SWORD FERN-FOAMFLOWER-CEDAR MAP UNITS

F1 A seral stage of the association. The area is a narrow sloping valley. A small stream is present and there is some windfall.

F2 A seral stage with a canopy of red alders, bigleaf maples and a few mature western red cedars. The unit is quite flat, bordered by a slope up to the ridge and slope down to the marsh. Area is suitable for trails.

F3 This unit is a climax forest with western red cedar and western hemlock. The unit is slightly higher than the surrounding area except to the north where it abuts a knoll. There is some exposed bedrock in the unit, but it is too wet for a Salal-Hemlock-Douglas Fir association.

F4 This is the largest unit of this ecosystem association. It is a seral forest with only a little regeneration of western red cedar and western hemlock. Three streams flow down the valley and merge into one before flowing out through the Salmonberry-Sword Fern-Cedar association unit into the marsh. Some exceptionally large black cottonwood grow by the stream.

The soil is nutrient rich and is one of the best growing sites in the park. The soil is generally medium textured and very suitable for trails except where it borders the Salmonberry-Sword Fern-Cedar unit.

This is one of the most attractive areas in the park because of the open canopy, and luxuriant understory of ferns and draping epiphitic mosses.

F5 This unit is almost a climax forest. Western hemlock is the dominant tree with western red cedar emerging strongly in the canopy. There are a few paper birch present.

F6 A seral stage with conifers occupying 20-30% of the canopy. The unit slopes to the eastern boundary of the park. An old logging road is located in the northeast portion.

F7 This is a seral stage of this association. The cover is mainly bigleaf maple. Young trees are abundant.

There are inclusions of the Salmonberry-Sword Fern-Cedar association in the wetter depressions near the old logging road that runs through this unit.

F8 This is an older seral forest with some conifers. The main part of this unit is a valley with a well developed stream bank situated between three knolls. The southern s-shaped portion of this unit includes the saddle area between two knolls and part of the valley to the south. A trail through the main valley is possible but must be located to avoid the steeper slopes and large rocks.

F9 This is an example of a forest in transition from a seral forest of hemlock to a climax where cedars will dominate. This unit occupies a flat area bordered by the marsh to the west, and by gentle slopes and a bluff on the other sides.

The face of the bluff can be viewed from this unit. Maidenhair fern and maidenhair spleenwort are found on the bluff.

This unit is very attractive with extensive and varied ground cover; it lacks tall shrubs which would obscure the view.

F10 A complex of the Sword Fern-Foamflower-Cedar and Salmonberry-Sword Fern-Cedar associations. There are some very large paper birches in this unit. Much of the unit is on medium textured soil which would make a good trail substrate.

F11 This unit is a coniferous forest approaching the climax stage. The outer loop of the 1983 Salmonberry Flats Loop Trail passes through this unit.

G. SALMONBERRY-SWORD FERN-CEDAR ECOSYSTEM ASSOCIATION

Climax Vegetation Description:

Western red cedar is the main tree in the climax forest. Western hemlock occurs to a lesser extent. Some deciduous species such as bigleaf maple, red alder and paper birch are usually present. Black cottonwood occurs along some of the streams.

Salmonberry is always present in the shrub layer. It is very dense in the seral forests but becomes less abundant as the coniferous canopy develops. Other shrub species, in descending order of abundance, include vine maple, red huckleberry, cascara and Pacific crabapple.

The herb layer is most developed where salmonberry is not abundant. Typical species are sword fern, spiny shield fern, deer fern, three-leaved foamflower and two-leaved false Solomon's seal. Youth-on-age occurs in wet soils adjacent to streams. Two-leaved false Solomon's seal and youth-on-age are more abundant here than in the Sword Fern-Foamflower - Cedar ecosystem.

Mosses are sparse on the humus. Common species are Plagiomnium insigne, Rhizonmium glabrescens and Leucolepis menziesii. Epiphytic mosses are abundant.

Small inclusions of this association often occur within the Sword Fern-Douglas Fir-Cedar and within the Sword Fern-Foamflower-Cedar associations. Less frequently it develops in swales and depressions within Salal-Hemlock-Douglas Fir units.

Seral Variations:

Much of the Salmonberry-Sword Fern-Cedar ecosystem was logged or cleared for agriculture. Presently most of the secondary forests are deciduous, dominated by red alder. Bigleaf maple and paper birch are present, especially in more mature seral forests. There are also some non-forested pioneer stages with either grass or salmonberry as the major cover.

Moisture Regime:

Hygric to subhydric; high watertable.

Soil Type/Parent Material:

Generally the soils are fine textured silt loams to clays, with occasional coarse outwash materials. Mottling, indicative of a fluctuating watertable, is common. Adjacent to the marsh shallow organic deposits and fine textured fluvial deposits create a mosaic of soils. Parent material is typically glacio-marine. Some units in the southeastern portion of the park have fluvial deposits.

Landforms:

This ecosystem occurs on flat areas or swales which are water receiving areas. There is a narrow strip of this association along most streams. These units are usually too small to include on the map.

Trail Construction Suitability:

A high watertable associated with fine textured soil will present a problem in many areas. Unsurfaced trails would be muddy and require drainage. Board-walks or trail surfacing would be advisable, especially where clay occurs very near the surface.

Points of Interest:

The dead trees (mostly red alder) attract woodpeckers and other cavity nesters. The trees are a source of food (insects) and nest sites. The salmonberry flowers and fruit attract a variety of wildlife.

The unit along Quarry Road is the largest continuous area of one ecosystem in the park.

Salmonberry-Sword Fern-Cedar Ecosystem Association - seral stage

G. Salmonberry – Sword Fern – Cedar

MINNEKHADA REGIONAL
NATURE PARK

SCALE 0 200 400 Metres
0 500 1000 1500 Feet

N

SALMONBERRY-SWORD FERN-CEDAR MAP UNITS

G1 The main tree cover is mature western red cedar. An old trail traverses the length of the unit. This unit has been disturbed. There is a strip of dead trees bordering the marsh. There are yellow wood violets and American stinging nettles in the area near the old outlet dam.

G2 Basically a non-forested seral stage of the Salmonberry-Sword Fern-Cedar association with a few conifers in the north portion of the unit. Salmonberry covers most of the northern part of the unit while grasses cover the southern portion. This area was once cleared for farming.

G3 A seral stage of the Salmonberry-Sword Fern-Cedar association. This unit occurs at the bottom of a knoll and borders an agricultural field. Some colluvial material from the knoll is present. Skunk cabbage grows at the field's edge.

G4 A late pioneer or early, seral stage. Salmonberry covers much of the site. Isolated paper birch, red alder and Pacific crabapple occur throughout the unit. In winter, this area attracts many fruit eating birds. The unit was part of the Pitt River flood plain.

G5 A seral stage. This unit has tree cover over most of its area. Black cottonwood grows along the ditch on the eastern boundary. Paper birch is the major tree species; red alder and Pacific crabapple are also common. This is good habitat for both insect eating and fruit eating birds in winter.

G6 A typical red alder seral stage of Salmonberry-Sword Fern-Cedar association. A small stream runs through this site.

G7 Salmonberry is abundant throughout the unit. Large western hemlock, western red cedar and black cottonwood form the very open canopy. Much of the soil is fine textured.

G8 Most of this unit occurs on a gentle southwest facing slope. It is a seral stage with bigleaf maple and red alder. Soil is suitable for trail construction.

G9 A climax Salmonberry-Sword Fern-Cedar association with some residual immature and mature deciduous trees (red alder) from the seral forest. Most of the red alder are dead from the higher water level of the marsh. An overmature sitka spruce, approximately 1 metre diameter, occurs in this unit. A strip of the Skunk Cabbage-Cedar association occurs where this unit borders the marsh.

G10 A young seral stage. This unit is situated in a depression between high ground. An old logging road runs through this unit. Drainage will be a problem on these fine soils if trails are constructed.

G11 This is the largest ecosystem association unit in the park. This unit is an immature seral stage. It contains small inclusions of the Skunk Cabbage-Cedar association. A few small streams flow through this unit.

Except for the area bordering the marsh this unit was cleared for farming before the 1930's. Stumps were removed so no remnants of the previous forest are left. There is little conifer regeneration under the red alder.

Most of the 1983 Salmonberry Flats Loop Trail is located within this unit. The trail, where located on medium textured soil, has few problems. On the fine textured soils, however, drainage and possibly trail surfacing are required.

G12 A climax forest of the Salmonberry-Sword Fern-Cedar association. Western hemlock and western red cedar dominate the canopy. Areas of medium textured soil in the unit would be suitable for trails.

G13 This unit is a non-forested pioneer stage of the Salmonberry-Sword Fern-Cedar association. The area is covered by grasses and rushes with some young red alder growing around the periphery. Some remains of old farm machinery and garbage can be found at the edge of the field.

G14 A complex of the Salmonberry-Sword Fern-Cedar and Sword Fern-Douglas Fir-Cedar associations in a mosaic of small patches. Both associations are in deciduous seral stages. Soils are a loam to sandy loam with pebble-sized coarse fragments.

G15 A deciduous seral stage. There are some small inclusions of the Sword Fern-Douglas Fir-Cedar association. The soil is medium-textured; a good trail substrate. Alaskan blueberry grows on a small forested knoll.

H. SKUNK CABBAGE-CEDAR ECOSYSTEM ASSOCIATION

Climax Vegetation Description:

The Skunk Cabbage-Cedar association is characterized by a mosaic of hummocks and depressions. The depressions contain standing water during part of the year; the hummocks are much drier.

The depressions support a western red cedar climax forest; Sitka spruce is often present. Vine maple and salmonberrry occur regularly. The common herbs, in descending order of abundance, are skunk cabbage, spiny shield fern, three-leaved foamflower and youth-on-age. The moss layer is fairly well developed but patchy. Plagiothecium undulatum and Rhytidiadelphus loreus, Rhizomnium glabrescens and Climacium dendroides are often present. The thallus liverworts, Marchantia polymorphia and Conocephalum conicum may grow in areas temporarily inundated with flowing water.

The hummocks are formed from accumulations of rotting logs and stumps. Western hemlock tends to dominate these drier sites but western red cedar is usually present. Shrubs include red huckleberry and Pacific menziesia. Salal occurs on decaying wood. The common herbs are deer fern, three-leaved foamflower and bunchberry.

The usual mosses are Hylocomium splendens, Rhytidia-delphus loreus, and Plagiothecium undulatum.

Moisture Regime:

Subhydric to hydric.

Soil Type/Parent Material:

Variable. Both mineral and organic soils are common and occur in a variety of combinations. Mineral soils range from silty clay loams to clays. Organic soils vary in depth from a thin veneer to over one metre deep. Typically the parent material is gleyed, fine textured glaciomarine.

Landforms:

This ecosystem is found in depressions and flat areas adjacent to the marsh.

Trail Construction Suitability:

Boardwalks would be necessary in most areas. The watertable is usually near the surface; standing water frequently occurs. Even where the ground surface is dry, the organic material would rapidly compress and become mucky with pedestrian traffic.

Points of Interest:

This ecosystem contains some interesting plant species, often in unusual combinations as dictated by the mosaic of hummocks and depressions. In the depressions the herb layer is luxuriant in early spring when the skunk cabbage is abundant.

Skunk Cabbage-Cedar Ecosystem Association

H. Skunk Cabbage – Cedar

MINNEKHADA REGIONAL
NATURE PARK

SCALE
0 200 400 Metres
0 500 1000 1500 Feet

N

SKUNK CABBAGE-CEDAR MAP UNITS

H1 A complex of the Skunk Cabbage-Cedar and Hylocomium-Cedar associations. Plants of both associations are found here as well as some uncommon to either.

This is an interesting and attractive site. The soil cannot take heavy traffic so a trail through this unit should follow the southern boundary where it abuts the Sword Fern-Douglas Fir-Cedar and Sword Fern-Foamflower -Cedar associations.

H2 A seral stage dominated by red alder and white birch. It is a receiving site for a stream which goes underground in some places. An increase in the water level of the marsh has resulted in many standing dead trees and many windfalls. This unit looks like a Salmonberry-Sword Fern-Cedar association in winter. It is not suitable for trails.

H3 Similar to H2.

H4 A typical example of a climax Skunk Cabbage-Cedar association. The unit has a wide variety of plants and is visually attractive. A trail through this unit would require a boardwalk.

H5 A Skunk Cabbage-Cedar, Salmonberry-Sword Fern-Cedar association complex. Each type occurs in large strips. Some areas of the Salmonberry-Sword Fern-Cedar association have no trees or just dead red alder. A trail can be put through this unit but special care is needed because of organic soils and the high water table.

I. HYLOCOMIUM-CEDAR ECOSYSTEM ASSOCIATION

Climax Vegetation Description:

Western red cedar is the dominant climax species. Western hemlock is always present and Sitka spruce usually occurs. Typically the canopy is closed.

The understory is open and the sparse shrub layer is restricted to a few scattered red huckleberry or salal.

Moss covers much of the ground. Hylocomium splendens and Rhytidiadelphus loreus are the most abundant species. Sphagnum spp. occurs in scattered patches.

Seral Variations:

Adjacent to the marsh, development of vegetation has been strongly influenced for the past 90 years by numerous water level fluctuations. Presently, a dying stand of western hemlock and shore pine borders the marsh. Further inland a dense seral stand of young western hemlock is developing. For a complete history of this site refer to the descriptions of individual units (see page 45).

Moisture Regime:

Subhydric; stagnant high watertable, presently about 30 centimetres below the surface.

Soil Type/Parent Material:

The soil consists of decaying organic material, often greater than one metre thick. Varying amounts of partially decayed matter, especially sphagnum moss, gives the material a fibrous texture. This soil is acidic and nutrient poor.

Landform:

Flat area adjacent to the marsh.

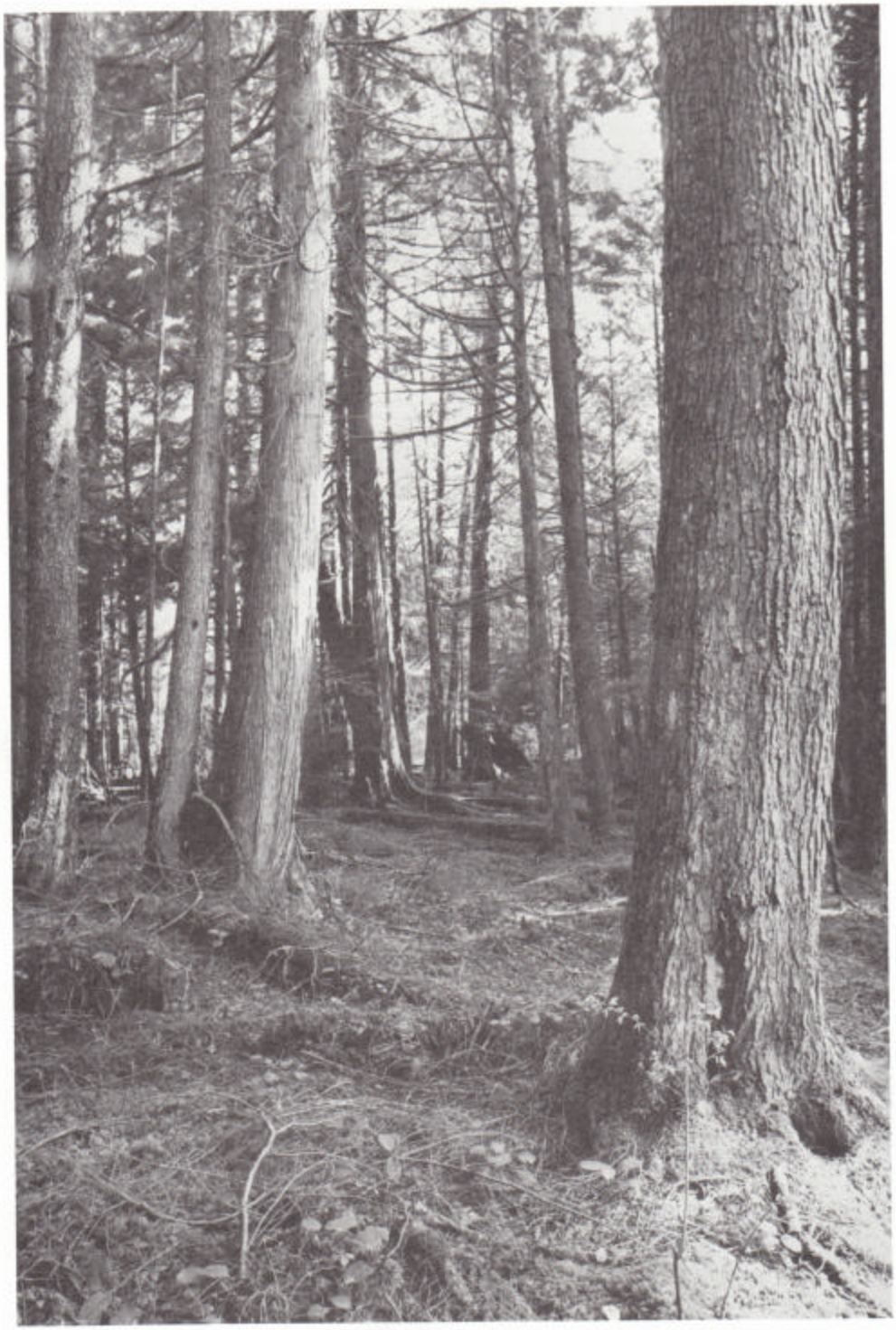
Trail Construction Suitability:

As in the Skunk Cabbage-Cedar ecosystem, the high watertable and compaction of the organic soil by pedestrians will dictate the use of boardwalks on regularly travelled routes.

Points of Interest:

This site is a good example of how man can influence the development of soil and vegetation.

The deep organic soil is also of interest.



Hylocomium-Cedar Ecosystem Association

I. Hylocomium – Cedar

MINNEKHADA REGIONAL
NATURE PARK

SCALE
0 200 400 Metres
0 500 1000 1500 Feet

N

HYLOCOMIUM-CEDAR MAP UNITS

I1 This unit is a young seral stage of the Hylocomium-Cedar association.

The area has an interesting history. In the soil profile the top 4-8 centimetres show humus with hemlock and pine needles. Beneath this is a layer of partly decomposed sphagnum moss. This indicates that the area was a sphagnum bog before the trees developed. A few pockets of bog vegetation (Labrador tea and sphagnum moss) remain along the northeastern boundary of the unit.

The abrupt change from a bog to a forest occurred when the site became drier. The Pitt River dyke was built in the 1890's and put an end to the periodic flooding of the Minnekhada Marsh during periods of high water in the Pitt River. Thus the water level was reduced in the bog. The drier regime stimulated the growth of trees on the outer marsh side of the unit. The dyking of Minnekhada Marsh in the 1930's and the subsequent control of water levels had its effect as well. Water levels were probably lower than before the 1890's, particularly in the summer, thus creating an even drier site. A dense stand of western hemlock grew up in the middle of the unit during these drier decades. In the past three years, as a result of beaver dams, the water level in the marsh has risen, thereby killing many of the trees near the marsh. It will be interesting to watch the changes that will take place on the site when the water level of the marsh is lowered.

This is a good site to interpret the effect of man and water on an area. However, because of the dead trees and the compaction of the organic soil, heavy pedestrian traffic should not be allowed on this site.

I2 This unit is a mature climax forest.

The history of this unit is similar to that of I1. However, this site was not as affected by the changes in water level.

A trail through this unit is not recommended. The organic soil is subject to compaction. Also the entrance into this site via trail from the south is difficult.

HYLOCOMIUM-CEDAR MAP UNITS

I1 This unit is a young seral stage of the Hylocomium-Cedar association.

The area has an interesting history. In the soil profile the top 4-8 centimetres show humus with hemlock and pine needles. Beneath this is a layer of partly decomposed sphagnum moss. This indicates that the area was a sphagnum bog before the trees developed. A few pockets of bog vegetation (Labrador tea and sphagnum moss) remain along the northeastern boundary of the unit.

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The history of this unit is similar to that of I1. However, this site was not as affected by the changes in water level.

A trail through this unit is not recommended. The organic soil is subject to compaction. Also the entrance into this site via trail from the south is difficult.

VEGETATION OF MINNEKHADA MARSH

Prior to the dyking of the Pitt River in the 1890's, Minnekhada Marsh was an extension of the Pitt River flood-plain and was innundated during spring freshet. Upon completion of the Pitt River dykes, Minnekhada Marsh was relatively dry, fed only by small creeks flowing from the north, east and west.

In the 1930's the narrow marsh outlet was dammed and several internal ditches were created. By the 1940's the marsh had been subdivided into three sections by two internal dykes. A high water level, promoting marsh development, was maintained in the north section while the two south sections were drained and cultivated. The southwest section in particular was cultivated for several years.[1]

The area was maintained in this state until the past decade when, due to lack of maintenance and to beaver activity, the water levels in all sections were allowed to rise. These high water levels existed until the spring of 1983 when Ducks Unlimited drained the marsh to facilitate reconstruction of the outlet dam and the east-west dyke.

The numerous fluctuations in water levels and the loss of nutrient rich Pitt River water have undoubtedly effected the development of vegetation. The existing vegetation, observed after the marsh was drained, is described below. A more detailed analysis of the marsh should be conducted when all plant species are flowering and can be identified.

The north section is the largest and most resembles a marsh. The periphery is predominantly hardhack with some sweet gale. Bulrushes (now possibly dead) and marsh cinquefoil occupy most of the central region. A small area of cattail occurs along a channel near the marsh's centre. A small region of manna-grass exists in the southwest corner. Pond lily and pondweed are abundant along the deeper channels.

Influenced by generally much lower water tables, the vegetation of the two southern sections differs from that of the northern section.

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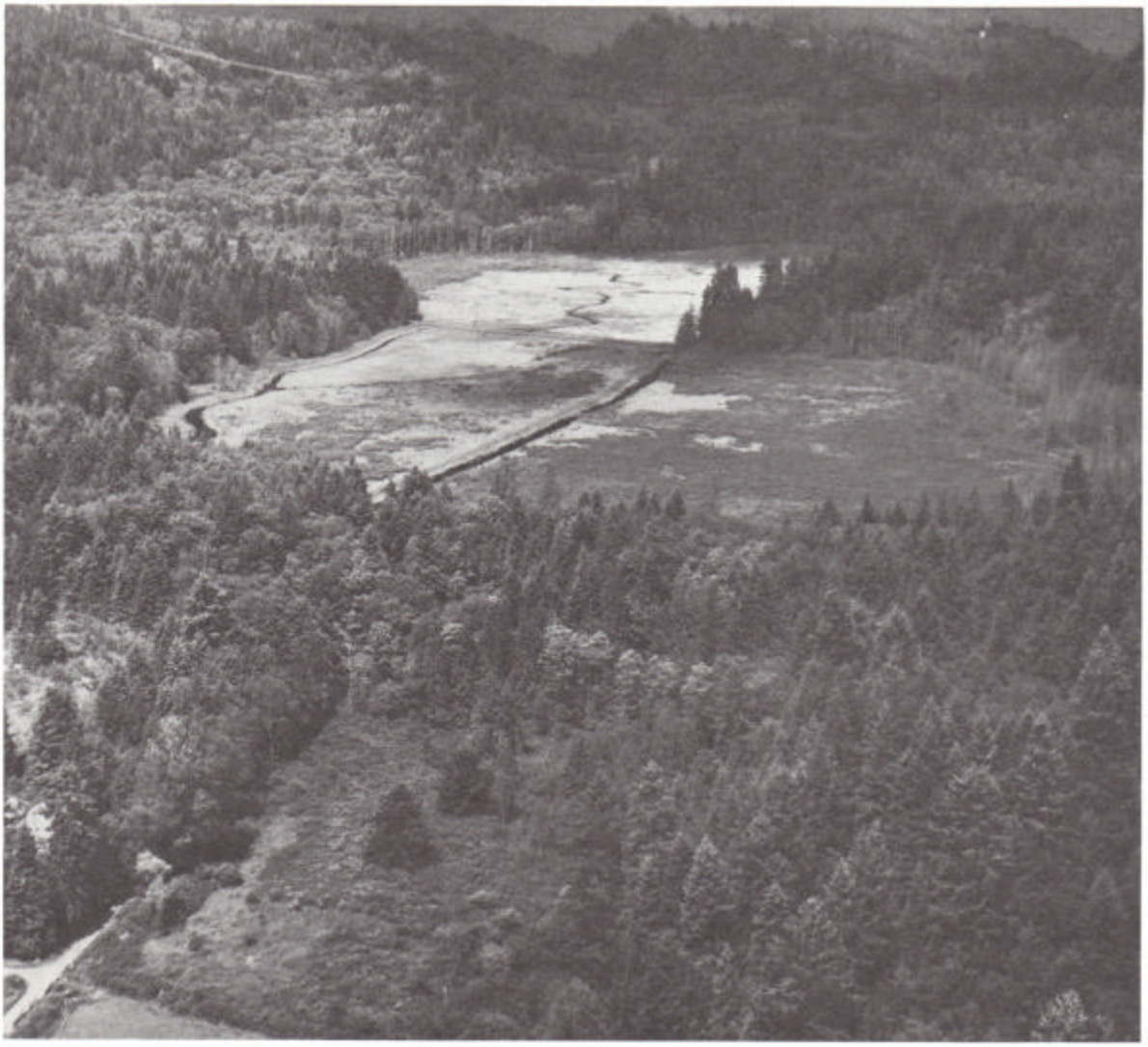
1. This historical information on the timing of dyke and ditch construction and maintenance of water levels has been surmised from air photos dated 1930, 1931, 1946 and 1959.

The southwest section is a mosaic of hardhack and Canada reed grass. Hardhack occupies approximately 20 percent of the area and is most dense to the south. Isolated sedges occur throughout the section. Small wet depressions along the north and northeast boundaries contain manna-grass.

Hardhack occupies approximately 60 percent of the southeast section. Sweet gale occurs with the hardhack, especially around the periphery. Openings of Canada reed grass are frequent. Regions of Labrador tea and sphagnum moss bog exist in the southeast corner.

Reed canary grass grows on the dykes.



PROPOSED TRAIL PLAN

In preparing the trail plan, the first consideration was the obvious destinations or attractions in the park which people would want to see. These include:

- the Lodge
- the highest knoll
- the Addington Marsh observation shelter
- the large outcrop that overlooks Minnekhada Marsh from the east.

Another consideration was that looped walking trails are preferred to one-way trails so that the visitor does not have to retrace the same route. An attempt was also made to route trails through or alongside all the ecosystem associations to expose the visitor to a great variety of settings.

Trails cannot, however, be directly routed to these attractions because of site constraints, particularly soil wetness and slope steepness. Information on these two major constraints was compiled as part of the ecosystem mapping and is presented on the two following maps. Both maps are small scale and are therefore quite general. Within any category small regions may exist that do not conform to the overall descriptions.

The slope analysis map (page 50) divides slope into four general categories, ranging from flat to precipitous. Where possible trails are located in regions included in the gentle to moderate slope categories.

The soil moisture regime map (page 51) depicts soil wetness as determined during the mapping of the ecosystem associations. See Appendix 1 for an explanation of soil moisture regime. Whenever possible the drier, well drained soils were selected for trail routes. Sometimes, however, it was necessary to route trails on wet soils.

Early in 1983 a public parking area was constructed just off Quarry Road. Trail routes from this parking lot to the various attractions were located so as to avoid unfavourable conditions whenever possible. The resulting plan, including a proposed development sequence, is shown on page 52. These proposed routes should be regarded as corridors in which to locate the trails. As precise trail routes are established in the field, an attempt should be made to select a course that is as aesthetic and varied as possible.

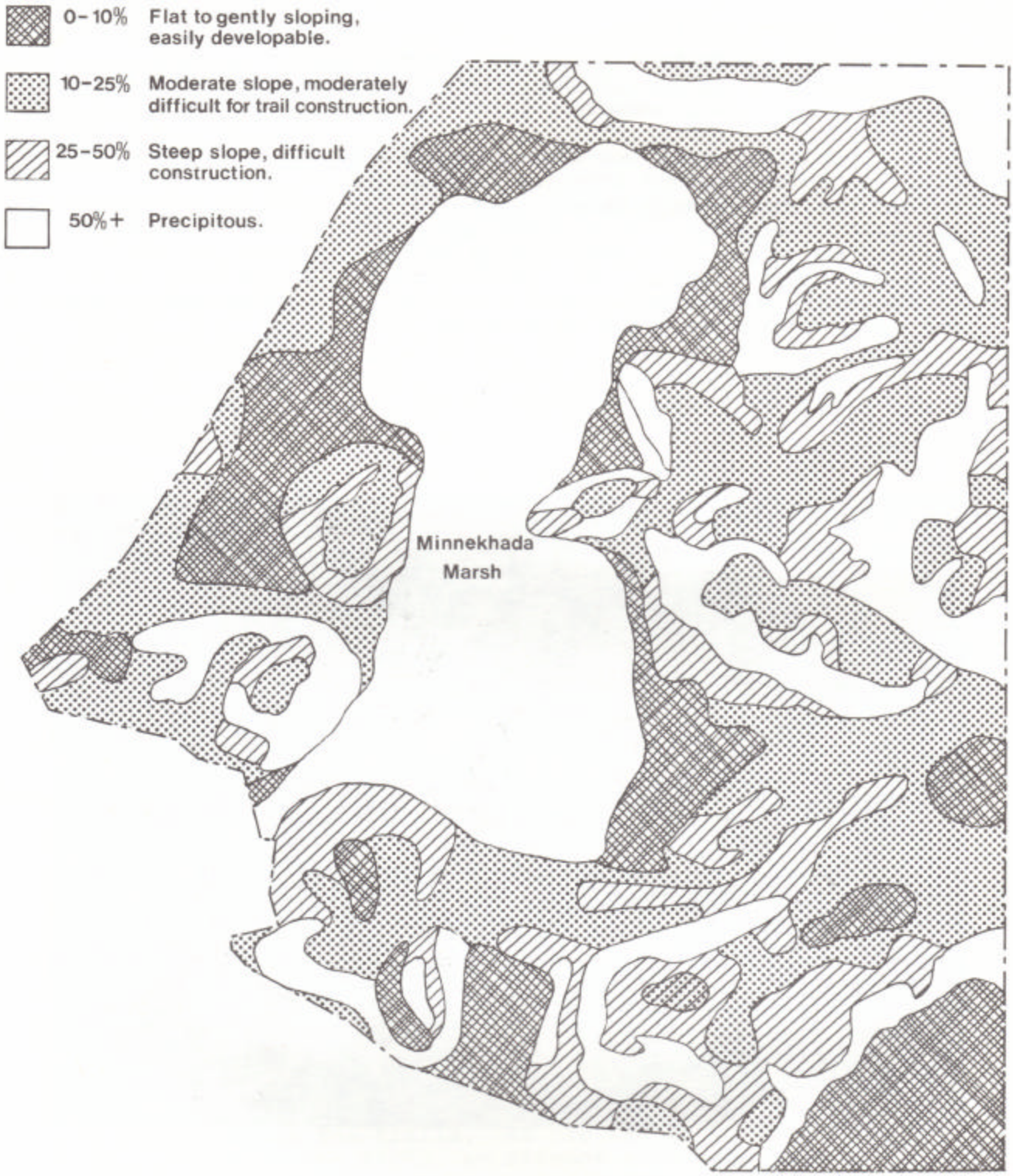
The trail plan map is followed by descriptions of individual trail corridors.

PARKING LOT AND EXISTING SALMONBERRY FLATS LOOP TRAIL

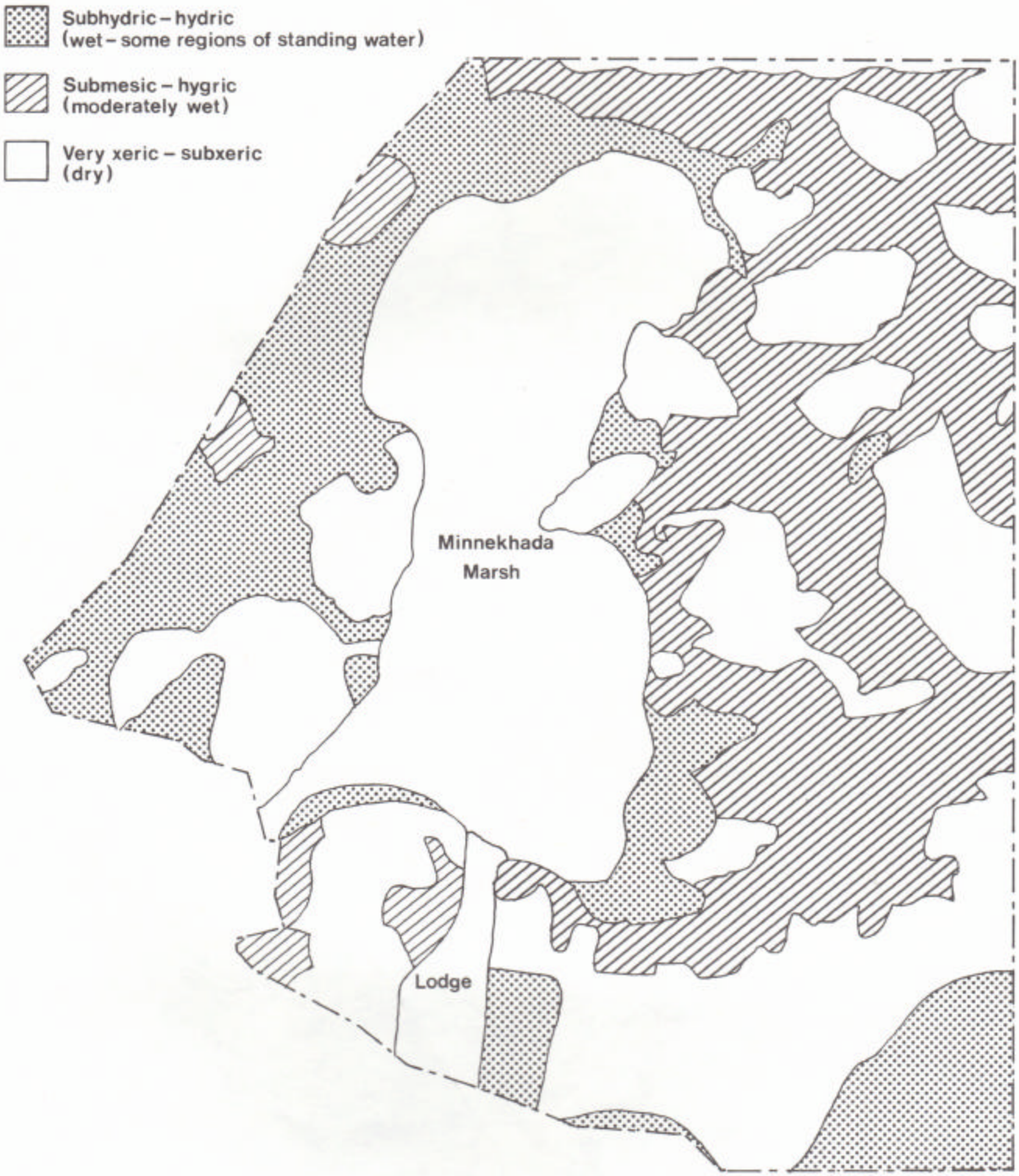
Early in 1983 a public parking area was established on the driest site available along Quarry Road. This lot, with a capacity for 30 cars, will, at present, be the only public access to the trail network.

A trail consisting of two loops, one larger and encircling the other, was constructed from the parking lot to a view point overlooking Minnekhada Marsh. Much of the trail is located in the Salmonberry-Sword Fern-Cedar ecosystem, hence its name, Salmonberry Flats. It also passes through regions of the Lichen-Salal-Douglas Fir and Salal-Western Hemlock-Douglas Fir ecosystems. A portion of this trail is situated on moderately wet soils; this could not be avoided.

Slope Analysis



Soil Moisture Regime



Proposed Trail Plan

MINNEKHADA REGIONAL
NATURE PARK

SCALE 0 200 400 Metres
0 500 1000 1500 Feet

N

DESCRIPTION OF PROPOSED TRAIL LOCATIONS

Phase 1

Length: 1.2 km
Start: Panabode area near the Lodge
Destination: Fish and Wildlife Branch observation shelter overlooking Addington Marsh

Phase 1 trail will provide public access to the Fish and Wildlife Branch observation shelter at Addington Marsh. There is presently no public access to this shelter.

This trail will parallel the marsh and then follow the edge of the Skunk Cabbage-Cedar and Hylocomium-Cedar ecosystem associations. The trail will provide views of these attractive ecosystem associations without travelling through them as the wet, organic soils are not suitable for trail construction. From here the visitor will follow the trail up a small valley, first through a Salmonberry-Sword Fern-Cedar association, then into a Sword Fern-Foamflower-Cedar association. The small valley joins a broad, gently sloping valley dominated by western sword fern and deciduous trees. Large isolated cedar and hemlock also occur. The soil along this section is good for trail construction. Three small bridges will be required. Eventually, the valley narrows to a saddle between two ridges. An attractive Oregon Grape-Cedar-Douglas Fir association, of which only a few small areas exist in the park, occurs in the saddle. The trail will continue up the valley to the saddle and then head south along a ridge. The ridge supports a Salal-Hemlock-Douglas Fir association with some large, mature Douglas fir. Finally the trail will pass through a Lichen-Salal-Douglas Fir ecosystem association to the observation shelter overlooking Addington Marsh.

Phase 2

Length: 0.6 km
Start: The southeast corner of the existing Salmonberry Flats Loop Trail
Destination: Panabode area near the Lodge

The Phase 2 trail will link the Quarry Road trails and the Phase 1 trail, thus connecting the Quarry Road parking area with the Addington Marsh observation shelter. It will also provide pedestrian access to the panabode (future centre for interpretation and education programs) and to the Lodge and its gardens.

The first part of the trail from the Salmonberry Flats loop trail to the marsh will be on coarse soils (good for trails). At the marsh, a wet area will have to be filled to connect the trail to the old dyke. The trail will run along this raised dyke of excavated material. The dyke level should be raised about one metre to be well above the potential high water level of the marsh. The outlet creek should be crossed at the site of the old bridge. From here a dyke can be built heading to the upland just past a rock outcrop. The trail will ascend the bank to about seven metres above the marsh and then parallel the marsh on this higher drier ground to the panabode.

Phase 3

Length:	1.3 km
Start:	West side of the eastwest dyke
Destination:	Joining the Phase 1 trail at the saddle below the high knoll

The Phase 3 trail will create a large loop trail through the southeastern portion of Minnekhada Park and provide another connection to the Quarry Road parking lot.

The first part of the trail will follow the new east-west dyke which Ducks Unlimited will be building in the summer of 1983. The trail will then climb Sun Point knoll, a good example of Lichen-Salal-Douglas Fir association. Some stairs may be necessary on the knoll. After leaving the knoll, the trail will ascend along the south side of a valley first through a Sword Fern-Foamflower-Cedar ecosystem then into a Sword Fern-Douglas Fir-Cedar ecosystem. As the trail approaches the high knoll it will turn southest, joining an old logging road in the saddle southwest of the knoll. From here it will approximately follow the road south around the knoll where it intersects with the Phase 1 trail.

A spur should be routed from the Phase 3 trail out to the moderately high knoll which affords excellent views over the Minnekhada Marsh.

Phase 4

Length: 0.6 km
Start: Phase 3 trail below high knoll
Destination: Top of the high knoll

This trail will provide access to Minnekhada's highest knoll which affords excellent views of Minnekhada and areas south and west toward Vancouver.

The trail should follow the old logging road northward around the high knoll to a saddle where it would leave the old road, turn south and begin to climb the ridge to the knoll. A reasonable route exists along the ridge; for the easiest approach a portion should be located in the Addington Sanctuary property.

Phase 5

Length: 0.9 km
Start: Phase 4 trail where it leaves the old road grade
Destination: Quarry Road at the north park boundary

This portion of the trail system has not been field-checked as thoroughly as the other phases. This trail will open up the northern areas of the park and provide a loop walk of the entire park. There are a couple of old road grades which can be utilized as trails. One bridge will be necessary to cross the stream in the northeastern corner of the park. On the north side of the marsh there are two old road grades. The lower one is proposed for the trail since it is the more scenic route to Quarry Road.

Phase 6

Length: 0.6 km
Start: Quarry Road and Phase 5 trail
Destination: North loop of the Salmonberry Flats trail

This trail would complete the large loop system around the park so that the hiker does not have to walk on Quarry Road.

The start of the trail may have to run alongside the road to avoid the Skunk Cabbage-Cedar/Salmonberry-Sword Fern-Cedar complex. Field checks may reveal a suitable trail route through this unit.

The rest of the trail will be routed through the areas of coarser soils to avoid drainage problems. The trail would link up to the north loop of the Salmonberry Flats Trail near the most northern bridge.

Phase 7

Length:	0.8 km
Start:	Phase 1 trail by the panabode
Destination:	Connects with trail to Addington observation shelter

This trail will provide a loop walk to the Addington shelter or a slightly shorter direct route. It will pass through the Sword Fern-Douglas Fir-Cedar and Salal-Hemlock-Douglas Fir associations. It would have to climb one steep colluvial slope to the ridge top where it could then follow an old road grade to join the Phase 3 trail.

BIRD INVENTORY

INTRODUCTION

Few bird records are available for Minnekhada Regional Park. Most of the existing data pertain to waterfowl observed in Minnekhada Marsh.

Waterfowl were censused over two consecutive winters[1] and the intervening summer.[2] (No data is available for September, October and November). During the summer and the second winter, counts were done weekly; censuses were conducted irregularly during the other winter. The censuses consisted of identifying and counting all observed waterfowl. Winter counts were conducted from two rock outcrops along the western edge of the north marsh. The marshes were canoed during the summer as deciduous vegetation obscured the view from the outcrops. Addington Marsh and the adjacent farmland were censused concurrently. The B.C. Fish and Wildlife Branch has all the census records on file.

Casual observations of all bird species were recorded for one winter[3] and, in the immediate vicinity of the marsh, for one summer.[2] A list of birds of Minnekhada Regional Park, Addington Marsh and the adjacent farmland, including observed and expected species, is provided (see Appendix 4). Addington Marsh was included because a trail will eventually link the park with an observation shelter overlooking the marsh.

1. 1982 J. van Hove, B.C. Fish and Wildlife Branch
   1982/83 Mark Gardiner and Lynn Castagner, EBAP

2. 1982 Harry Brownlow, Summer Canada Employment Project

3. 1982/83 Mark Gardiner and Lynn Castagner, EBAP

DISCUSSION

Minnekhada Regional Park contains a variety of habitats and this is reflected in the diversity of bird species. Eighty-one species, including waterfowl, have been recorded for the park with an additional twenty-five species recorded for Addington Marsh and the agricultural land along Oliver Road.

With continued observation these totals should notably increase. A complete list of birds, including species expected to occur in the park, is found in Appendix 4. This list provides no information on abundance or seasonal distribution of species. Too few records are available to make such conclusions. Approximate information can be obtained from the "Checklist to Vancouver Birds" issued by the Vancouver Natural History Society.

A variety of studies could increase our knowledge of Minnekhada's birds, for example:

- continuation of the waterfowl censuses
- breeding bird survey
- regular censuses (throughout the year) of all species
- maintain records of all casual observations.

WATERFOWL

Sixteen species of waterfowl are recorded for the marsh Minnekhada Regional Park (Table 1). Greatest species diversity and abundance occur during the winter months (Table 1). Total individuals per winter count ranged from twelve to one hundred and eighty-five. Noteworthy species include swans and the Ring-necked Duck. Swans were observed on three occasions but never on census days. They were likely part of the population (>100) of Tundra and Trumpeter Swans that winter regularly along the Pitt River foreshore adjacent to Addington Marsh and around the islands at the confluence of Wigeon Creek and the Pitt River. The Ring-necked Duck, an uncommon species in the Lower Mainland, occurs in large numbers; a maximum of fifty-two individuals were observed on one census, with lesser numbers common throughout the winter. Mallards, Green-winged Teal and Ring-necked Ducks are the most abundant and regularly observed wintering species; Bufflehead, Wood Ducks and Hooded Mergansers were recorded regularly but in much fewer numbers; Canada Geese occurred irregularly in flocks varying from two to more than thirty individuals (Table 2). Pintail, American Wigeon, Common Goldeneye, Common Merganser and Scaup sp. were observed less than thrice during the winter.

Most wintering waterfowl congregate along the northern perimeter of the north marsh. Exceptions are as follows: Bufflehead occur throughout the marsh with most individuals usually located in the southern ponds. Wood Ducks also occur throughout the marsh but prefer forested edges and ditches. Swans and Canada Geese were observed in the north marsh.

As spring approaches many species depart to breed elsewhere; most are gone by late March (Table 1). By June, Cinnamon Teal and Blue-winged Teal return to Minnekhada from southern wintering areas. They may breed in Minnekhada Regional Park but this has not been documented. Breeding records are available for only the mallard and the Canada Geese. Wood Ducks have been recorded throughout the summer and most certainly nest.

Wood Ducks nest in cavities in trees, and since natural cavities are scarce, the breeding population would likely be enhanced by the placement of artificial nest boxes. Canada Geese nest on artificial platforms or, more frequently, on the ground. Mallards and teal nest on dry ground in the vicinity of water.

In recent years the water level in the marsh has been unusually high. In late February 1983 the marsh was drained to facilitate Ducks Unlimited's reconstruction of the east-west dyke and the outlet dam. Also, other modifications, such as the addition of loafing islands in the north pond and breaching of the north-south dyke are planned. Upon completion of this work, the waterlevels will differ from those typical of the census period. These changes should increase waterfowl use of the marsh.

TABLE 1

WATERFOWL OF MINNEKHADA MARSH

	Species Presence by Month (1982-1983)											
	January	February	March	April	May	June	July	August	September	October	November	December
Swan sp.		X[3]										
Canada Goose*		X[3]	X[1,3]	X[1]	X[1]							
Mallard*	X[3]	X[1,3]	X[1,3]	X[1]	X[1,2]	X[2]		X[2]				X[3]
Pintail		X[3]										X[3]
Gadwall							X[2]					
American Wigeon		X[3]	X[1]									
Blue-winged Teal					X[2]	X[2]	X[2]	X[2]				
Cinnamon Teal					X[3]	X[2]						
Green-winged Teal	X[3]	X[1,3]	X[1,3]									X[3]
Wood Duck	X[3]	X[3]	X[1,3]	X[1]	X[1,2]	X[2]	X[2]					
Ring-necked Duck	X[3]	X[1,3]	X[1,3]	X[1]								X[3]
Scaup sp.		X[1]										
Common Goldeneye	X[3]											
Goldeneye sp.			X[1]									
Bufflehead	X[3]	X[1,3]	X[1,3]	X[1]	X[1]							
Common Merganser	X[3]		X[1]									
Hooded Merganser	X[3]	X[3]	X[1,3]				X[2]	X[2]				X[3]

NO DATA AVAILABLE

* indicates that active nest or brood has been observed.

Sources:
1. John van Hove, B.C. Fish & Wildlife Branch
2. Harry Brownlow, Summer Canada Employment Project
3. Mark Gardiner and Lynn Castagner, 1983 EBAP, includes casual observations and weekly census data.

TABLE 2

RELATIVE ABUNDANCE AND FREQUENCY OF OCCURRENCE OF WATERFOWL SPECIES WINTERING IN MINNEKHADA MARSH

	February - March 1982[1]		December 1982 - March 1983[2]	
	Relative Species Abundance[3] n=566	Frequency of Occurrence[4] n=5	Relative Species Abundance[3] n=1103	Frequency of Occurrence[4] n=14
Canada Goose	1	60	0	0
Mallard	33	80	30	79
Pintail	0	0	1	14
American Wigeon	1	20	2	7
Green-winged Teal	8	60	35	86
Wood Duck	2	60	6	57
Ring-necked Duck	34	100	13	79
Scaup spp.	1	20	0	0
Common Goldeneye	0	0	1	14
Goldeneye spp.[5]	2	60	0	0
Bufflehead	18	100	6	71
Common Merganser	1	20	1	7
Hooded Merganser	1	40	7	93

[1]John van Hove, B.C. Fish and Wildlife Branch

[2]Mark Gardiner and Lynn Castagner EBAP, includes only weekly census data.

[3]Relative species abundance as percentage of total waterfowl observed.

[4]Percentage of censuses on which species was observed.

[5]Goldeneye species were not differentiated the first winter.

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APPENDICES

APPENDIX 1

ECOLOGICAL MOISTURE REGIME CLASSES

MOISTURE REGIME	DEFINING CHARACTERISTICS		
	DESCRIPTION	PRIMARY WATER SOURCE	SLOPE POSITION
VERY XERIC	Water removed extremely rapidly in relation to supply, soil is moist for a negligible time after ppt	precipitation	ridge crests shedding
XERIC	Water removed very rapidly in relation to supply; soil is moist for brief periods following ppt	precipitation	
SUBXERIC	Water removed rapidly in relation to supply; soil is moist for short periods following ppt	precipitation	upper slopes shedding
SUBMESIC	Water removed readily in relation to supply, water available for moderately short periods following ppt	precipitation	
MESIC	Water removed somewhat slowly in relation to supply; soil may remain moist for a significant, but sometimes short period of the year. Available soil moisture reflect climatic inputs.	precipitation in moderately to fine-textured soils & limited seepage in coarse textured soils	mid-slope normal rolling to flat
SUBHYGRIC	Water removed slowly enough to keep the soil wet for a significant part of the growing season; some temporary seepage and possibly mottling below 20 cm	precipitation and seepage	
HYGRIC	Water removed slowly enough to keep the soil wet for most of the growing season; permanent seepage and mottling present; possibly weak gleying	seepage	lower slopes receiving
SUBHYDRIC	Water removed slowly enough to keep the water table at or near the surface for most of the year; gleyed mineral or organic soils; permanent seepage less than 30 cm below the surface	seepage or permanent water table	
HYDRIC	Water removed so slowly that the water table is at or above the soil surface all year; gleyed mineral or organic soils	permanent water table	depressions receiving

From B.C. Ministry of Environment and Ministry of Forests, Describing Ecosystems in the Field, RAB Technical Papar #2, Victoria, B.C. 1980, p.39.

Location of Old Logging Roads

MINNEKHADA REGIONAL
NATURE PARK

SCALE 0 200 400 Metres
0 500 1000 1500 Feet

N

APPENDIX 3

FLORAL LISTS [1]

TREES

Acer circinatum	Vine Maple
Acer macrophyllum	Bigleaf Maple
Alnus rubra	Red Alder
Betula papyrifera	Paper Birch
Malus fusca	Pacific Crabapple
Picea sitchensis	Sitka Spruce
Pinus contorta	Shore Pine
Populus balsamifera subsp. trichocarpa	Black Cottonwood
Pseudotsuga menziesii	Douglas Fir
Rhamnus purshianus	Cascara
Thuja plicata	Western Red Cedar
Tsuga heterophylla	Western Hemlock

1. These lists are based on records collected only during one winter and are therefore not complete.

SHRUBS

Alnus viridis subsp. sinuata	Sitka Mountain Alder
Amelanchier alnifolia	Saskatoon
Arctostaphylos uva-ursi	Kinnikinnick
Corylus cornuta var. californica	California Filbert
Cytisus scoparius	Scotch Broom
Gaultheria shallon	Salal
Holodiscus discolor	Oceanspray
Ilex aquifolium	English Holly
Ledum groenlandicum	Common Labrador Tea
Mahonia nervosa	Dull Oregon Grape
Menziesia ferruginea	Pacific Menziesia
Myrica gale	Sweet Gale
Osmaronia cerasiformis	Indian Plum
Oplopanax horridus	Devil's Club
Paxistima myrsinites	Oregon Boxwood
Physocarpus capitatus	Ninebark
Rubus discolor	Himalayan Blackberry
Rubus laciniatus	Cutleaf Evergreen Blackberry
Rubus spectabilis	Salmonberry
Rubus ursinus	Pacific Trailing Blackberry
Salix spp.	Willow
Sambucus racemosa pubens	American Red Elderberry
Spirea douglasii	Hardhack
Symphoricarpos albus	Common Snowberry
Vaccinium alaskaense	Alaskan Blueberry
Vaccinium parvifolium	Red Huckleberry

HERBACEOUS PLANTS

Achilla millefolium	Yarrow
Arceuthobium compylopodium	American Dwarf Mistletoe
Cerastium spp.	Chickweed spp.
Circaea alpina	Alpine Enchanter's-Nightshade
Claytonia sibirica	Siberian Spring Beauty
Cornus canadensis	Bunchberry
Dicentra formosa	Pacific Bleedingheart
Digitalis purpurea	Common Foxglove
Fragaria vesca	Wood Strawberry
Geum macrophyllum	Large-leaved Avens
Glechoma hederacea	Ground Ivy
Goodyera oblongifolia	Western Rattlesnake Plantain
Luzula spp.	Woodrush
Lysichiton americanum	American Skunk-Cabbage
Maianthemum dilatatum	Two-leaved False Solomon's-Seal
Nuphar lutea	Yellow Pond-lily
Plantago lanceolata	Ribwort Plantain
Potamogeton spp.	Pondweed
Potentilla palustris	Marsh Cinquefoil
Ranunculus repens	Creeping Buttercup
Rumex acetosella	Sheep Sorrel
Rumex occidentalis	Western Dock
Saxifraga ferruginea	Alaska Saxifrage
Tiarella trifoliata	Three-leaved Foamflower
Tolmiea menziesii	Youth-on-Age
Trientalis europaea	Northern Starflower
Trientalis latifolia	Broad-leaved Starflower
Trillium ovatum	Western White Trillium
Urtica dioica	American Stinging Nettle
Utricularia vulgaris	Greater Bladderwort
Viola glabella	Yellow Wood Violet

FERNS

Adiantum pedatum	Northern Maidenhair Fern
Asplenium trichomanes	Maidenhair Spleenwort
Athyrium filix-femina	Common Lady Fern
Blechnum spicant	Deer Fern
Cryptogramma crispa	Parsley Fern
Dryopteris assimilis	Spiny Shield Fern
Gymnocarpium dryopteris	Oak Fern
Polypodium glycyrrhiza	Licorice Fern
Polystichum munitum	Western Sword Fern
Pteridium aquilinum	Bracken Fern

FERN ALLIES

Lycopodiella inundata	Bog Club-moss
Selaginella wallacei	Wallace's Selaginella

MOSSES

Aulacomnium androgynum
Climacium dendroides
Dicranum scoparium
Eurhynchium oreganum
Hylocomium splendens
Isothecium stoloniferum
Leucolepis menziesii
Orthotrichum lyellii
Plagiomnium insigne
Plagiothecium undulatum
Pleurozium schreberi
Pogonatum contortum
Polytrichum juniperinum
Rhacomitrium lanuginosum
Rhizomnium glabrescens
Rhytidiadelphus loreus
Rhytidiadelphus squarrosus
Rhytidiadelphus triquetrus
Sphagnum spp.
Stokesiella oregana

LIVERWORTS

Conocephalum conicum
Marchantia polymorpha
Plagiochila asplenioides
Scapania americana

FUNGI

Armillariella mellea	Honey Mushroom
Cantharellus cibarius	Golden Chanterelle
Dacrymyces palmatus	
Laccaria laccata	Waxy Laccaria
Mycena haematopus	Bleeding Mycena
Pleurotus porrigens	Angel Wings
Pleurotus serotinus	
Polyporus versicolor	
Pseudohydnium gelatinosum	
Stropharia ambigua	Questionable Stropharia
Tremella mesenteria	Witch's Butter
Xeromphalina campanella	Golden Trumpets
Xylosphaera polymorpha	Dead Man's Fingers

APPENDIX 4

FAUNA LISTS[1]

BIRDS OF MINNEKHADA REGIONAL PARK,
ADDINGTON MARSH, AND THE ADJACENT FARMLAND

This list includes species recorded to May 1, 1983. The present list contains 117 species and is divided into three sub-categories. Species not footnoted, a total of 81, are those that have been observed in Minnekhada Regional Park. The list is based on data from various sources, collected over one year, mostly during the summer and winter months. Few spring and fall records are available. Species followed by a (1) are species expected, but not yet recorded, in the park. Finally, those species followed by a (2) have been observed in Addington Marsh and/or the adjacent farmland but not recorded in Minnekhada Regional Park.

Common Loon (2)
Pied-billed Grebe
Double-crested Cormorant (2)
Great Blue Heron
Green Heron (2)
American Bittern
Tundra Swan (2)
Trumpeter Swan (2)
Swan spp.
Canada Goose
Mallard
Gadwall
Pintail
Green-winged Teal
Blue-winged Teal
Cinnamon Teal
American Wigeon
Wood Duck
Ring-necked Duck
Scaup spp.
Common Goldeneye
Bufflehead
Ruddy Duck (2)
Hooded Merganser
Common Merganser
Sharp-shinned Hawk (1)
Cooper's Hawk
Red-tailed Hawk
Rough-legged Hawk (2)
Bald Eagle
Northern Harrier (2)
Osprey (2)
Peregrine Falcon (2)
Ruffed Grouse
Ring-necked Pheasant
Sandhill Crane (2)
Virginia Rail
Sora Rail
American Coot (2)
Killdeer (2)

1. With the exception of the bird list, the fauna lists are based on records collected only during one winter and are therefore not complete.

Common Snipe (1)(2)
Glaucous-winged Gull (2)
Tern sp. (2)
Band-tailed Pigeon
Rock Dove (2)
Mourning Dove
Barn Owl (1)
Screech Owl (1)
Great Horned Owl
Pygmy Owl (1)
Short-eared Owl (2)
Saw-whet Owl (1)
Common Nighthawk (1)
Black Swift (1) (2)
Rufous Hummingbird
Belted Kingfisher
Northern Flicker
Pileated Woodpecker
Red-Breasted Sapsucker
Hairy Woodpecker
Downy Woodpecker
Eastern Kingbird (1)(2)
Willow Flycatcher
Western Flycatcher
Western Wood Pewee (1)
Olive-sided Flycatcher
Violet-green Swallow
Tree Swallow
Barn Swallow
Cliff Swallow

Stellar's Jay
Common Raven
Northwestern Crow
Black-capped Chickadee
Chestnut-backed Chickadee
Bushtit
Red-breasted Nuthatch
Brown Creeper
Winter Wren
Bewick's Wren
Marsh Wren
Gray Catbird (2)
American Robin
Varied Thrush
Hermit Thrush (1)
Swainson's Thrush
Townsend's Solitaire
Golden-crowned Kinglet
Ruby-crowned Kinglet
Cedar Waxwing
Starling
Hutton's Vireo
Solitary Vireo
Red-eyed Vireo
Warbling Vireo (1)
Orange-crowned Warbler
Yellow Warbler (1)(2)
Yellow-rumped Warbler (1)
Black-throated Gray Warbler
Townsend's Warbler

MacGillivray's Warbler (1)
Common Yellowthroat
Wilson's Warbler
Red-winged Blackbird
Brown-headed Cowbird (1)(2)
Western Tanager (1)(2)
Black-headed Grosbeak
Evening Grosbeak
Purple Finch
House Finch
Pine Siskin
American Goldfinch
Red Crossbill
Rufous-sided Towhee
Savannah Sparrow (2)
Dark-eyed Junco
Song Sparrow

(1) Species expected, but not yet observed in Minnekhada Regional Park.

(2) Species observed in Addington Marsh and/or the adjacent farmland but not recorded in Minnekhada Regional Park.

MAMMALS

Castor canadensis	American Beaver
Didelphis marsupialis	American Oppossum
Lutra canadensis	River Otter
Microtus longicaudus	Long-tailed Meadow Vole
Odocoileus hemionus subsp. columbianus	Columbian Blacktail Deer
Ondatra zibethica	Muskrat
Procyon lotor	Raccoon
Tamiasciurus douglasi	Douglas Squirrel
Ursus americana	Black Bear

REPTILES

Thamnophis sirtalis	Red-spotted Garter Snake

AMPHIBIANS

Ambystoma gracile	Northwestern Salamander
Hyla regilla	Pacific Tree Frog
Rana aurora	Red-legged Frog
Rana catesbeiana	Bullfrog

FISH

Gasterosteus aculeatus	Threespine Stickleback
Ictaluridai spp.	Catfish

INVERTEBRATES

Ariolimax columbians	Banana Slug
Arion ater	Black Slug
Haplotrema sportella	Yellow-whelled Snail

APPENDIX 5

SUMMARY OF VEGETATION CHARACTERISTICS AND TRAIL CONSTRUCTION SUITABILITY BY MAP UNIT

Map Unit	Ecosystem Association[1]	Forest Type	Age Class (years)	Soil Moisture[2] Regime	Suitability For Trails
A1	A	>80%C[3]	21-80	xeric	not suitable
A2	A	>80%C	uneven aged	xeric	not suitable
A3	A	>80%C	uneven aged	xeric	not suitable
A4	A	>80%C	21-80	xeric	not suitable
A5	A	>80%C	81-140	xeric	variable
A6	A	>80%C	uneven aged	xeric	variable
A7	A	>80%C	21-80	xeric	not suitable
A8	A	>80%C	uneven aged	xeric	variable
A9	A	>80%C	21-80	xeric	variable
A10	A/B	>80%C	21-80	subxeric	variable
A11	A	>80%C	81-140	xeric	not suitable
A12	A	>80%C	uneven aged	xeric	not suitable
A13	A/B	>80%C	21-80	xeric	variable
A14	A	mixed 50-79%D[4]	21-80	xeric	variable
A15	A/B	>80%C	81-140	xeric	variable
A16	A/B	>80%C	81-140	xeric	variable
B1	A	>80%C	21-80	subxeric	good
B2	A	>80%C	21-80	subxeric	variable
B3	A	>80%C	21-80	subxeric	variable
B4	A	>80%C	uneven aged	subxeric	good
B5	B/F	>50%C	21-80	subhygric	variable
B6	A	>80%C	uneven aged	subxeric	good
B7	A	>80%C	21-80	subxeric	variable
B8	A	>80%C	21-80	subxeric	variable
B9	A	>80%C	21-80	xeric	variable
B10	A	>80%C	21-80	subxeric	not suitable
B11	A	>80%C	21-80	subxeric	variable
B12	A	>80%C	21-80	subxeric	variable
B13	A	>80%C	21-80	subxeric	not suitable
B14	A	>80%C	21-80	subxeric	good
B15	B	>80%C	21-80	xeric	variable
B16	B	>80%C	21-80	subxeric	good
B17	B	>80%C	uneven aged	subxeric	good
B18	B	>80%C	21-80	subxeric	variable
B19	B/A	>80%C	21-80	subxeric	variable
B20	B/A	>80%C	21-80	subxeric	not suitable
B21	B	>80%C	21-80	subxeric	variable
B22	B/A	>80%C	21-140	subxeric	variable

1 letters refer to ecosystem association names used in text

2 wettest condition within map unit

3 coniferous

4 deciduous

Map Unit	Ecosystem Association	Forest Type	Age Class (years)	Soil Moisture Regime	Suitability For Trails
B23	B	>80%C	21-80	subxeric	variable
C1	C	>80%C	21-80	subhygric	good
C2	C	mixed 50-79%C	21-80	subhygric	good
C3	C	>80%C	81-140	subhygric	good
C4	C	>80%C	uneven aged	subhygric	good
D1	D/A	>80%C	uneven aged	xeric	not suitable
E1	E/B	>80%C	21-140	subhygric	variable
E2	E	mixed 50-79%D	uneven aged	subhygric	variable
E3	E	mixed 50-79%C	21-80	subhygric	good
E4	E	>80%C	21-80	subhygric	good
E5	E	mixed 50-79%C	21-80	hygric	variable
E6	E	>80%D	21-80	subhygric	variable
E7	E	mixed 50-79%D	21-80	hygric	variable
E8	E	mixed 50-79%C	uneven aged	hygric	not suitable
E9	E	>80%C	21-80	subhygric	variable
E10	E	mixed 50-79%C	21-80	subhygric	variable
E11	E	mixed 50-79%D	21-80	subhygric	good
E12	E	mixed 50-79%D	81-140	hygric	variable
E13	E	mixed 50-79%C	21-80	hygric	variable
E14	E	>80%C	uneven aged	subhygric	variable
E15	E	>80%C	81-140	subhygric	variable
E16	E/B	>50%C	21-80		
E17	E	>80%D	uneven aged	hygric	good
E18	E	>80%C	81-140	subhygric	good
E19	E/F	>80%D	21-80	subhygric	good
E20	E	>80%C	uneven aged	hygric	not suitable
E21	E/B	>80%C	uneven aged	subhygric	variable
E22	E	mixed 50-79%D	21-80	subhygric	variable
E23	E	>80%C	21-80	hygric	variable
E24	E	mixed 50-79%C	21-80	hygric	variable
E25	E	mixed 50-79%C	uneven aged	subhygric	variable
F1	F	>80%D	21-80	hygric	variable
F2	F	>80%D	21-80	subhygric	good
F3	F	>80%C	81-140	hygric	variable
F4	F	mixed 50-79%D	81-140	hygric	variable
F5	F	>80%C	21-80	hygric	good
F6	F	mixed 50-79%D	uneven aged	hygric	good

Map Unit	Ecosystem Association	Forest Type	Age Class (years)	Soil Moisture Regime	Suitability For Trails
F7	F	80%D	uneven aged	hygric	variable
F8	F	mixed 50-79%D	uneven aged	hygric	good
F9	F	> 80%C	81-140	hygric	good
F10	F/G	> 80%D	21-80	subhygric	good
F11	F	> 80%C	21-80	hygric	good
G1	G	> 80%C	21-80	hygric	good
G2	G	> 80%D	21-80	subhydric	not suitable
G3	G	> 80%D	21-80	hygric	not suitable
G4	G	non forested		subhydric	not suitable
G5	G	> 80%D	21-80	subhydric	not suitable
G6	G	> 80%D	21-80	hygric	variable
G7	G	> 80%D	21-80	subhydric	variable
G8	G	> 80%D	21-80	hygric	good
G9	G	> 80%C	81-140	hygric	variable
G10	G	> 80%D	21-80	hygric	variable
G11	G	> 80%D	21-80	subhydric	variable
G12	G	mixed 50-79%C	81-140	hygric	variable
G13	G	non forested		subhydric	not suitable
G14	G/E	> 80%D	21-80	hygric	good
G15	G	> 80%D	21-80	hygric	good
H1	H/I	> 80%C	81-140	hydric	not suitable
H2	H	> 80%D	21-80	subhydric	not suitable
H3	H	> 80%D	21-80	subhydric	not suitable
H4	H	mixed 50-79%C	uneven aged	hydric	not suitable
H5	H	> 50%C	uneven aged	subhydric	variable
I1	I	> 80%C	21-80	subhydric	not suitable
I2	I	> 80%C	81-140	subhydric	not suitable