excavations commonly needed to extend down into mineral soil to determine pathogen presence/absence. Due to time constraints, infection confirming excavations were limited to trees that needed to have disease status confirmed to allow accurate delineation of the extent and location of bridge tree removal buffers.

When assessing the Douglas-fir Bark beetle, the presence of boring frass (Figure 2) or pitch exudations (Figure 3) on bark surfaces was the preliminary indicator of beetle colonization. Successful beetle establishment was then confirmed by the removal of sections of bark to reveal the presence of characteristic galleries (Figure 4) and insect broods.

The root disease related data that was collected during the inspections is as follows:

- Data (trees species, diameter (DBH) and status (live vs. dead))on infected trees,
- Data (DBH and species) on all trees that may need to removed should such a disease management activity,
- Options for salvaging or leaving logs should tree removal be implemented.

Figure 1 Tree Root Collar Excavation to Determine Presence of Laminated Root Rot Infections

Figure 2 Reddish Boring Dust from a Successful Douglas-fir Beetle Attack

Figure 3 Resin Exudations from an Unsuccessful Douglas-fir Beetle Attack

Figure 4 Characteristic Douglas-fir Beetle Galleries in a Bark Sample

Results of 2006 Inspections

Inspections of Douglas-fir stands done in the areas proximal to the previously identified disease centers confirmed an additional six areas of laminated root rot outside of the previously established buffer areas (Map1). Within these newly identified infection areas and the surrounding 10m buffer zone, a total of 59 trees are recommended for removal. A summary of the data collected during the field inspections can be found in Table 1 while the complete data collected can be found in Appendix 2.

For pests other than laminated root rot, it was observed that three spatially separated trees were heavily infected with or killed by Armillaria root rot and two other areas were found to have dead or dying trees due to the Douglas-fir beetle (Figure 6).

Discussion

Historical Root Disease Management Activities

Survey results and observations confirmed the treatment activities completed to date have been reasonably effective in isolating diseased areas within buffer treatments. The most notable exception to this are the infection centers at locations 5 and 6 (Figure 6) each of which, has about 20 trees that are currently proposed to be removed.

From the review of the previously prescribed and implemented activities, it was noted that there were two other key management tools that had not been implemented to manage of laminated root rot spread and impact. First, there was no plan developed or activities undertaken or scheduled to maintain buffer areas free from infill by Douglas-fir, grand fir, hemlock and other laminated root rot susceptible conifers. Key intervention activities that could have been undertaken to achieve this include, a) the physical removal (hand-pulling or cutting) of susceptible tree species that may reseed into the buffer areas, b) replanting of the buffer areas with immune and resistant tree species that would occupy the site and help prevent re-establishment of laminated root rot host species or c) the combination of activities a and b. In the absence of such site maintenance, the infill of these root rot susceptible species will likely, overtime, create localized networks of susceptible root systems that will compromise the long-term integrity of the treated buffer zones.

The second key management tool not previously utilized was the inspection of stump tops of felled trees to look for disease related decay or wood staining (Figure 5). In Sunnyside Acres Urban Forest and other areas with tall mature trees and high levels of crown closure, it is difficult to use crown symptoms other above-ground symptoms to accurately delineate the periphery of a disease centre. In such middle-aged stands, stump top inspections of felled trees are a key tool in confirming that buffer zones are properly located. Where stump staining is found, trained fallers, are able to do last minute fine-tuning of buffer zone boundaries by extending buffer zones 10m outward from the last symptomatic stump. It is important to note that certain stump top incipient decay symptoms may only be visible for a few days post-falling (Thies and Sturrock 1995) but these transient indicators can provide important information on the infection status of a given tree. Stump top inspections significantly increase the ability to

accurately identify the extent of a laminated root rot disease centre (Wallis and Reynolds 1981) (Theis and Sutrrock 1995) as well as the associated bridge trees that need to be removed.

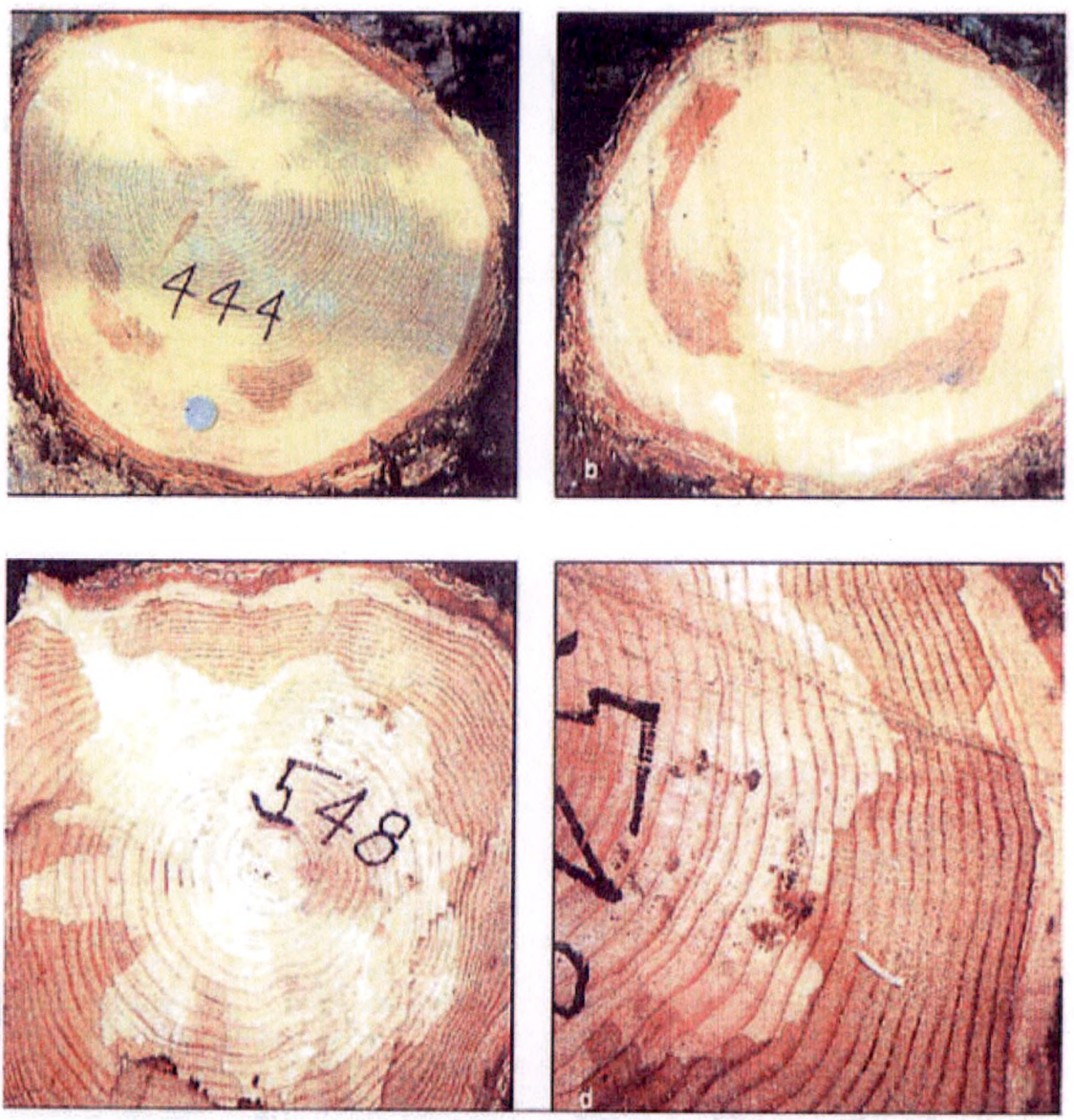

Figure 5 Characteristic Laminated Root Rot Staining on Freshly Cut Douglas-fir stems.

Photos extracted from *Laminated Root Rot in Western North America* by Thies and Sturrock 1995).

Table 1 Summary of Tree Data Collected

Information on specific rough locations denoted on attached preliminary inspection map.

Location	Primary Pest	Secondary Pest	Rough No*. of confirmed infected trees	Rough No*. trees in buffer	Total No. of Tree for potential removal
1	Laminated root rot		0 (old stump)	2	2
2	Laminated root rot		1	3	4
3	Laminated root rot	Douglas-fir beetle	2	6	8
4	Laminated root rot		1	2	3
5	Laminated root rot		4	15	19
6	Laminated root rot		3	14	17
A	Armillaria root rot		1		0
B	Armillaria root rot		1		0
C	Armillaria root rot		1 (windfall)		0
D	Douglas-fir beetle	Armillaria root rot	8		0
Blue dots	Girdled buffer tree - live		6	none	6
Sum			28	42	59

* to be accurately confirmed

Note:

- More *Armillaria ostoyae* infected trees located throughout the park but only those close to the buffer that were inspected for Laminated Root Rot were recorded.
- Buffers will delineated using diseased standing and windfall as well as any stumps confirmed to have disease.

Interrelationship Between Douglas-fir Beetle Impacts Recent Root Rot Management Actions

Ongoing minor Douglas-fir bark beetle activity can be seen throughout the park but standing trees currently being killed can be found in the far south-east end of the main root disease pocket. Douglas-fir beetles continue to be active in the disease trees and the populations reared from these trees appear to be attacking and, periodically, killing trees. Many of the trees attacked by these beetles are located within the disease centre at location 5 (Figure 6) and are infected with laminated root or directly adjacent to diseased trees. The ongoing advancement of disease infections within the unfelled root rot centers can be expected to maintain local bark beetle populations and to further contribute to attacks of standing trees outside of the existing buffers.

The timing of the Douglas-fir beetle killed timber identified in locations 3 and 6 (Figure 6) appears to have coincided with the logging and removal of timber within the root disease buffer area. Beetles appear to have reared in felled timber or logging slash and spilled over into adjacent apparently health standing trees. Fortunately, the elevated beetle population and resultant tree mortality appears to have rapidly declined over a two to three year period.

The use of tree girdling as a technique to remove buffer trees did not appear to be a successful. First, a number of trees managed to survive the girdling process and these live trees currently compromise the success of disease buffers around them. Secondly, it is apparent that the dieing girdled trees reared beetles (Figure 7) that likely contributed to the local Douglas-fir beetle populations that attacked and killed standing trees in and adjacent to at the disease center at locations 3 (Figure 6).

Proposed Treatment Options

While there are a number of potential approaches that could be taken to manage forest health issues in Sunnyside Acres Urban Forest, three options were determined to be the most appropriate for park staff to select from. These options, presented below, were selected primarily based on 1) protection of existing Douglas-fir stands from short-term impacts from both laminated root rot and the Douglas-fir beetle, 2) protection of the long term stability of Douglas-fir ecosystems in the park, 3) protection of the effectiveness of laminated root rot management investments done to date, and 4) minimizing the impacts of forest health management activities of park aesthetics.

In the implementation of these options, it is anticipated that all tree retention or removal decisions need to give full consideration to their potential to impact bark beetle activity. With any harvesting activities that may be undertaken, the timing of the felling and removal of logs will need to be carefully planned to ensure local beetle populations are "soaked up" and moved off-site prior to beetle emergence. There is sufficient historical evidence that without such consideration, more otherwise healthy trees will be killed.

An additional point to note is all of the presented management options are intended to compliment the routine hazard tree abatement actions being undertaken at the park.

Figure 7 Girdled Tree from Buffer Zone with Bark Sample Revealing Douglas-fir Beetle Galleries

The recommended options are:

Option 1

1. Remove trees from identified disease centers and associated10 meter buffer zones at locations 2-6 (inclusive) as described below.

    a. Tree felling should occur just before or during the bark beetle flight period (expected in May or June) so that existing beetle populations can be drawn away from trees that will be retained.

    b. Trees must be felled into existing open areas in a manner that maximizes the distance between those stems and standing timber. This careful placement is needed to help draw attacking beetles away from healthy Douglas-fir trees that will be retained.

    c. Inspect stumps created during felling of buffer zone trees to determine if disease related staining (Figure 5) is present. Where present extend buffer zone boundary 5 to10 meters outward form last stained stump.

    d. All felled timber must be removed before beetles emerge from those stems. While this initial emergence can be expected around mid-July, the maturation of the beetle broods needs to be monitored to ensure appropriate timing.

2. Remove all trees that are still alive after previous girdling treatments. These trees need to be removed to establish the 10 meter buffer zone that the girdling treatment intended to achieve.

    a. Remove the trees in accordance with the timing and approaches described in 1 above.

3. Create a schedule of annual root disease inspections to confirm that no spread has occurred from the hollow stump in location 1. Where spread is found outside of the buffer treat the disease center and a 10 meter buffer zone in a manner prescribed for locations 2-6.

4. Consider salvage opportunities or danger tree management activities for locations A - D.

Option 2

Implement all actions described in Option1 and undertake the following actions:

5. In the summer following the implementation of Option1, fell living trees from the disease center to create trap logs within the disease management buffer zone openings. These trap logs will be used to capture Douglas-fir beetles that may be reared by the logging debris and stumps created by implementation of Option1. Undertake these actions such that:

    a. Fall three or four adjacent trees to create three separate trap tree clusters in each the buffer areas openings of the northern, central and southern sections of the disease center.

    b. Trap tree felling should occur just before or during bark beetle flight (expected in May or June) so that existing beetle populations can be drawn away from trees that will be retained.

    c. Trap trees must be felled into existing open areas in a manner that maximizes the distance between those stems and adjacent standing timber. This careful placement is needed to help draw attacking beetles away from healthy Douglas-fir trees that will be retained.

    d. All felled timber must be removed before beetles emerge from those stems. While this initial emergence can be expected around mid-July, the maturation of the beetle broods needs to be monitored to ensure appropriate timing.

Option 3

Implement all actions described in Options 1 & 2 and undertake the following incremental actions:

6. Develop and implement a treatment strategy and implementation timetable to maintain buffer areas free from infill by Douglas-fir, grand fir, hemlock and other laminated root rot susceptible conifers. Key steps in this strategy include:

    a. Stratify the existing and newly created buffer openings on the basis of existing or anticipated infill from disease host tree, non-host trees or brush species. For each strata determine which plant species complex will be targeted for creation or retention.

        i. Brush species dominated community. This community will be relatively short lived before a gradual transition towards a tree dominated community.

        ii. Non-host tree dominated community – Can be achieved by passive restocking from local seed sources or by planting.

b. Develop strata-specific management plans that include host exclusion activities and monitoring regime. Key host exclusion techniques to be used include:

   i. the physical removal (hand-pulling or cutting) of susceptible tree species that may invade the buffer areas,

   ii. replanting of the buffer areas with immune and resistant tree species that would occupy the site and help prevent re-establishment of laminated root rot host tree species.

      Note: Deciduous trees can be expected to fill this role for 40 – 80 years before die-off is expected. In the case of conifers, only establishment of western red cedar is recommended and use of this species will be limited to wetter portions of the park. Western red cedar can be expected to live hundreds of years on a suitable site

   iii. a combination of activities i and ii as per above.

Summary

The spread of laminated root rot at Sunnyside Acres Urban Forest is currently under control with the exceptions of the identified pockets outside of the cut over buffer areas. The implementation of any of the presented options should finalize any immediate actions required control spread of this disease and will minimize the potential for bark beetle impacts in the short term. Option 3 provides the most desirable scenario to maximize short and long-term disease control success while keeping bark beetle impacts in check and maintaining park functionality and visual aesthetics.

Additional options to restore and maintain the Douglas-fir ecosystems currently located within the disease centers should be considered. Information on these activities can be found in the report I did for Crescent Park (Fournier 2004).

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Appendix 1 Douglas Fir Bark Beetle Biology And Management Options

The Douglas-fir beetle can be a highly destructive pest in Douglas-fir trees throughout British Columbia but is particularly threatening in the interior regions of the province. The beetle primarily inhabits wind felled trees, damaged or drought-stressed timber, harvvested timber, and logging debris (DFB Pest Guide 2002, Johnson 1960a). During epidemic populations, attacks from this pest kill can significant numbers of healthy green trees (McMullen 1975).

Insect description and biology

Adult beetles are reddish brown to dark brown in color and about 4.5 to 7mm in length (Bark Beetle Management Guide Book, 1995) while mature larvae are generally about 6 mm in length and white with a brown head capsule. Eggs are glossy white, elliptical in shape and about 0.5 mm in length (McMullen 1977).

The Douglas-fir beetle generally has a one year life cycle with up to two broods produced in one year. Overwintering occurs in host material with beetle in the form of young (callow) adults or mature larvae. When spring temperatures exceed 18 ^{0} C, usually May or June, the main (adult) brood will emerge and attack new host material. By July, the overwintering larvae of the secondary brood have matured and begin their emergence. It is also this time when adults from the initial flight may re-emerge to find new host material (McMullen 1977). New adults maybe present well in advance of the forthcoming winter but will not emerge until the following spring due to a need for diapause (Ryan 1959).

Upon emergence from a host, adult beetles seek and attack out new host material. After finding a suitable host, adults bore in through the bark and construct main galleries in the phloem tissue that are parallel to the long axis of the stem. Eggs laid in niches along the parent gallery later hatch and the resulting larvae mining galleries that are perpendicular to those of the adults (Figure 4)

Attack symptoms

The first symptom of successful attack is the presence of reddish-brown boring dust on a host's bark (Figure 2). Adults normally bore in through fissures in the host bark. This diagnostic boring dust can be washed away by rain and is best observed in late June or early July shortly after an attack has commenced. Suspected infestations can be confirmed by removing a section of the bark to expose the beetle's characteristic galleries (Figure 4) (McMullen 1977). In standing live trees, the evidence of attack is most commonly found in the mid bole area of the stem.

Another good indicator of a successful attack in a live tree is the discoloration of tree foliage. Foliage will turn from green to pale-green to reddish brown as the beetle colonization progresses (DFB Pest Guide, 2002). These symptoms may be apparent as early as in the fall but often do not appear until the spring of the year following attack (McMullen 1977).

Evidence of an unsuccessful attack in green trees is the presence pitch being exuded from attempted bark beetle entrance holes and down the stem in the upper and mid-bole sections of the host (Figure 3).

Host influences

The physical condition of the host, dead or alive, can be the single greatest factor determining the success of Douglas-fir beetle attacks. With living hosts, the better the physiological condition of a tree, the greater its chance of it warding of bark beetle attacks. Healthy vigorous trees are able to exude sufficient quantities of resin to "pitch out" or suffocate attacking beetles. Over mature, injured and moisture stressed trees have reduced resin producing capabilities and more readily colonized by bark beetles. However, in situations where bark beetle numbers are high, even vigorous trees do not have sufficient resources to fend off beetle attacks and are eventually killed (Knight and Heikkenen 1980).

With dead host material, the success of the beetle infestation is attributable to the condition of the host's phloem tissues. Recently killed or felled timber provides the best rearing material for the Douglas-fir bark beetle with the quality of the host rapidly declining over time (Knight and Rudinsky 1958).

Control tactics

There are a number of options that can be employed to prevent or mitigate Douglas-fir beetle infestations through the reduction or removal of suitable host materials. All of these approaches require careful timing relative to beetle flights and other biological constraints. The ones most applicable to the Sunnyside Acres Urban Forest are as follows:

1. Single tree treatments

With single tree treatments, individual Douglas-fir beetle infested tree are felled and removed, peeled or burnt to prevent spread to adjacent host materials. This approach is cost intensive and is most appropriate when dealing with high value trees where low level beetle populations are in isolated and discrete pockets.

2. Sanitation harvesting

With sanitation harvesting, the focus is on the removal of existing infested Douglas-fir logs, trees and materials to move the associated bark beetle populations off-site before they can spread to adjacent healthy host material. The removed materials are then put through a debarking or milling process which will kill off the beetle broods. Sanitation harvesting can be utilized to dampen beetle populations that range from low to high levels.

3. Trap trees

With the trap tree approach, healthy recently felled Douglas-fir logs are used to attract and absorb local adult beetles. The newly attacked materials are then removed from the site prior to the adult flight period to suppress local beetle populations. Trap trees normally rely on the natural attractiveness of the freshly felled trees but colonization levels may be enhanced by the use of pheromone attractants. Once removed from the site, the infested is debarked or milled to kill off the beetle population.

Appendix 2 Individual Statistics of Trees Proposed For Removal

Loc'n	Tree #	SPP	DBH	Surrey Tree Id #	Health Status (Live or dead)	Pest Status and Comments
1	-	DFC	-	-	-	Single rotted out stump- no evidence of transfer to existing stand
2	1	DFC	68.2	-	live	former boundary tree
2	2	DFC	26.5	-	live	former boundary tree
2	3	DFC	61.5	-	live	
2	4	Hw	24.6	-	live	
2	5	DFC	37.5	-	dead	laminated root rot confirmed
2	6	DFC	39.4	-	live	
2	7	DFC	49.9	-	live	
3	1	DFC	25.1	-	dead	snag
3	2	DFC	31.8	-	live	
3	3	DFC	39.0	-	live	
3	4	DFC	21.5	-	live	
3	5	DFC	23.8	-	dead	Douglas-fir beetle old attack
3	6	DFC	53.5	-	live	former boundary tree
3	7	DFC	52.8	-	dead	laminated root rot confirmed and Douglas-fir beetle (old)
3	8	DFC	42.8	-	live	laminated root rot confirmed and Douglas-fir beetle pitch-out
3	9	DFC	52.9	-	dead	Douglas-fir beetle current attack
3	10	DFC	54.1	-	dead	Douglas-fir beetle old attack
3	11	DFC	62.7	-	dead	Douglas-fir beetle old attack
3	12	DFC	26.8	-	dead	Douglas-fir beetle current attack
4	1	DFC	39.7	-	live	Douglas-fir beetle pitch-out
4	2	DFC	53.1	-	live	Douglas-fir beetle pitch-out
4	3	DFC	37.9	-	live	Douglas-fir beetle pitch-out
4	4	DFC	24.3	-	live	Douglas-fir beetle pitch-out
4	5	DFC	34.9	-	live	
4	6	DFC	52.3	-	live	laminated root rot confirmed and Douglas-fir beetle (current)
5	1	DFC	29.3	-	live	
5	2	DFC	49.0	-	live	former boundary tree and Douglas-fir beetle (current)
5	3	DFC	34.0	-	live	Douglas-fir beetle pitch-out
5	4	DFC	41.0	-	live	Douglas-fir beetle pitch-out
5	5	DFC	23.9	-	live	
5	6	DFC	28.4	-	live	
5	7	DFC	43.8	-	live	
5	8	DFC	53.8	-	live	
5	9	DFC	23.7	-	live	
5	10	DFC	35.5	-	live	
5	11	DFC	34.1	-	live	
5	12	DFC	39.7	-	live	
5	13	DFC	26.5	-	live	
5	14	DFC	43.9	-	live	
5	15	DFC	35.4	-	dead	Douglas-fir beetle old attack
5	16	DFC	38.0	-	live	

Loc'n	Tree #	SPP	DBH	Surrey Tree Id #	Health Status (Live or dead)	Pest Status and Comments
5	18	DFC	16.8	-	live	Douglas-fir beetle pitch-out
5	19	DFC	52.7	-	live	Douglas-fir beetle pitch-out
5	20	DFC	23.8	-	live	
5	21	DFC	51.2	-	live	laminated root rot confirmed
5	22	DFC	23.4		live	
5	23	DFC	55.6		live	
5	24	DFC	32.4		live	
5	25	DFC	33.4		live	
5	26	DFC	53.8		live	
5	27	DFC	65.1		live	
5	28	DFC	51.2		live	
5	29	DFC	55.7		live	
5	30	DFC	48.0		live	
5	31	DFC	47.0		live	laminated root rot confirmed
5	32	DFC	56.8		live	dieing - Douglas-fir beetle?
5	33	DFC	27.3		dead	Douglas-fir beetle?
5	34	DFC	42.3		dead	laminated root rot confirmed
5	35	DFC	53.2		live	
5	36	DFC	40.4		live	
5	37	DFC	61.8		live	
5	38	DFC	24.9		live	stem decay
5	39	DFC	21.8		live	
5	40	DFC	16.2		live	stem decay
5	41	DFC	21.6		live	
5	42	DFC	27.5		live	
5	43	DFC	22.9		live	stem decay
5	44	DFC	18.7		live	former boundary tree
5	45	DFC	72.2		live	former boundary tree
5	46	DFC	17.1		live	former boundary tree
5	47	DFC	30.5		live	former boundary tree
5	48	DFC	52.7		live	former boundary tree
6	1	DFC	74.2		live	
6	2	DFC	34.7		live	
6	3	DFC	55.3		live	
6	4	DFC	30.5		live	
6	5	Hw	14.0		live	
6	6	DFC	26.0		live	
6	7	DFC	61.8		live	
6	8	DFC	17.5		live	
6	9	DFC	46.1		live	
6	10	DFC	57.2		live	laminated root rot confirmed
6	11	DFC	21.3		live	
6	12	DFC	23.5		live	
6	13	DFC	85.3		live	laminated root rot confirmed
6	14	DFC	54.4		live	

Loc'n	Tree #	SPP	DBH	Surrey Tree Id #	Health Status (Live or dead)	Pest Status and Comments
6	16	DFC	17.2		live	
6	17	DFC	16.1		live	
6	18	DFC	14.1		live	
6	19	DFC	43.7		live	
6	20	DFC	29.8		live	
6	21	DFC	45.3	1640	dead	laminated root rot confirmed and Douglas-fir beetle (old)
6	22	DFC	42.7	1639	dead	laminated root rot confirmed
6	23	DFC	47.4		live	
6	24	DFC	19.1		live	
6	25	DFC	62.1		live	
6	26	DFC	31.0		live	
6	27	DFC	27.8	1642	dead	
6	28	DFC	18.4	1643	dead	
6	29	DFC	42.8	1641	dead	
6	30	DFC	36.3		live	
6	31	DFC	42.5		dead	
6	32	Hw	53.8		live	
6	33	DFC	31.5		live	
6	34	DFC	44.5		live	
6	35	DFC	25.0		live	
6	36	DFC	31.0		live	
6	37	DFC	55.4		live	
6	38	DFC	35.1		dead	laminated root rot confirmed
6	39	DFC	20.7		live	
6	40	DFC	33.8		live	
6	41	DFC	23.1		live	
6	42	DFC	42.1		live	
6	43	DFC	48.8		live	

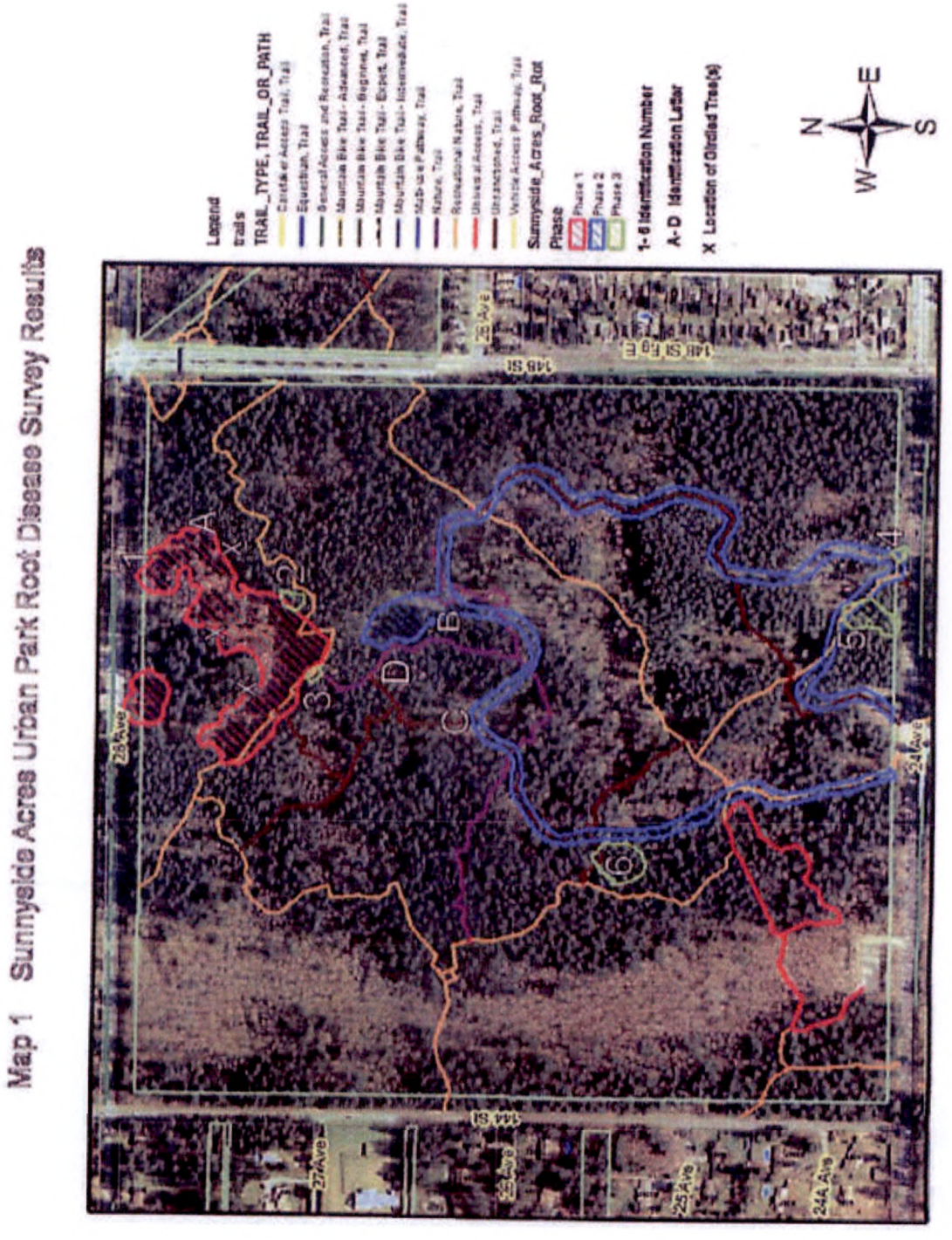
Note: removal recommended for an additional 5-7 buffer trees that were previously girdled and have not died

Location 1 should be monitored to determine if disease transfer has occurred. If transfer occurs, an additional eight standing trees will need to be removed in the future to allow for a 10m buffer

Locations A,B,C - Individual dead trees with *Armillaria ostoyae* present.

Location D only Douglas-fir beetle was confirmed as a primary mortality agent for pocket of dead trees. *Armillaria ostoyae* confirmed to be present as a secondary pest.

Figure 6 Locations of New Laminated Root Rot Infection Centers and Other Pest Activity Areas Found in October 2006 Surveys



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14

FOREST Pest LEAFLET

Douglas-fir beetle in British Columbia

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Introduction

The Douglas-fir beetle (*Dendroctonus pseudotsugae* Hopk.) is an important native pest throughout the range of its principal host, Douglas-fir (*Pseudotsuga menziesii* (Mirb.) Franco). Western larch (*Larix occidentalis* Nutt.) is also occasionally attacked. Damage caused by this beetle has been most extensive in the interior of British Columbia. Tree volume losses from 1956 to 1994 were estimated at about 2 403 000 m^3; ninety percent of this mortality occurred in the interior of the province.

Description and life cycle

The egg is elliptical, pearly white, and 1 to 1.2 mm long. The larva is a white, legless grub with a pale brown head, about 6 mm long when mature. The pupa is white to light tan, about 6 mm long, with adult features (legs, wings, etc.) visible. The adult is a stout, brown to blackish-brown beetle with reddish elytra, 4 to 7 mm long.

The duration of the life cycle is approximately one year and two broods may be produced each year.

The Douglas-fir beetle overwinters primarily as young adults or as mature or nearly mature larvae. The adults typically fly and attack susceptible trees in the spring, shortly after daytime temperatures exceed 18°C. The major flight period usually occurs in May and June. Larvae that have overwintered complete their development and emerge in July and August. The parent beetles occasionally emerge the same summer for a second flight or "summer flight", and then attack fresh material and establish a second brood.

Adult Douglas-fir beetle, *Dendroctonus pseudotsugae* Hopkins: top view (left); side view (right)

The female chews through the outer bark into the inner bark, constructs the egg gallery and deposits egg masses of 10 to 36 in small niches in groups which alternate along the sides of the gallery. A male follows the female into the gallery; although he does no excavating, he helps initially in pushing boring dust out the entrance and later in packing the boring dust in the part of the gallery closest to the entrance.

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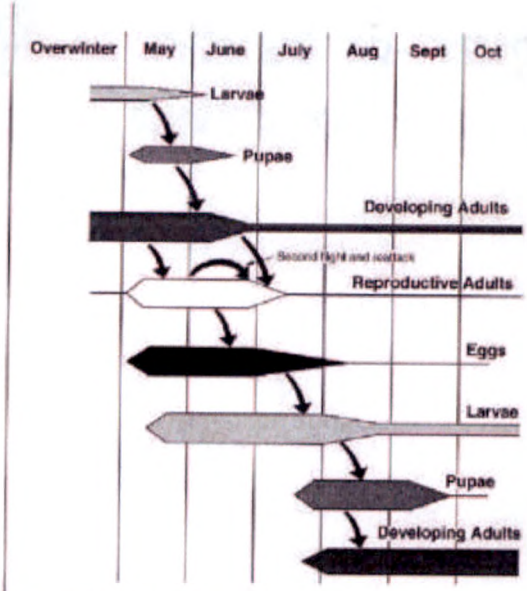
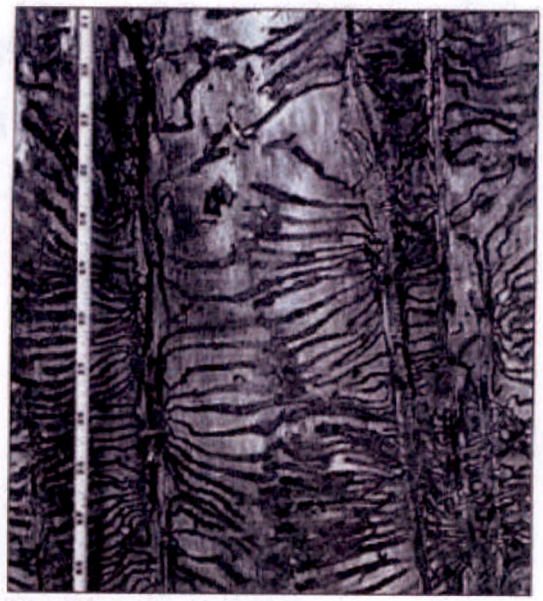


The life cycle of the Douglas-fir beetle



Several Douglas-fir beetle galleries

Eggs hatch in about 2 weeks and the young larvae bore away from the egg gallery. The larvae feed in the inner bark for 2 to 3 months (until winter intervenes), enter the pupal stage, and a few weeks later become young adults. At emergence, the young adults bore a circular hole to the bark surface. Although young adults may be present as early as late July, none emerge until the following spring.

Damage

Gallery system

The gallery system is in the inner bark next to the sapwood. The egg galleries made by the parent adults are parallel to the grain of the wood, usually with a slight hook or curve at the beginning. They are usually 20 to 25 cm long but may be 75 cm long and 5 to 6 mm wide. The larval galleries diverge from the egg groups in fan-shaped groups which alternate from side to side of the egg gallery. Most of the egg gallery and all of the larval gallery are packed with boring dust. The larval mines frequently disappear from the inner surface of the bark since the larvae, when nearing maturity, often bore into the inner bark. The pupal cells are constructed at the end of the larval mines.

Brood survival in standing trees is usually higher and more concentrated in the middle portion of the infested stem. In downed trees, egg galleries tend to be uniformly successful but more dense on the shaded underside.

Trees are usually not infested above a top diameter of 15 to 20 cm. Other bark beetles often occur in the top of the stem, especially *Scolytus tsugae* (Swain) and *Pseudohylesinus nebulosus* (Le Conte).

Effect on the tree

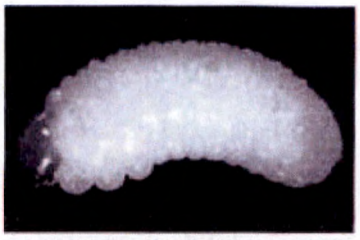
The work of adults and larvae eventually girdles the tree and, along with an associated fungus, results in the tree's death. Foliage discoloration, from green to pale yellow-green to red, occurs a few months to a year after attack, depending on seasonal weather, locality, date and intensity of infestation, and elevation. The red foliage remains on the tree for an average of two years. Occasionally the needles may drop without discoloration. Often conks of the pouch fungus, *Cryptoporus volvatus* (Peck) Shear, form on the outer bark the year following attack.

Host susceptibility and attack pattern

The Douglas-fir beetle prefers hosts such as felled trees, slash, stumps, windfall, overmature and decadent trees, trees damaged by abiotic factors, and trees stressed by defoliation and root disease. Host material over 20 cm is preferred; the beetle occasionally attacks trees of smaller diameter, but brood production is low.

Where susceptible trees are abundant, the beetle can quickly become epidemic and kill adjacent apparently healthy green timber. Consequently, groups of killed trees may surround trees such as windfall, a lightning-struck tree, or fire-damaged trees.

In endemic situations, the damage caused by the insect occurs in small scattered groups in the stand.



The Larva of the Douglas-fir beetle is white with a brown head, and is about 6 mm long when mature.

The size of these groups and intensity of attack is a reflection of both the amount of suitable host material and the population level in the stand. Frequently, trees around a killed group may have been attacked but were able to survive. In urban areas, trees weakened by a sudden change in environmental conditions due to development or construction may become suitable hosts for the insect.

Association with root disease

There appears to be a strong relation between Douglas-fir beetle and the root rots *Armillaria ostoyae* (Romagn.) Herink, *Phellinus weirii* (Murr.) Gilbertson, and *Phaeolus schweinitzii* (Fr.) Pat. During studies of Douglas-fir beetle outbreaks in northern Idaho *Leptographium wageneri* (Kendr.) Wingf. var. *pseudotsugae* Harrington & Cobb was found for the first time in Douglas-fir. The relationship between root disease and bark beetles is more pronounced with endemic beetle populations. Root rots reduce water uptake and vigor in infected trees. Lower vigor predisposes the tree to attack by bark beetles. The severity or amount of the root disease is related to the success of beetle attack. Successful beetle attacks are more likely in trees with 70 to 90 percent of their roots affected by disease. Root rot also contributes to blowdown which helps to initiate and perpetuate beetle outbreaks.

Defoliation

There is some evidence that defoliation by western spruce budworm,

The pupa of the Douglas-fir beetle is white to light tan and about 6 mm long.

Choristoneura occidentalis (Freeman), and the Douglas-fir tussock moth, *Orgyia pseudotsugae* (McDunnough), predisposes larger trees to bark beetle attack. Defoliation weakens the trees and its ability to resist beetle attacks, possibly due to the fact that heavy defoliation reduces the trees ability to produce monoterpenes. Trees that have been more than 90% defoliated by tussock moth are very susceptible to attack and provide host material for the build-up of beetle populations.

Detection

The first obvious evidence of attack in a stand is the presence of trees with discolored foliage. However, this discoloration may not occur until a year following attack when the beetles are ready to leave (in some cases, may have already left) to attack new host material. This discoloration may be observed from the air or from high vantage points. Confirmation that the damage is due to Douglas-fir beetles may be obtained by removing bark and observing the typical gallery systems.

Detection of infested trees in the early stages of attack is difficult. The earliest evidence of attack is the reddish brown boring dust on the bark at the entrance holes of the gallery. There are no pitch tubes such as those associated with certain other *Dendroctonus* species, although clear resin (pitch) exuding from entrance holes at the upper limit of the infestation on the stem has been noted. Early detection thus requires examination of individual boles, which is best done in late June or July while the boring dust is still easily seen.

Control of Douglas-fir beetle

The following recommendations are grouped primarily into two categories: preventive measures and remedial measures. Although the concepts are the same, the timing of these operations changes somewhat when trees are already infested. A third category describes methods of brood destruction.

Preventive measures

(a) Log and slash disposal

1. All infested logs should be removed and utilized before beetles emerge. Those felled during May, June and July should be removed before April of the following year.
2. All culls and slash over 20 cm in diameter should be kept to a minimum and, if infested, they should be treated by burning or peeling bark to prevent emergence of the brood within the time specified above for removal of the logs.
3. Tops should be kept small (under 20 cm in diameter).
4. Stumps should be cut as low as possible and, if infested, should be treated burning or removing bark to destroy the bark beetles in them.
5. Roads and right-of-way should be constructed if possible after August immediately before their use. If logs, slash, etc., resulting from road construction, can be utilized or treated as in steps 1 to 4 above, cutting roads and right-of-way in early spring would remove some of the beetle population. Stands adjacent to new roads should be carefully examined in late summer of the year of road construction and infested trees should be removed. Trees with root damage should be re-examined for attack the summer of the next year, and if they are infested they should be removed.
6. Procedures 1 to 4 should receive special attention during the last year of logging in an area.

(b) General logging practices

1. Priority should be given to overmature or decadent stands, particularly those in which the Douglas-fir beetle is active.
2. The residual stand should be carefully watched for evidence of infestation, and infested trees should be removed promptly.
3. Trees felled during May and June should

absorb much of the beetle population. If this felling procedure is followed, it must be accompanied by strict sanitation measures as described in (a) 1 to 4.

4. Care must be taken to ensure minimal mechanical damage to the residual stand. This includes root damage such as that caused by road cuts.

Remedial measures

If, in spite of all precautions, infestations develop in standing timber, remedial action may be necessary for control.

1. The procedures described above under "Preventive measures" should be continued and, if possible, intensified.
2. Currently infested trees should be removed before the following April. Single tree removal with helicopters and small block harvesting have proved successful in controlling the beetle in the past. Identification of these trees requires examination of individual boles for the presence of the reddish brown boring dust. Removal of red-topped trees from which the beetles have emerged does not reduce the beetle population. In some years, discoloration of foliage may occur in the year of attack before beetles emerge.
3. Trap trees may be used to attract beetle populations to highly susceptible and readily extractible material. Fell the trap trees shortly before beetle flight, preferably in early April, and dispose of them by late March of the following year, before beetle emergence. The area at risk should be gridded with groups of trap trees at intervals of about 0.4 to 0.8 km. The groups of trap trees should be placed where they can be easily removed. Beetles will be attracted to these trap trees and may attack some adjacent green trees as well; all of the resulting infested material should be removed or treated by April of the following year.
4. The effectiveness of trap trees may be increased with the use of pheromones. When pheromones (such as frontalin or seudenol) are used on live or recently felled trees, flying beetles are attracted to them; in some studies up to 5 or 6 times as many beetles have attacked baited trees compared with non-baited trees. Stand density and tree diameter also influence attacks in baited stands.
5. The anti-aggregative pheromone MCH (methylcyclohexenone) has been used to disrupt or prevent beetle attacks. Attacks and progeny have been reduced by over 90% by the application of this pheromone. The use of the pheromone could be most useful in areas of blowdown.

Brood destruction

The following methods may be used for brood destruction in slash and other material not removed from the woods.

1. Piling and Burning. The fire should be intense and all bark should be thoroughly burned. Broadcast burning does not produce a fire hot enough to overcome the insulating qualities of Douglas-fir bark.
2. Peeling. Peeling the bark exposes the broods to weather and predators. Since many beetles can overwinter in the forest duff, peeling should be done in July or August, before the young adults develop. The procedure increases the fire hazard, but when peeling is used in conjunction with burning, a less intense burn is required.
3. Lethal trap trees using MSMA (monosodium methanearsonate) can significantly reduce the number of progeny in trap trees.

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Additional Information

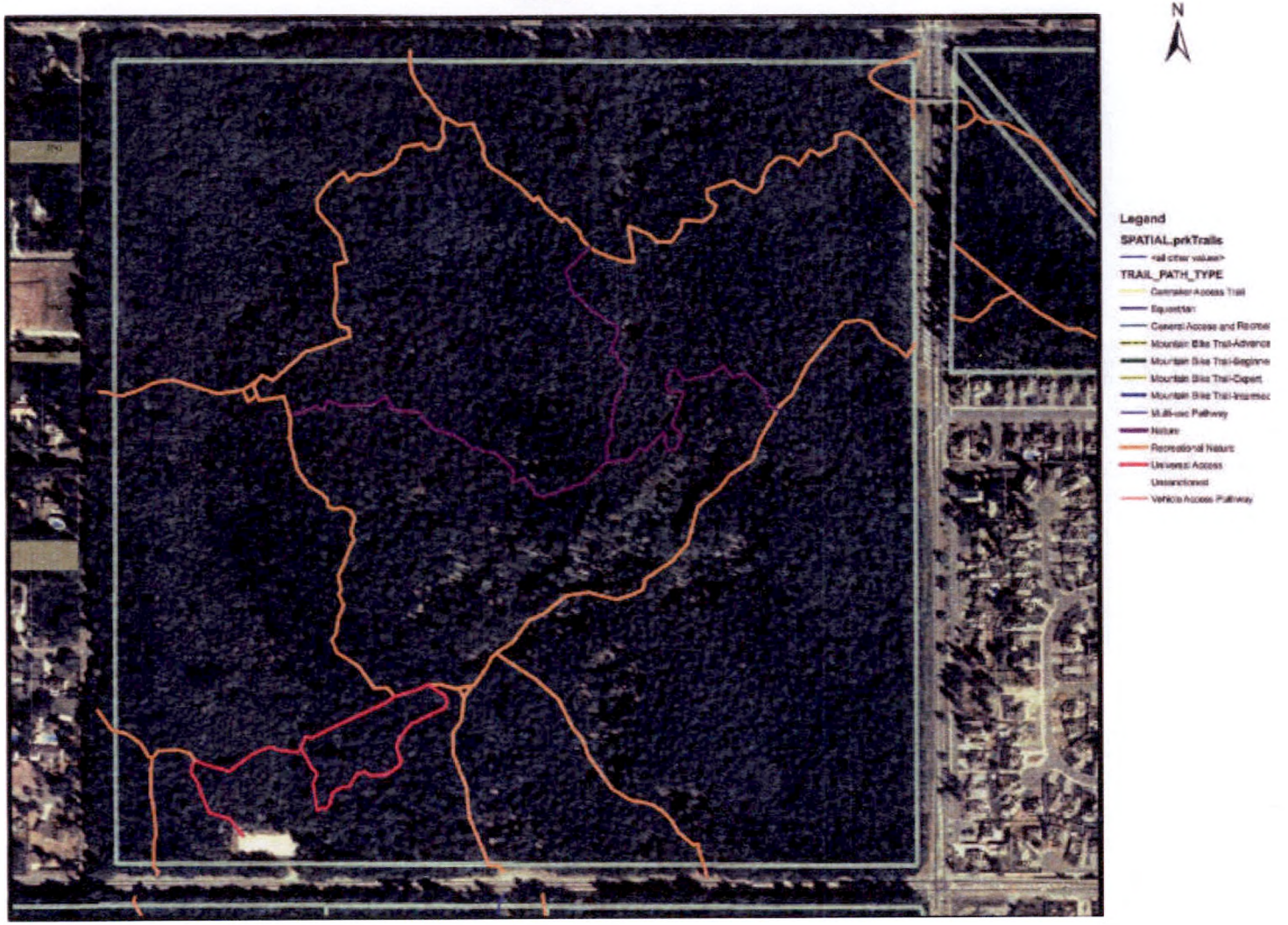
Additional copies of this and other leaflets in this Forest Pest Leaflets series, as well as additional scientific details and information about identification services, are available by writing to:

Natural Resources Canada
Canadian Forest Service
Pacific Forestry Centre
506 West Burnside Road
Victoria, B.C. V8Z 1M5
Phone (250) 363-0600
http://www.pfc.forestry.ca

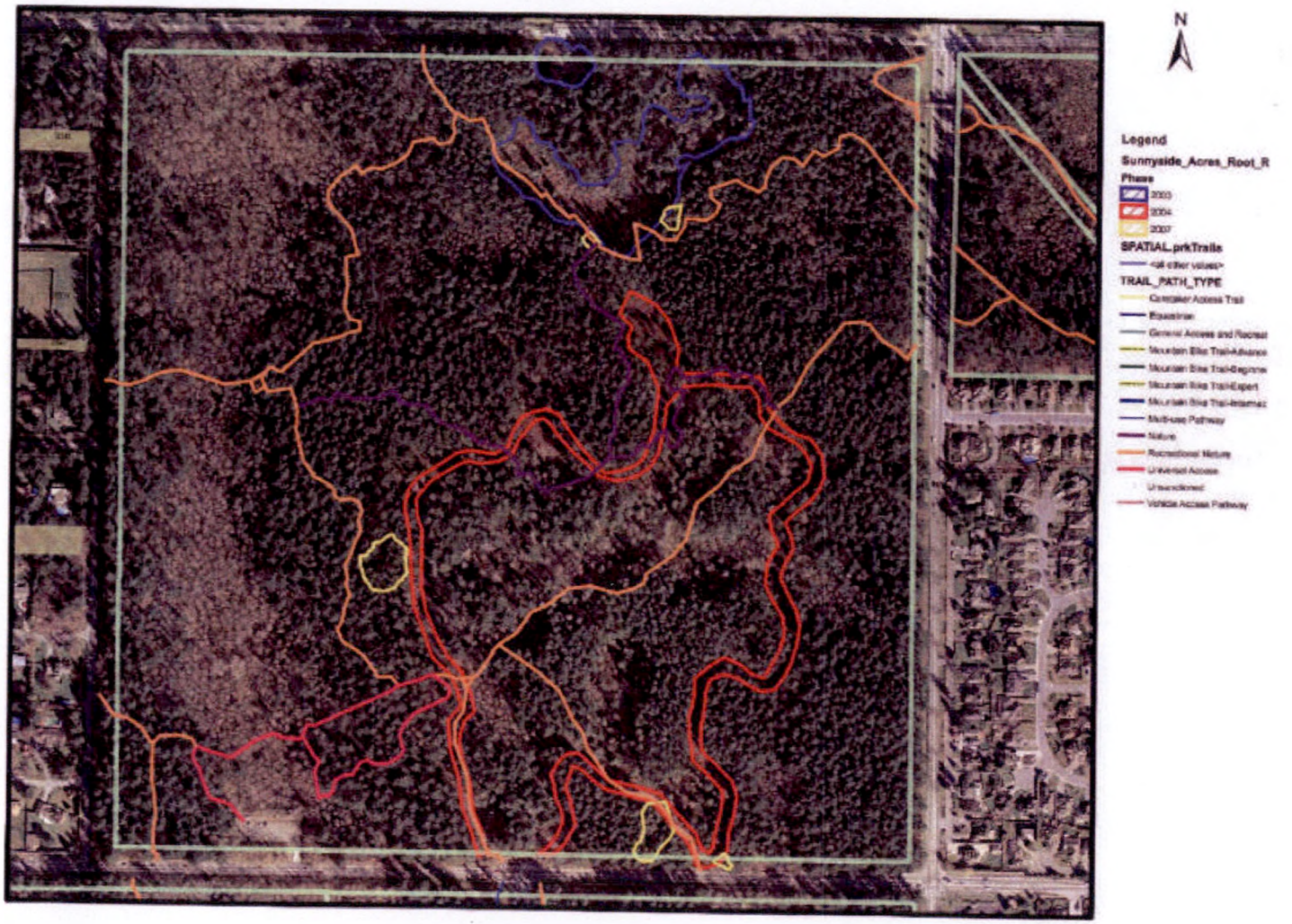
May 1995
PDF version August 2000

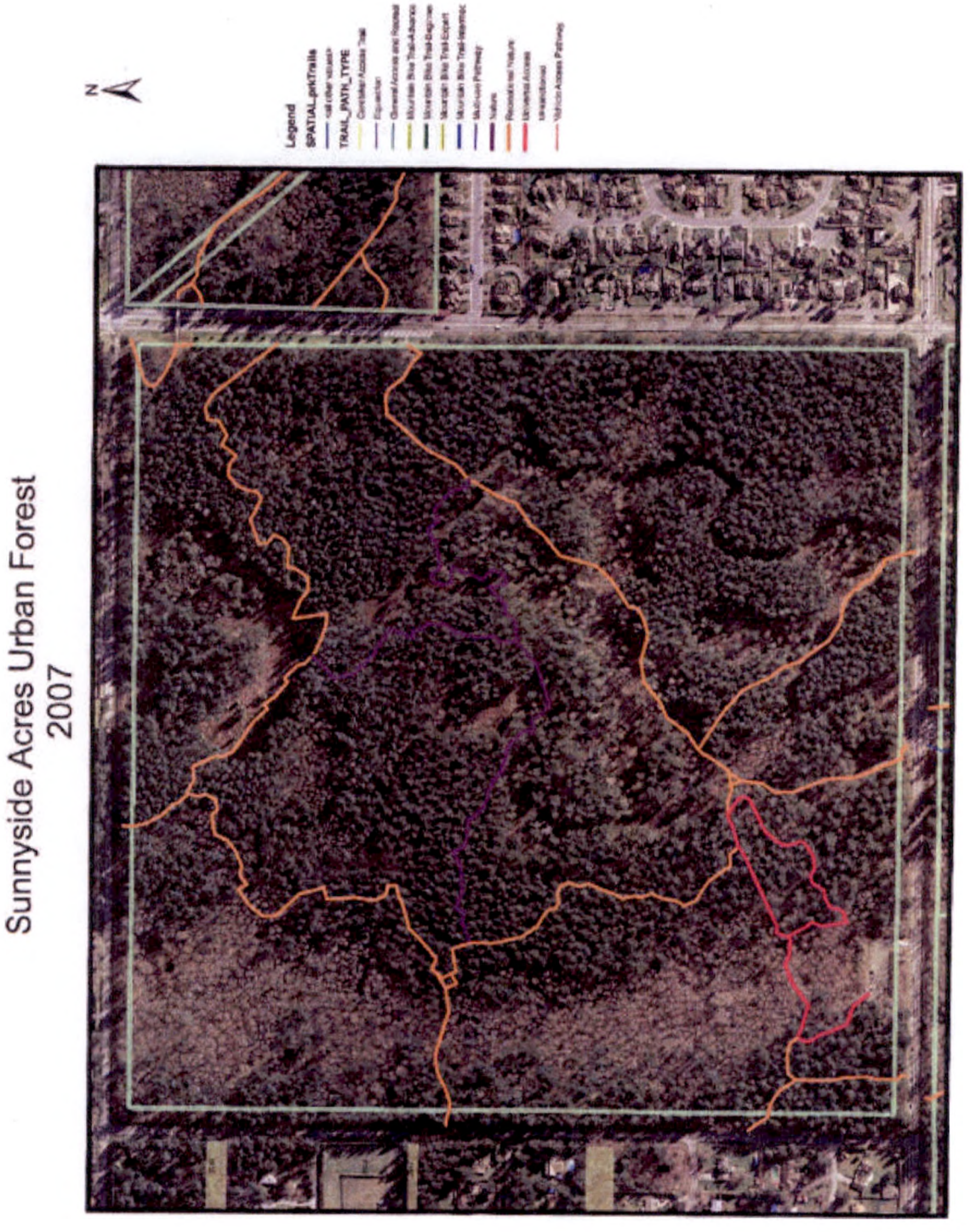
Natural Resources Canada | Ressources naturelles Canada
Canadian Forest Service | Service canadien des forêts

Sunnyside Acres Urban Forest
1998



Sunnyside Acres Urban Forest
2007





This note was written for and published by Surrey Museum's 'Heritage Newsletter.

Appendix 6

The Holly and the Ivy

Many of you will be familiar with the traditional English carol of this name, but no, we are not trying to jump-start Christmas (it begins too soon for many of us as it is!). Rather, we want to show how these two plants provide a useful lesson in the complexity of ecological issues.

Neither Holly (*Ilex aquifolia*) nor Ivy (*Hedera helix*) is native to Sunnyside Acres Urban Forest but they are both widespread in the Acres now. Having been introduced as garden ornamentals, quite possibly by homesick immigrants from the UK, they flourish in the Lower Mainland. Their seeds are eaten by birds and sometimes excreted in the forest, where they germinate and become established.

To preserve the ecological integrity of the forest, eradication of some or all such plants is sometimes suggested, but this would require examining every square metre of the forest – an impractical and damaging activity which, at best, could be only temporarily effective. Reinvasions from surrounding gardens ensue and necessitate continuing regular periodic clean-up efforts.

Quite apart from these practical considerations, there is also a subjective element that helps explain why the impulse towards eradication is often strangely selective. Holly is known to be benign, or beneficial, in that its attractive berries are eaten by birds, whereas ivy is known to often be harmful to trees. The weight of its foliage can break stems and branches, deforming the trees and creating wounds which allow damaging fungi to invade. When visitors are asked for their opinions on what should be done about these non-native species, most want the Holly to be retained and the Ivy eradicated. This may seem commonsensical to some, but not when it is pointed out that such views are based on value judgements that have little to do with the life of the forest. Once established, the plants become part of the naturally changing forest scene. The two are equally exotic, they have been introduced in an identical manner, and they are both well adapted to the local environment. The difference is that observers find one potentially harmful and the other not.

A tour guide leading visitors can use this example to show that what seems, on the surface, to be an obvious solution is in fact coloured by the observers' values. There is no clearly right or wrong answer (and this is very often the case with ecological questions), something that is too frequently overlooked in ecological debate and argument. We find it a useful discussion topic as we escort visitors around the Urban Forest and we hope they will extend the lesson into other ecological debates. Perhaps someone will come up with the absolutely "right" solution for the Urban Forest; until then, we think it important to continue the debate.

This note, written by this book's author, first appeared in the fall 1999 issue of the Community Heritage Information Newsletter. It is reproduced here with permission.

Appendix 7

SUNNYSIDE ACRES URBAN FOREST

FIRE MANAGEMENT PLAN

JULY 2001

Prepared by: Roy Strang, Ph.D., R.P.F.
Diana Wegner, Ph.D.
Sunnyside Acres Urban Forest Advisory Committee

SUNNYSIDE ACRES URBAN FOREST
FIRE MANAGEMENT PLAN

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I. INTRODUCTION: SUNNYSIDE ACRES: AN URBAN/WILDLAND INTERFACE AREA

1. Background: Fire Risk and Management
2. Goals, Objectives, and Principles
3. Division of Responsibilities

II. THE SUNNYSIDE ACRES FIRE MANAGEMENT PROGRAM: INVENTORY, PREVENTION, DETECTION, SUPPRESSION AND REHABILITATION

1. Inventory, Priorization, and Mapping of Sunnyside Acres for Fire Hazard and Risk

   A. Fire History
   B. Hazard Assessment
   C. Mapping

2. Prevention

   A. Fire Risk Abatement
   B. Public Education
   C. Fire Hazard Abatement
   D. Access Management
   E. Fire Weather
   F. Planning

3. Detection

4. Suppression

5. Rehabiliation and Mitigation

6. Training and Equipment

   A. All Parks Operations staff
   B. All City Operations crews

7. Annual Reviews

8. Mutual Aid Agreements

II. SUNNYSIDE ACRES FIRE MANAGEMENT PROGRAM

INVENTORY, PREVENTION, DETECTION, SUPPRESSION AND REHABILITATION

The following describes the key activities of the Sunnyside Acres Fire Management Plan and should be implemented as part of the Parks, Recreation and Culture Department's responsibility. These strategies are based on current fire management operations which have been adopted by other agencies including Canadian National and Provincial Parks, US Forest Service, US National Parks Service, and the B.C. Ministry of Forests.

1. INVENTORY, PRIORIZATION, AND MAPPING OF SUNNYSIDE ACRES FOR FIRE HAZARD AND RISK

A. FIRE HISTORY: develop, maintain, and annually update a fire history data-base.

The database needs to include a number of retrievable attributes. From a vegetation management and public safety point of view the most important attributes are as follows:

i) the cause (if known)
ii) location
iii) date and time of day
iv) the site association and successional stage (fuel type)
v) the area burned
vi) the Canadian Forest Fire Weather Index (FWI) System codes and indexes
vii) control/suppression tactics and results
viii) interval between fire report and initiation of suppression
ix) type of fire: ground or crown
x) structural damage resulting

This data base is to be reviewed and updated annually in December.

B. HAZARD ASSESSMENT:

i) Develop an inventory program to identify areas of high hazard.

Fuel and fuel moisture are important to ignition, build-up, and behaviour of fire more than any other single factor (Agee 1993; Kozlowski and Ahlgren 1974). Forest health problems may also contribute to fuel build-up (e.g. root rots that result in windthrow of trees and accumulation of fuels on the forest floor). Information on the types of fuels present and the quantity of forest fuels within Sunnyside Acres is summarized in Appendix 2. To adequately address some of the key fire management concerns, a natural area fuel survey is required by the Parks, Recreation and Culture Department. This survey should include an assessment of fuel types, structure and architecture, and their continuity.

The preferred method is visual fuel hazard and risk assessment (as detailed in the overall fire strategy for Surrey's natural areas). These assessments should be photo documented and carried out on all sites every two to five years. In the absence of trained observers, survey forms and procedures should be utilized (see *Beware and Prepare Community Planner, Part 2, Interface Fire Hazard Forms*)

The inventory program will identify high, medium, and low hazard areas which require some form of vegetation management to minimize the current hazard. A detailed prescription will be required as a basis for the treatment of any vegetation. It should document the present and desired fuel conditions, treatment method, long term maintenance and treatment impact on other resources, and attributes at risk. The assessment should incorporate basic site-specific information as follows.

In Sunnyside Acres the degree of fire hazard varies with the different conditions of specific areas. Only in one corner does the Forest abut directly on to homes and gardens, the Forest Edge housing development on the south-east corner of 140th Street and 24th Avenue. Fortunately, the stand adjacent to the housing development is the low-flammability deciduous/hardwood type. The north, west and south boundaries of the Forest adjoin two-lane paved roadways—28th Avenue, 140th Street, and 20th Avenue respectively—while the eastern edge is bounded by a four-lane boulevard, 148th Street.

Between 24th Avenue, which bisects the Forest in an east/west direction, and 20th Avenue, the southern boundary, the Forest adjoins a mountain bike park which is part of the South Surrey Athletic Park complex. The vegetation is mostly the Douglas-fir type. This Park is much frequented by youths and teenagers, and so has a high hazard rating, particularly in the south-east corner towards 20th Avenue and in the vicinity of a skate boarding and youth facility. Teenagers partying, drinking, smoking and lighting bonfires make it the highest hazard area, one where fuel reduction may be desirable.

- accessibility
- location of fire hydrants
- history of fire incidences (if records available)

Within the Douglas-fir stand type, areas affected by root-rot are to be assessed, rated and treated as a separate sub-unit. Until control measures are successfully implemented, the boundaries will change steadily and fuel loads and characteristics will be in a state of continual flux.

Precedence should be given to the more flammable Douglas-fir component, the boundary with Forest Edge housing, and the vicinity of the Youth Centre and skate-board facility (as noted above) which are both in the transition zone.

iii) Map the forest: The Forest should be mapped for the following features:

1. The two major forest stand types
2. Trails wide enough to be accessible to a small ATV or "bobcat"
3. Trails for only pedestrian passage
4. Access or entry points
5. Position of fire hydrants around the perimeter
6. Boundaries of Forest Edge housing development
7. Location of the skate board and Youth facility

[INSERT MAP 2 HERE DEPICTING THESE FEATURES]

2. PREVENTION

A. FIRE RISK ABATEMENT:

i) Ensure the City develops a training program to increase the level of staff awareness in the area of fire prevention, as set out in the City-wide Strategy. It is the responsibility of Parks, Recreation and Culture Department to educate other City operations Departments on forest fire conditions.

ii) Apply the general requirements and strictures for risk-abatement as they are set out in the overall Strategy. The Parks, Recreation and Culture Department will liaise with all other City operations staff to ensure that basic Fire Safe work procedures are implemented. It will also maintain contact with the RCMP Community Policing Station, District 5.

As noted above under Hazard Abatement, particular attention will be paid to the

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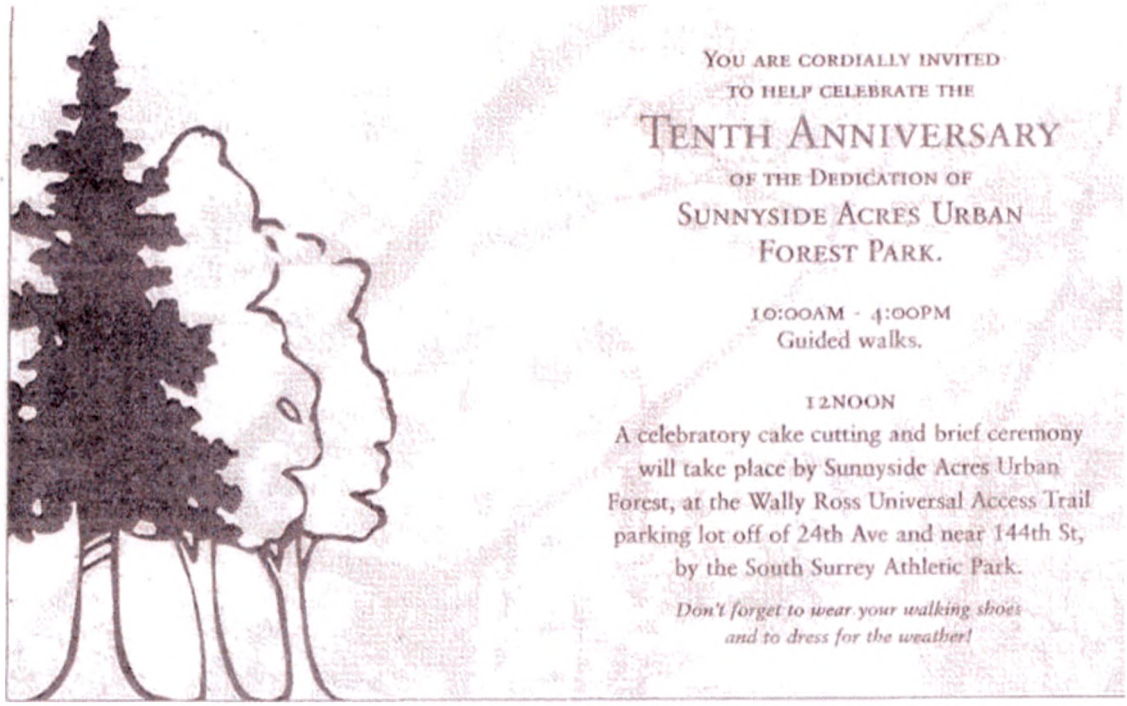
Appendix 8. Tenth Anniversary of Dedication Open-House, 1998.



You are cordially invited
to help celebrate the

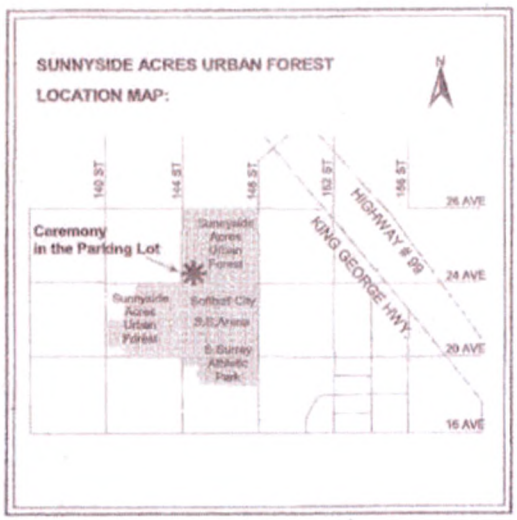
Tenth Anniversary

of the Dedication of
Sunnyside Acres Urban
Forest Park.

10:00AM - 4:00PM
Guided walks.

12NOON
A celebratory cake cutting and brief ceremony will take place by Sunnyside Acres Urban Forest, at the Wally Ross Universal Access Trail parking lot off of 24th Ave and near 144th St, by the South Surrey Athletic Park.

Don't forget to wear your walking shoes and to dress for the weather!



Sunnyside Acres Heritage Society

SURREY PARKS, RECREATION & CULTURE

Sunnyside Acres Heritage Society

10th Anniversary

Saturday, September 26, 1998

SURREY

SURREY PARKS, RECREATION & CULTURE

Sunnyside Acres Heritage Society

10th

ANNIVERSARY

SATURDAY, SEPTEMBER 26, 1998

SURREY

YOU ARE CORDIALLY INVITED
TO HELP CELEBRATE THE

TENTH ANNIVERSARY

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Appendix 9. 20th Anniversary of Dedication Celebration, 2008.

CELEBRATE

Sunnyside Acres Urban Forest's

20th BIRTHDAY!

Saturday, May 31st

11am - 1pm

Sunnyside Acres Urban Forest

(Parking lot off of 24 Avenue)

Appendix 10. Climatic Data for South Surrey.

CONSECUTIVE DAYS WITH NO MEASURABLE PRECIPITATION

No. of Days	Beginning on
58	14 June 1951
53	18 July 1986
42	2 July 1960
41	7 July 1990
38	20 July 1939; 8 July 1961
34	13 July 1972; 2 July 1984
33	12 July 1979; 13 July 1988
32	7 June 1940; 30 June 1985; 13 Sept. 1991; 16 July 1998
30	18 Aug.1998
28	30 Mar.1951; 24 July 1952; 6 July 1959; 31 Aug. 1975
27	11 July 1938; 27 Aug. 1950
26	20 July 1954; 23 April 1958; 13 Aug.1974
25	21 Aug. 1989

CLIMATIC DATA FOR SOUTH SURREY

PRECIPITATION (mm)

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
Mean Rainfall	142	125	94	78	52	53	33	50	73	141	156	162	1159
Mean Snowfall*	173	48	46	--	--	--	--	--	--	--	33	147	447
Mean Total	159	130	99	78	52	53	33	50	73	141	159	177	1204
Days of Measurable Rain	18	16	15	15	10	9	7	8	9	17	19	19	162
Measurable Snow	6	1	1	--	--	--	--	--	--	--	1	4	13
Measurable Precipitation	20	16	16	15	10	9	7	8	9	17	20	21	169

TEMPERATURE (C)

Daily Maximum	4.5	7.7	9.5	13.1	17.2	19.3	22.5	21.8	19.4	14.0	8.5	5.8	13.6
Daily Minimum	-1.3	0.6	2.0	4.2	7.0	9.4	11.6	11.7	9.6	6.0	2.2	0.6	5.3
Daily Mean	1.9	4.2	5.6	8.5	12.1	14.6	17.0	16.5	14.5	10.3	5.7	3.3	9.5
Extreme Max.	12.2	17.5	18.0	25.6	26.1	29.4	36.0	34.0	31.0	25.0	17.5	15.0	36.0
Extreme Min.	-12.0	-8.0	-15.0	-3.9	1.7	1.1	5.6	5.0	4.0	-0.6	-7.8	-13.0	-15.0
Days w/frost	20	14	9	2	--	--	--	--	--	1	10	12	68
Degree days above 18.0 C**	--	--	--	--	0.4	3.8	17.9	13.3	0.9	--	--	--	36.3
Hours of bright sunshine**	53.5	87.2	129.3	180.5	246.1	238.4	307.1	256.2	183.1	121.0	69.3	47.9	1919.6

Water Equivalent = 10%
*Data from Vancouver International Airport
Source – Canadian Climatic Normals

SUMMER RAINFALL at SUNNYSIDE ACRES

Rain Days and Amounts

	1989		1990		1991		1992		1993		1994		1995		1996		1997		1998		1999	
	Days	mm	Days	mm	Days	mm	Days	mm	Days	mm	Days	mm	Days	mm	Days	mm	Days	mm	Days	mm	Days	mm
May	13	118.8	14	45.1	8	64.0	6	14.8	13	85.8	9	31.2	6	35.9	11	75.2	14	139.5	8	95.0	11	56.0
June	10	45.7	15	90.8	14	51.4	6	68.6	14	89.0	10	63.0	13	43.0	8	16.5	10	75.7	6	32.8	n.d.	
July	8	37.4	5	8.4	8	26.2	6	57.6	12	62.6	3	14.2	3	65.2	5	14.4	8	90.2	8	25.8	8	59.0
Aug	8	94.2	5	39.8	11	124.6	5	27.0	n.d.		6	22.2	13	75.2	5	26.7	7	32.6	1	7.0	11	36.4
Sept	2	13.2	5	25.8	3	7.8	5	50.2	n.d.		7	91.4	8	20.4	9	82.3	10	96.2	3	18.4	5	11.0
Total	41	309.3	44	209.9	44	274.0	28	218.2	–	–	35	222.0	43	239.7	38	215.1	49	434.2	26	179.0	–	–

	2000		2001		2002		2003		2004		2005		2006		2007		means	
	Days		Days		Days		Days		Days		Days		Days		Days		Days	
May	16	98.5	9	44.6	12	48.4	10	43.2	11	82.8	14	46.8	8	35.0	10	35.8	11	47.4
June	10	79.2	14	69.6	6	47.4	6	13.4	7	31.2	12	41.2	7	36.9	16	56.8	16	46.1
July	8	39.0	6	42.6	4	18.6	4	8.4	2	13.3	6	25.2	5	7.6	5	46.6	5	28.9
Aug	5	13.4	9	86.4	1	41.2	2	15.0	12	80.4	3	16.4	2	8.0	6	13.8	4	23.8
Sept	8	56.6	6	29.2	5	32.6	7	52.6	15	129.2	7	47.0	8	54.3	10	50.4	8	49.9
Total	47	256.7	44	272.4	28	188.2	29	132.6	47	336.8	42	176.60	30	141.8	47	203.4	44	196.1

Appendix 11. Soils of Sunnyside Acres Urban Forest.

Four Soil Series are reported by Peepre (1987) and although Luttmerding (1980) mapped the area as "unclassified," he did describe the same four types. Throughout the area, compact glacial till and pre-glacial deposits underlie the surficial strata. The consequence is poor internal drainage.

Bose Soil Series

Moderately well-drained orthic humo-ferric podsols up to 1m thick but underlain by impervious till. Ten-15cm of organic strata cover a loose, gravelly leached Ah horizon about 20cm thick over a sandy loam Bf. This cobbly stratum grades in colour from reddish to yellowish-brown with increasing depth. A compacted or cemented Cg lies below the Bf and rests on pre-glacial sands.

This series is rated low for agriculture having low water and nutrient-holding capacity in the surficial, gravelly strata.

Boosey Soil Series

Small pockets of rego-humic gleysols within the Bose Series. These are more poorly-drained than the Bose soils having a 5cm organic layer over 15cm of Ah and up to 100cm of mottled B/C brownish gravelly sand. The subtending unweathered glacial till is impermeable.

Poor internal drainage means this soil is very poor for agriculture or landscaping.

Sunshine Soil Series

Orthic-humic-ferric podsols with some 50 cm of sandy loam below 12cm of thin surficial organic horizons. The sandy loam contains a thin Ae stratum over an enriched Bf which is interlain with veins of coarse material. Unweathered, impervious till occurs below 80-100cm.
This soil has a low agricultural potential because of poor water-holding capacity in the upper strata and impermeability in the underlying till.

Heron Soil Series

Rego-humic gleysols with permeable upper horizons over an impervious till. Five cm of dark organic soil lie over some 20cm of peaty material. Below this there are 75-100cm of mottled B/C over the compact till.

This series has limited agricultural potential, requiring very careful water management for successful cropping. Without drainage it is too wet for most uses but, having limited water-holding capacity in the surficial strata, it can be droughty when drained.

Soil Profile

A soil pit was examined in the north-east block of Douglas-fir. Soil colour was obtained by comparing moist soil samples with a Munsell colour chart.

Depth	Horizon	Composition	Colour (moist)
8 - 6.5cm	L	mor/moder transition (mostly mor as it is still matted)	
6 - 4. cm	F		
4.5 - 0cm	H		
0 – 7cm	Ah	granular fine sandy loam	4/4 7.5YR
7 -15cm	Bm	gravelly sandy loam	4.5/4 7.5YR
15 -17cm	Ahb	charcoal	
17 -26cm	Bf1	gravelly sandy loam	
26 -55cm	Bf2	gravelly sandy loam	
55 -69cm	BCg	gravelly sandy loam	4/6 5YR
>69cm	Cg	loam or sandy loam	6/2 2.5YR

This somberic humo-ferric podsol may be differentiated from the ortho humo-ferric podsols reported in the Sunshine Soil Series on the basis of the depth of the Ah horizon (it exceeds 10cm). The structure of these horizons varies from a weak medium blocky Bm, a structureless Ahb-Bf2, a gleyed cemented BCg and a platey glacial till Cg that is impermeable to water.

Appendix 12. Nomenclature of plant species identified in Sunnyside Acres. (Hitchoch and Cronquist, 1976).

TREES	
Conifers	
Abies grandis (Dougl.) Forbes	grand fir
Pseudotsuga menziesii (Mirb.)Franco	Douglas-fir
Thuya plicata Donn.	western red cedar
Tsuga heterophylla (Raf.)Sarg.	hemlock
Hardwoods	
Acer macrophyllum Pursh	big leaf maple
A. circinatum Pursh	vine maple
Alnus rubra Bong.	alder
Betula occidentalis Hook.	birch
Cornus nuttallii Aud.	dogwood
Populus trichocarpa T.& G.	black cottonwood
Salix spp. L.	willow
Sorbus sitchensis Roemer (rowan)	mountain ash
SHRUBS	
Amelanchier alnifolia Nutt.	serviceberry
Berberis aquifolium Pursh	Oregon grape
Corylus cornuta Marsh.	hazelnut
Gaultheria shallon Pursh	salal
Holodiscus discolor (Pursh) Maxim.	ocean spray
Lonicera ciliosa (Pursh) DC	honeysuckle
L.involucrata (Rich.) Banks	twinberry
Oemleria cerasiformis (H.& A.) Landon	Indian plum
Prunus virginiana L.	cherry
Rhamnus purshianus DC	cascara
Ribes lacustre (Pers.)Poir.	gooseberry
R. sanguineum Pursh	rose
Rubus parviflorus Nutt.	flowering currant
Rosa gymnocarpa Nutt.	thimbleberry
R. spectabilis Pursh	salmonberry
R. ursinus Cham.& Schlecht.	trailing blackberry
Sambucus racemosa L.	elderberry
Spirea douglasii Hook.	spirea, hardhack

Symphoricarpus albus (L.) Blake	snowberry, waxberry
Taxus brevifolia Nutt.	yew
Vaccinium spp. L.	huckleberries

FERNS

Athyrium felix-femina (L.) Roth	lady fern
Blechnum spicant (L.) Roth	deer fern
Dryopteris aaustriaca (Jacq.) Waynar	wood fern
Polypodim glycyrrhiza D.C. Eaton	licorice fern
Polystichum munitum (Kaul.)Presl	sword fern
Pteridium aquilinum (L.)Kuhn	bracken

FORBS & HERBS

Achlys triphylla (Sm.)DC	vanilla leaf
Anaphalis margaritacea (L.) B. & H.	pearly everlasting
Cardamine oligosperma Nutt.	bitter cress
Clintonia uniflora (Schult.)Kunth.	Queen's cup
Cornus canadensis L.	bunchberry
Dicentra formosa (Andr.)Walp	bleeding heart
Equisetum arvense L.	horsetail
Goodyera oblongifolia Raf.	rattlesnake plantain
Lactuca muralis (L.) Fresen.	wall lettuce
Lysichiton americanum Hult. & St.John	skunk cabbage
Maianthemum dilatatum (Wood) Nels.& McB.	false lily-of-the-valley
Monotropa uniflora L.	Indian pipe
Montia sibirica (L.) Howell	miners' lettuce
Oenanthe sarmentosa Presl. ex DC	water parsley
Plantago macrocarpa Cham.&Schlecht	plantain
P. major L.	plantain
Ranunculus repens L.	trailing buttercup
Smilacina racemosa (L.) Desf.	false Solomon's seal
Stachys cooleyae Heller	hedge nettle

Tiarella trifoliata L.	foamflower
Tellima grandiflora (Pursh) Dougl	
Trientalis latifolia Hook.	starflower
Trillium ovatun Pursh	Trillium
Urtica lyallii S.Wats.	stinging nettle

MOSSES
(after H.Quian & K.Klinka, 1998)

Dicranum fuscescens Turn.
Eurhynchium oreganum (Sull.) Jaeg.
Hylocomium splendens (Hedw.) Schimp in B.S.G.
Hypnum circinale Hook.
Isothecium mysuroides Brid.
Leucolepus acanthoneuron (Schwaegr.) Lindb.
Plagiomnium sp. T.Kop
Plagiothecium undulatum (Hedw.) Schimp. in B.S.G.
Ploytrichum juniperinum Hedw.
Rhytidiadelphus loreus (Hedw.) Warnst.
R. squarrosus (Hedw.) Warnst.
R. triquetrus (Hedw.) Warnst.
Rhyzomnium glabrescens (Kindb.) T.Kop
Tetraphis pellucida Hedw.

Appendix 13. Birds, mammals, and amphibians of Sunnyside Acres.

BIRDS, MAMMALS and AMPHIBIANS of SUNNYSIDE ACRES

BIRDS

From data kindly provided by White Rock/S.Surrey Naturalists and by B.Graham

Blackbirds	
Brown-headed cowbird	summer resident,
Chickadees & Titmice	
Black-capped chickadee	resident, nests
Chestnut-backed chickadee	resident, nests
Common bushtit	resident, nests
Creepers	
Brown creeper	resident, nests
Ducks	
Wood duck	not seen in last few years
Flycatchers	
Hammond's flycatcher	
Olive-sided flycatcher	summer only, nests
Traill's flycatcher	summer only, nests
Pacific slope flycatcher	
Western flycatcher	summer only, nests
Western wood-pewee	summer only, nests
Grouse	
Ruffed grouse	resident, nests
Gulls	
Glaucous-winged gull	
Hawks	
Goshawk	rare, winter migrant
Sharp-shinned hawk	rare summer, frequent wint
Cooper's hawk	rare summer, frequent wint
Red-tailed	resident, nests
American kestrel	winter, mainly peripheral
Humming birds	

Anna's hummingbird	resident, nests
Ruby-throated hummingbird	
Rufous hummingbird	summer only, nests
Jays & Crows	
Common raven	resident, nests
Northwestern crow	resident, nests
Steller's jay	resident, nests
Kinglets	
Golden–crowned kinglet	resident, nests
Ruby-crowned kinglet	resident, nests
Nuthatches	
Red-breasted nuthatch	resident, nests
Owls	
Western screech owl	rare resident, nests
Saw-whet owl	rare resident, nest
Great-horned owl	rare resident, nests
Pigeons & Doves	
Band-tailed pigeon	common in summer, nests
Rock dove	
Sparrows & Finches	
American goldfinch	resident, nests
Pine siskin	resident, nests
House finch	resident, nests
Purple finch	resident, nests
Chipping sparrow	summer only, nests
Fox sparrow	rare, winter only
House sparrow	resident, nests[perimeter]
Lincoln's sparrow	rare spring migrants
Song sparrow	resident nests
White-crowned sparrow	summer only
Black-headed grosbeak	summer only
Evening grosbeak	common winter, rare summer
Dark-eyed junco	resident, nests
Spotted towhee	resident, nests
Swallows & Swifts	
Black swift	summer only
Barn swallow	summer only
Rough-winged swallow	summer only
Tree swallow	summer only, nests
Violet-green swallow	summer only, nests

Tanagers	
Western tanager	summer only. nests
Terns	
Caspian tern	
Thrushes	
American robin	resident, nests
Swainson's thrush	summer only, nests
Varied thrush	frequent winter, rare summer
Warblers	
Audubon's warbler	spring and fall migrant
Orange-crowned warbler	summer only, nests
Black-throated grey warbler	summer only, nests
McGillivray's warbler	summer only, nests
Townsend's warbler	spring and fall migrant
Wilson's warbler	summer only, nests
Yellow warbler	summer only, nests
Waxwings	
Bohemian waxwing	irregular, winter only
Cedar waxwing	summer and winter, may nest
Wrens	
Bewick's wren	resident, nests
Winter wren	resident, nests
Woodpeckers	
Common flicker	resident, nests
Downy woodpecker	resident, nests
Hairy woodpecker	resident, nests
Pileated woodpecker	resident, nests
Yellow-bellied sapsucker	rare resident, nests
Vireos	
Hutton's vireo	rare, winter only
Red-eyed vireo	summer only, nests
Solitary vireo	summer only, nests
Warbling vireo	summer only.

Bald eagles commonly seen circling overhead,
Turkey vultures occasionally seen circling in summer.

MAMMALS

(From White Rock/South Surrey Naturalists, Mr. T.Bates and Ms. B. Graham.)

Species	Status
Blacktailed deer	small resident herd
Chipmunk – Townsend's	frequently seen
Coyote	frequent
Mole - Townsend's	one sight record
Myotis bats	several species
Opossum	sighted & road kills
Rabbit	feral
Raccoon	common
Squirrel – Douglas	common
Squirrel, flying	infrequent
Squirrel, grey [and melanistic form]	becoming more common

AMPHIBIANS AND REPTILES

The following have been sighted:

Alligator lizard	mostly on perimeter
Garter snake	mostly on perimeter
Pacific tree frog	fairly common
Red-backed salamander	fairly common
Red-legged frog	in wettest, marshy areas
Western toad	fairly common

ADDENDA

Since the booklet was first compiled these additional occurances have been noted

PLANTS

Conifers	Picea sitchensis(Bong.) Carr	Sitka spruce
Forbs	Monotropa uniflora L.	Indian pipe

BIRDS (data kindly provided by Dr. A. Schultz)

Blackbirds	Brewers Blackbird
Flycatchers	Willow Flycatcher - a more specific identification than "Traill's Flycatcher
Hawks	Northern Harrier - over playing fields adjoining the Forest
Meadowlarks	Western Meadowlark - in grassy area adjoining the Forest
Owls	Barred Owl
Orioles	Northern (Buttock's) Oriole - summer
Pigeons & Doves	Mourning Dove - summer
Sparrows & Finches	Golden-Crowned Sparrow - winter Red Crossbill
Thrushes	Hermit Thrush

ABOUT THE AUTHOR

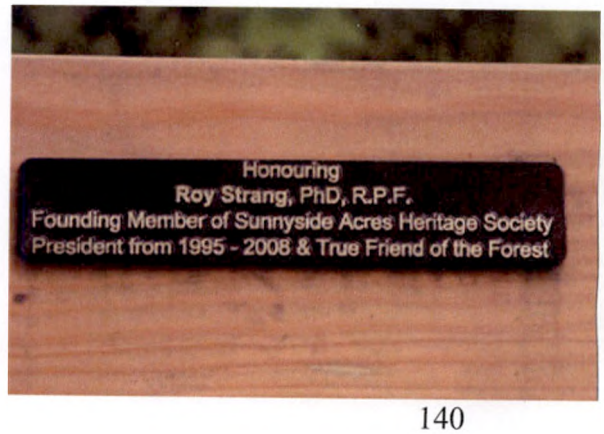
Roy Strang brought his family and 26 years of international forestry experience to Sunnyside Acres when he moved to the Sunnyside area from Ottawa in 1976. Roy holds degrees in Forestry (B.Sc., University of Edinburgh, 1950 and in Ecology (Ph. D., London University, 1965).

With Alison, his wife, and her dogs, he has regularly walked in the woodlands which straddled 24th Avenue between 140th and 152nd Streets. Thirty years ago they would see coyotes, an occasional deer, some horse-back riders, and a few walkers—but no joggers. Things are different now; where once it was quietly rural, the area has become largely suburbanized.

The tranquility of the woods plus the opportunity to watch a second-growth forest recover from human disturbance convinced him that it was desirable to preserve at least part of the area. Time has strengthened that resolve. Thanks largely to the campaign by the Save Our Sunnyside group (Roy was one of the originals), Surrey has an immediately accessible oasis and an outdoor laboratory of nature. Roy is anxious that it should be maintained as such.

In May of 2008 Roy was recognized for his stewardship and advocacy for Sunnyside at the 20th anniversary of the dedication of Sunnyside as an Urban Forest. He was presented with a plaque that was then affixed to a specially dedicated bench in the Acres. The plaque reads: "Honouring Roy Strang, Ph.D., R.P.F., Founding member of Sunnyside Acres Heritage Society, President from 1995-2008. A true friend of the Forest." At the same event, Roy was made a life member of the Society.

Photo 22: Bench dedicated to Roy Strang (A. Lockley).



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