Province of British Columbia

Ministry of Environment and Parks

Fish and Wildlife
Main Street
Box 370
Queen Charlotte City
British Columbia
V0T 1S0

Nimpkish River

Ref. No.: 413

December 31, 1987.

Hans Roemer,
Ecological Reserves Program,
Parks and Outdoor Recreation Division,
Ministry of Environment & Parks,
4000 Seymour Place,
Victoria, B.C.
V8V 1X5

Dear Hans:

Attached is my assessment of the windfirmness of Nimpkish Island. I hope it is what you had in mind.

Although I do not say so in the text, my personal feeling is that the streambank erosion problems are much more likely to cause problems than the wind. The most immediate problem is at Kiyu Creek but the long term gravel imputs from the Sebalhall/Yookwa must also be a problem because they are filling the bed of the Nimpkish causing it to widen and meander.

I'm enclosing most of the material I collected for your files. The March 1977 cruise report might prove useful in future if you could retrieve the original cruise cards from Forest Service in Vancouver. Since all the trees were numbered, this would seem to give a good baseline for future work.

Thanks for the opportunity to do this for you. I'd be interested in your comments. If you need further information or clarification please call me at 559-8431.

Yours sincerely,

Keith Moore
Habitat Management Biologist
Queen Charlotte City

KM/bll
Encl.
cc: E. Warnock

AN ASSESSMENT OF THE WINDFIRMNESS OF THE NIMPKISH ISLAND PROPOSED ECOLOGICAL RESERVE

Prepared by: Keith Moore
Habitat Management Biologist
Ministry of Environment

December 31, 1987

1. INTRODUCTION

Nimpkish Island is a 16 hectare island of tall trees situated in the Nimpkish River approximately 18 kilometers from Woss on northern Vancouver Island. The island has, since 1973, been proposed as an ecological reserve because it contains very tall and apparently young healthy Douglas fir trees as well as several other tree species.

In 1986, the Wilderness Advisory Committee to the provincial government reviewed the Nimpkish Island Ecological Reserve proposal and recommended that "the site should be designated the "Nimpkish Douglas Fir Ecological Reserve" under the Ecological Reserves Act and be managed by the Ministry of Forests." Prior to proceeding with the establishment of the Reserve, the Ecological Reserves Unit has requested an assessment of the long-range windfirmness of the island forest. An assessment was completed during the week of December 14-20 and is reported here. Terms of reference provided for the assessment are included as Appendix I.

2. METHODS

This assessment has been prepared from information gathered on a one day field assessment on Nimpkish Island and surrounding areas, and by interviews with employees of Canadian Forest Products, Ministry of Environment and Parks, and Department of Fisheries and Oceans staff who have long term experience with the island and Nimpkish River valley.

Air photos of the island and surrounding area taken in 1977 and 1984 and a series of ground photographs taken over several years were examined. Five year development plan maps, topographic maps and maps prepared by the Water Management Branch in 1987 were reviewed.

The fieldwork was done on December 15, 1987 with approximately 5 cm of snow on the roads and 2 cm under the forest canopy of the Island so ground assessment was not optimal. However stream flows were very low providing good visibility of the banks and channel of the Nimpkish River. Field assessment closely followed a period described by Port Hardy weather office and staff at Woss Camp as unusually windy, during which wind gust speeds exceeded 40 knots on 8 days in the one month period prior to December 15th and reached a high of 59 knots on two days.

The assessment also relies heavily on my earlier work on blowdown in streamside leave areas on Vancouver Island (Moore and Bowling, 1974, and Moore, 1977) and past observations of windfirm leave areas in north central Vancouver Island.

Relevant literature on blowdown including that listed in the attached bibliography was reviewed.

3. LIMITATIONS OF THE WINDFIRMNESS ASSESSMENT

This windfirmness assessment of the trees on Nimpkish Island has focussed primarily on the island in its present state. This raises two important caveats.

First, the assessment deals with blowdown caused by winds. It does not deal with the potential for trees falling over as a result of their roots being undercut by stream erosional processes. This undercutting of tree roots has been an important cause of trees "blowing over" at several locations on the edge of the island over the last ten years as described in section 4 of this report. However this toppling of trees is a result of hydrological processes in the Nimpkish River and its tributaries and is not indicative of the relative windfirmness of the island. In this assessment of windfirmness, as required by the Terms of Reference, it is assumed that the banks remain stable. An assessment of the stability of the channel and banks of the Nimpkish River provided by the Water Management Branch will determine the stability of the stream edge trees.

Second, in its present state the island is somewhat sheltered from wind by the trees standing to the south and west of the island on the opposite bank of the river as shown on the airphoto included as Map 1. Thus the basic assessment of the windfirmness of the island is made with the surrounding trees in place. However since these surrounding trees are not part of the ecological reserve proposal, some predictions of the windfirmness of the island, if the surrounding trees were logged, are made in section 6.

4. LOCATION OF PAST AND PRESENT BLOWDOWN

The following descriptions of past and recent blowdown are based on field observation, review of airphotos and discussion with people who were on-site in earlier periods. The areas described below are shown in Map 2.

Area 1. - This site is at the south-east corner of Nimpkish Island and has been a source of concern about blowdown for several years. Between 30 and 50 trees blew down at this site between 1984 and 1986. This blowdown occurred concurrent with a major change in the channel of the Nimpkish River, which moved from its normal channel on the south and west sides of the island to a former overflow channel on the east side of the island. It is believed by most of the individuals who looked at this blowdown, that it occurred as a result of bank undercutting associated with the channel change in the Nimpkish and that as trees fell over they created streamflow obstructions which led to further undercutting and more trees toppling over.

An examination of photos taken at this site from 1984 to 1986 indicates that most of the trees fell in an easterly and south-easterly direction, out of the stand and across the flood channel. This

direction of fall is consistent with the undercutting of their roots by the river and is an unlikely direction for trees to be blown over by the wind. Trees blown down at this location would have been expected to have fallen in a north-westerly direction into the stand. Thus I agree with the assessment that these trees were toppled by undercutting of their roots rather than blown down by wind.

All of these trees were removed in the summer of 1987 and a very neat job of rip rapping this corner of the island was completed. No sign of the extensive blowdown remains.

Since completion of the work in September 1987, signs of fresh blowdown along this newly exposed forest edge are minimal. One small 40 cm d.b.h. cedar has fallen in a south-westerly direction from the edge of the stand. However this tree butt is heavily scarred and the stem is shattered. I think this tree was damaged in the past and may have been pushed over or further damaged by a machine during riprapping. One Douglas fir approximately 125 cm d.b.h. has fallen west-north-westerly into the stand near the edge. However this tree had no top and there are no green branches. It has blown over and is not related to the bank undercutting, but may have occurred prior to 1987. I do not consider it significant.

The leading edge of the stand at this south-east corner is now very exposed to the wind. Since the bank protection work of 1987, there are no fresh tension cracks in the ground, no freshly exposed roots, and apart from one small and questionable cedar, no blowdown.

Area 2 - Approximately six trees have fallen this winter in a north-east or east-north-easterly direction. One large Douglas fir in this group appears to have brought others down with it. All trees fell directly away from the river into the stand. Branches are fresh and green and this blowdown has occurred this winter. Two of the edge trees have been under cut by the river while the third, and largest tree is about 1/2 meter from the stream edge but not undercut.

This clump of trees is on a stretch of the river where there is a lot of old blowdown. On the north side of the river on the island many of the stems are hanging out over the river with the tops laying in the forest. Although the root wads have been broken off by the river, or cut off, it is evident that the roots were up to ten meters out in the river from the present bank edge. This evidence of major undercutting, which can also be seen in the airphotos, indicates that "blowdown" in this location is also a result of a continuing erosional process, along the river banks.

Also observed at this location were numerous fresh branches, limbs and tops broken off standing trees. Most were small diameter or less than 30 cm. but in observing trees in this vicinity and debris on the ground, it is evident that the canopy is exposed to winds sufficient to break off the tops. These winds appear to be coming from westerly or south-westerly directions.

Area 3 - Six trees, including two grand fir have fallen this winter in an easterly and south-easterly direction into the stand. The edge trees in this group have been severely undercut by the river and then apparently blown over by the wind. Both upstream and downstream of these trees the banks are freshly eroded and many roots are exposed. It is evident that other trees have also recently fallen and washed downstream in the Nimpkish.

Streamflow at this point is directed into the standing timber by the large accumulation of gravel at the mouth of Kiyu Creek. The main channel of Kiyu Creek,which is also shifting, as shown in Map 2, now enters the Nimpkish River at or above the midpoint of this side of the island and directs the flow of the Nimpkish against the island. The banks at this location are only about 1 1/2 meters high and tree roots are readily undercut. It is expected that more trees will fall at this location this winter associated with this undercutting of tree roots.

Area 4 - This is the second major blowdown area on Nimpkish Island but again appears to have been heavily influenced by erosion. Comparison of 1977 and 1984 air photos indicates that the northern nose of the island has disappeared as a result of bank undercutting on both sides, from both Nimpkish River and the overflow channel.

Approximately 40 trees are laying on the ground in the stand or laying across the overflow channel. Additional trees appear to have fallen and washed downstream. As in area 3, the process seems to be that roots are undercut, then trees are blown over by winds from the west and south-west or simply fall down. The bank undercutting has been from both sides.

Some trees away from the streamedge have been knocked over or been blown over after the edge trees have fallen leaving them highly exposed. The trees are predominantly large Douglas fir and are lying in a north-east direction across the flood channel. Most of these trees fell prior to 1987. Some can be seen in the 1984 airphotos. The erosion on the flood channel side of the island has now been halted by the 1987 channelization but erosion on the Nimpkish River side is continuing because of the influence of Kiyu Creek. The few trees that fell in this area this winter are from the Nimpkish River side into the stand.

5. ASSESSMENT OF WINDFIRMNESS ON NIMPKISH ISLAND

Based on the assessment described in section 2 above, I consider Nimpkish Island to be reasonably windfirm. Blowdown of trees is a natural process in the life of a forest and at any stage, blown down trees can be observed. This type of blowdown can be seen on the island at present and will continue. However the likelihood of a major blowdown event in which numerous trees or groups of trees blow down in a single storm event is considered to be relatively low. This assessment is based on a number of factors including:

a) storm wind direction and local topographical features;
b) species, age and health of trees;

c) soil conditions and rooting depth;
d) age of nearby or adjacent clearcuts;
e) general conditions in the Nimpkish Valley.

Storm Wind Direction and Topographic Features

Storm winds likely to cause blowdown occur predominantly in fall and winter months (October through March) and are predominantly from a southerly and easterly direction. At the nearest weather station to Nimpkish Island, Port Hardy, winter storm winds are predominantly from the east-south-east. The attached table 1 (from Holmes, 1985) and table 2 (obtained from Port Hardy weather office) indicate the predominantly east and south-easterly direction of the winds.

However winds are channelled by local topography and at this inland location, influenced by high ridges and mountains, the orientation and shape of valleys is a more significant indicator of wind direction and speed than the weather patterns at a coastal weather station.

Nimpkish Island is located at the confluence of the Nimpkish River and a major tributary, Sebalhall Creek as shown in Map 3. At this point the main Nimpkish valley, which runs south-east to north-west through a fairly narrow valley confined by high parallel ridges ,widens out to greater than 3 kilometers in width.

The valley of Vernon Lake and Sebalhall Creek enter from the southwest and a high ridge separates Vernon Lake from the main Nimpkish valley.

Thus storm winds are channelled by those two valleys and the damaging winds can be expected to come down these valleys from south and south-westerly directions. Of the two valleys it is probable that higher wind speeds come down the Vernon Lake/Sebalhall because wind speeds tend to increase over lakes.

There are no topographic features such as knolls, or ridges at right angle to winds or valley constrictions which will cause blowdown by increasing speeds and creating turbulence in the vicinity of Nimpkish Island. In fact the island is favorably located because of a major widening of the valley at this point. In this location winds may be able to flow around or over the island.

The fact that the eastern edge of Nimpkish Island has stood exposed for 10 years as shown in the photo Map 1 without blowdown indicates that the southerly winds coming down the Nimpkish valley bypass the island.

The indications of blowdown from west and south-westerly directions noted in section 4 suggest greater concern for the winds coming down the Vernon Lake drainage or tributary drainages from the west. But again there are no topographic features on the west side of the island which would cause serious blowdown problems and again the valley is wider than upwind.

b) Species, age and health of trees

The tallest trees on Nimpkish Island are Douglas fir and the greatest number of trees on the island are cedar. Douglas fir and cedar constitute 95% of the timber volume and 76% of the total number of stemsas shown in Table 3. These two species are considered to be the most windfirm of the species in coastal British Columbia and given favorable rooting conditions, suitable orientation to wind and an absence of topographic features causing winds to speed up or become turbulent will be windfirm. Numerous studies including Baker, 1915; Boyle, 1929; Gratkowski, 1956; Kinnear, 1969; Pegues, 1959; Ruth and Yoder, 1953; and Steinbrenner and Gessel, 1956 have provided this assessment of fir and cedar. My own work on Vancouver Island (Moore and McDonald, 1974 and Moore, 1977) confirms those findings for Vancouver Island.

Both fir and cedar have large and circular root balls and incorporate a large volume of soil and rock within their rootball (Eis, 1974). Their rooting habit in favorable rooting conditions is deep and provides a lot of anchoring capability that is usually not seen in hemlock, true fir or spruce and in those conditions, they can be considered windfirm.

In the studies cited above, hemlock was found to be the least windfirm tree species and again my 1974-1977 studies on Vancouver Island confirm this. On Nimpkish Island however, hemlock constitutes only 16.5% of the number of stems and less than 3% of the cruise volume, indicating that hemlock is predominantly a small understory tree on the Island and thus not likely to blowdown. Heights and diameters shown in Table 3 confirm this.

The southern portion of the island is reported to be in the vicinity of 320 to 350 years old and healthy. (This figure was quoted in, or by several sources, but I could not confirm it from the various cruise reports.) The northern portion of the island was reported to be older (in the vicinity of 500-600 years old, but again this age could not be confirmed).

The trees are considered to be healthy and there are no reported signs of root rot. The defect, waste and breakage component of the gross volume of Douglas fir was only 7.5%.

Nimpkish Island was proposed as an Ecological Reserve because it was a relatively young, healthy stand of trees. There is as yet no evidence to the contrary. At this age and in the absence of root rot Douglas fir and cedar should form a windfirm stand.

c) Soil conditions and rooting depth

Soil pits were not dug on the island and soils under upturned trees were difficult to see because of snow. However based on observations along the banks, and from discussions, the island appears to be sands, gravels and cobbles overlain by a silty loam. Based on the presence of

salmonberry, devils club and red osier dogwood the site appears to be well drained. Flooding of the island and deposition of fresh silts appears to be an annual occurrence.

Tree rooting observed along banks appeared to be as deep as the height of the bank. The tree roots that were examined had incorporated cobbles and gravels into their rootball.

There is no evidence of any of the features such as perched water tables or impervious soil horizons that would lead trees to develop the flat plate root systems that are susceptible to blowdown. Therefore on this coarse textured well drained site with soil depths in excess of 1 meter, I feel that the Douglas fir and cedar would develop the deep and rounded root systems described in Eis (1974) for well drained alluvial sites. With these rooting conditions fir and cedar are relatively windfirm.

d) Age of nearby and adjacent clearcuts

Most authors reporting on blowdown have observed that most blowdown occurs within the first five years after an edge is exposed and often in the first year, (for example, Alexander 1954, 1964, 1967, Gratkowski, 1956, Holmes, 1985, Kinnear, 1969, Pegues, 1959, Ruth and Yoder, 1953). This has also been observed in my work on Vancouver Island and the Queen Charlottes. Blowdown of trees in leave areas or timber edges following clearcut logging is a result of the dramatically changed exposure to wind rather than excessively high winds. Most trees likely to blow down will fall soon after logging because of their exposure to winds which formerly flowed over the canopy.

As described further in Section 6 and shown on the airphoto included as Map 1, most of the timber edges near or on Nimpkish Island have been exposed to winds for more than 10 years since adjacent clearcutting. This includes the eastern edge of the island, exposed to the east since adjacent 1977 logging, a long edge of timber below Duncan Road to the south and west of the island, exposed to south-west and westerly winds since 1974 and earlier, and an edge of timber along Sebalhall Creek, exposed to south-easterly winds since 1973.

As described earlier the south-east corner of the island did suffer some "blowdown" but this is considered to be a result of bank erosion. The new edge, protected from erosion, has been exposed to strong winds this November and December with virtually no sign of fresh blowdown. If blowdown were to be expected on this edge, it probably would have occurred already.

The indications from these 10 year old edges, which are predominantly Douglas fir and cedar, are that they are windfirm.

e) General conditions in the Nimpkish

Blowdown of streamside leave areas or streamside wildlife wintering areas has not been a problem in general in the Nimpkish valley. Many isolated and exposed fir can be seen along the main river in rows or small patches. Canadian Forest Products does not consider these likely to blowdown.

Blowdown has occurred on clearcut boundaries in the Nimpkish and in the adjacent Tsitika Valley (Holmes 1985). But I believe these areas are commonly on sloping hillsides where the edge is at right angles to the flow of storm winds through the valley or (in the case of the Tsitika) are hemlock/balsam timber types.

Thus in summary, in its present state, I consider Nimpkish Island to be reasonably windfirm. It is a young, apparently healthy stand of Douglas fir and cedar, well-rooted on a well drained site. The hemlock component is minor. It is favorably located in a wide valley and without obvious topographic features to affect local wind velocities or turbulence. There is no evidence from adjacent areas that blowdown on this type of site should be anticipated.

As a cautionary note, I believe the potentially most damaging winds are coming from south-west and westerly directions down the Vernon Lake drainage with wind speeds accellerating over the lake. The edges of the island which these winds will hit are the edges presently most impacted by the erosional processes particularly the north-west edge of the island opposite the mouth of Kiyu Creek. Therefore while I consider the stand on Nimpkish Island to be windfirm, I would also expect further toppling of trees to continue on the island as a result of bank erosion and tree root undercutting. Loss of trees in this way will be most serious on the north-west side opposite Kiyu Creek.

There is also evidence of some top breakage from these westerly winds, as noted in section 4. I consider the potential for top breakage to be greater than the potential for uprooting of trees by wind. Breakage might then cause a potentially serious problem in future with decay and root rots.

6. THE EFFECT OF PAST, PRESENT AND PROPOSED LOGGING ON WINDFIRMNESS OF NIMPKISH ISLAND

Much of the area surrounding Nimpkish Island has been logged in the past and edges exposed by this logging have sustained very little blowdown. These locations, which were briefly described in Section 5d, are shown on Map 4 and described more fully here as they are included in presently approved or future logging plans. Blocks are identified on Map 4 and can be seen on the airphoto in Map 1. They are described here in terms of the likely impact their logging will have on the windfirmness of Nimpkish Island.

Block Y-47

This block is located south-west and west of Nimpkish Island and shown in purple on Map 4. It is being felled at the present time and is scheduled for logging in 1988.

The southern edge of this block did suffer blowdown from a south and south-westerly direction and was salvage logged in 1982 and 1986.

The harvesting of adjacent blocks Y-41 in 1965 and Y-38 in 1974 caused little blowdown in the timber coloured green on Map 4 to the east of Duncan Road even though parts of this area are poorly drained. This timber edge along Duncan Road is now considered to be windfirm.

The harvest of Block Y-47 is not expected to have any significant impact on Nimpkish Island because of the intervening timber along Duncan Road. It may cause some limited new blowdown in that timber along Duncan Road in block Y-55 because of the poor drainage. However this is not expected to be significant for two reasons.

First, the timber below Duncan Road has been exposed by past harvesting with little blowdown and even adjacent to Y-47 has been exposed by the wide right-of-way.

Second, the leading edge is predominantly relatively short cedar and it is at a lower elevation than Y-47. Even if harvesting of Y-47 did cause some localized blowdown in the timber along Duncan Road this would still not effect Nimpkish Island.

Block K-71B

This block is to the north-east of Nimpkish Island and shown in yellow on Map 4. It has been approved for harvest on past five year development plans and is now scheduled to be logged in 1992. It is 50-60% roaded at present.

It is instructive that the tall trees on the southern edge of this block have been exposed to southerly storm winds since 1978 with virtually no blowdown.

The harvest of this block is expected to have no effect on the windthrow potential on Nimpkish Island due to its location to the northwest of the Island and separated by a 10 year old clearcut.

Block Y-55

This block is to the west and south-west of Nimpkish Island and shown as crosshatched green on Map 4. It was submitted by Canadian Forest Products for approval on a five year logging plan approximately five years ago. It was not approved by the B.C. Forest Service and remains deferred. It does not appear in current five year plans but the timber remains in the forest inventory for AAC calculation purposes. Canfor however has no intention to pursue the harvest of this block in the near future.

Harvest of this block Y-55 would increase the blowdown potential on Nimpkish Island because of the increased exposure to the potentially damaging winds coming down Vernon Lake from a south-westerly direction, but trees on the island are already exposed to winds from that direction because they appear to be taller and because they are separated by main channel of Nimpkish River which ranges from approximately 50 to 100 meters in width. Thus even if Y-55 was logged, Nimpkish Island would probably still re relatively windfirm.

However maintenance of the timber in block Y-55 does limit the exposure and keeps winds higher in the crown of trees on the island, which probably accounts for the broken tops and lost branches rather than upturned trees on that side of the island. Removal of those trees would lower the wind profile and expose more of the lower crowns to high winds.

Remaining timber due south of island.

This timber, which is shown in green on Map 4, is not scheduled for harvest and is considered to be deferred with block Y-55. The volume, although not harvestable at present, remains in the inventory for AAC purposes.

This timber has been exposed to winds from the south west since the harvesting of block Y 39 in 1971 and blocks K04A and K04C in 1973. The removal of block Y-45 in 1986 may have increased this exposure slightly. But since there was no blowdown along the edges exposed to south-west winds in either of blocks Y-45 or Y-39 in ten years of exposure, this patch of timber at the mouth of Sebalhall Creek can be considered windfirm.

This patch of timber including the adjacent area described as Y-55 above certainly acts as a buffer for Nimpkish Island against winds coming from the south-west down Vernon Lake and Sebalhall Creek. Its retention undoubtedly increases the windfirmness of the island. If it was removed the potential for blowdown would increase. On this basis alone, I believe it would be prudent to maintain this stand of timber, including Y-55 as a buffer against winds from the south-west. I suggest that mechanisms for its deferral for a long period, similar to 50 year deferrals for deer and elk winter range, should be investigated to maintain this timber until adjacent areas are tall second growth.

However if it was logged, I believe the island would probably be relatively windfirm for the reasons described in the previous sections. The margin of safety or confidence in that assessment would be reduced.

It also appears from the airphotos that flood channels from Sebalhall Creek flow through this stand. The standing timber may therefore also be important in protecting fish habitat in these channels and in stabilizing the notably unstable channel of the Sebalhall. Long term deferment of harvest of this timber might be considered for those reasons as well.

7. SUMMARY

Windfirmness assessments are complex, requiring the consideration of a number of factors which occur simultaneously and in a symbiotic manner. They can therefore be made only in a relative fashion, in terms of a high or low probability of blowdown.

In the case of Nimpkish Island, my assessment is that the probability of blowdown is low and I consider the stand, in its present state to be reasonably windfirm. I have not seen any features which would lead me to conclude that if the stand was retained in its present state, extensive blowdown would be likely to occur.

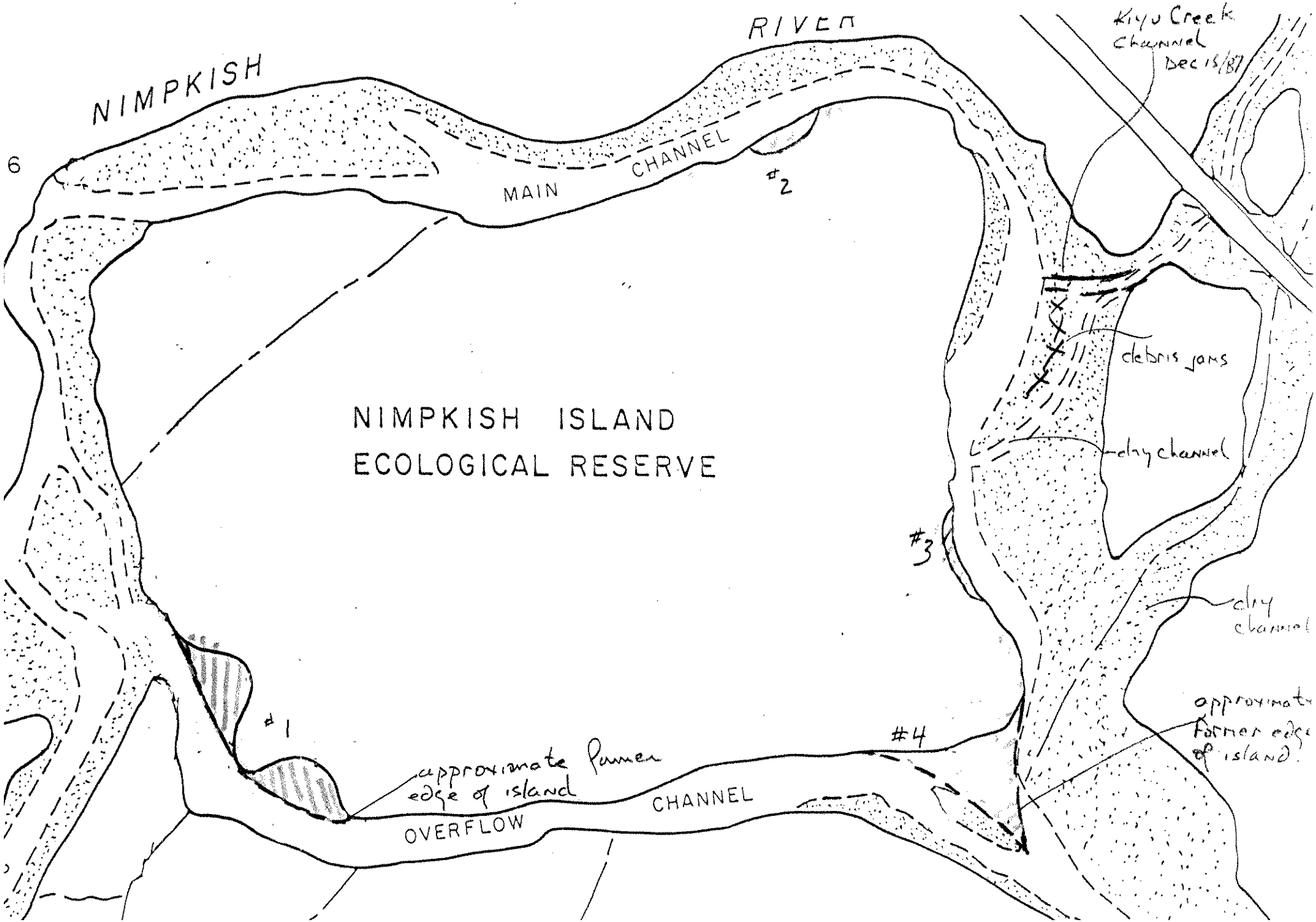
There is a much higher potential for continuing streambank erosion causing trees along the edge to topple over in winds and there is a higher potential for continuing top breakage, particularly from the south-west and west, which may cause problems in the longer term.

In this regard, I suggest that more streambank protection measures will be required to prevent "blowdown" from erosion and I assume these will be outlined in the Water Management Branch report.

With regard to top breakage, I suggest that this question could be further investigated, if felt to be desirable, by redoing the 1977 100% cruise and comparing individual trees, all of which are identified in the field.

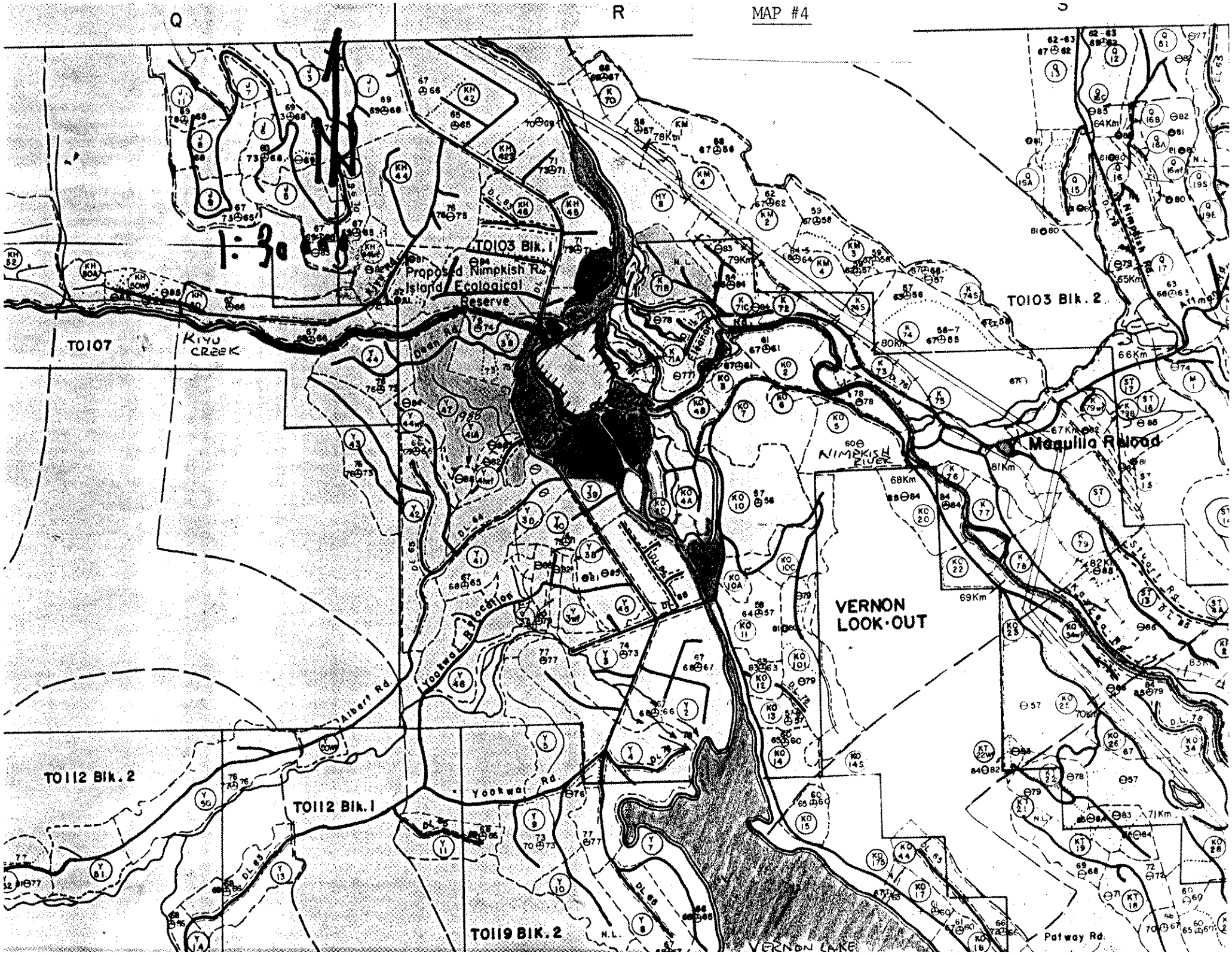
While the Nimpkish Island stand appears to be windfirm, its stability is improved by the presence of standing timber to the south and west. Removal of this timber would increase the exposure to wind considerably. Even if this timber were removed, my assessment is that Nimpkish Island would still be relatively windfirm but at least for the first few years after harvest, some trees would fall. I suggest that maintenance of this timber is a useful insurance policy and that methods for its long term deferral, at least until surrounding second growth has reached considerable height, should be investigated.

MAP #2


NIMPKISH RIVER
Kiyu Creek channel Dec 15/87
6
MAIN CHANNEL
#2
NIMPKISH ISLAND
ECOLOGICAL RESERVE
debris jams
dry channel
#3
dry channel
#1
#4
approximate former edge of island
approximate former edge of island
CHANNEL
OVERFLOW

MAP #1

MAP #4


Q
R
S
TO103 Blk. 1
Proposed Nimpkish Rge
Island Ecological
Reserve
TO107
KIYU CREEK
TO103 Blk. 2
Nimpkish River
Nimpkish Rd.
Meguilla Road
VERNON
LOOK-OUT
Yookwa Reserve
Yookwa Rd.
Albert Rd.
TO112 Blk. 2
TO112 Blk. 1
TO119 Blk. 2
VERNON LAKE
Patway Rd.
64Km
66Km
67Km
68Km
69Km
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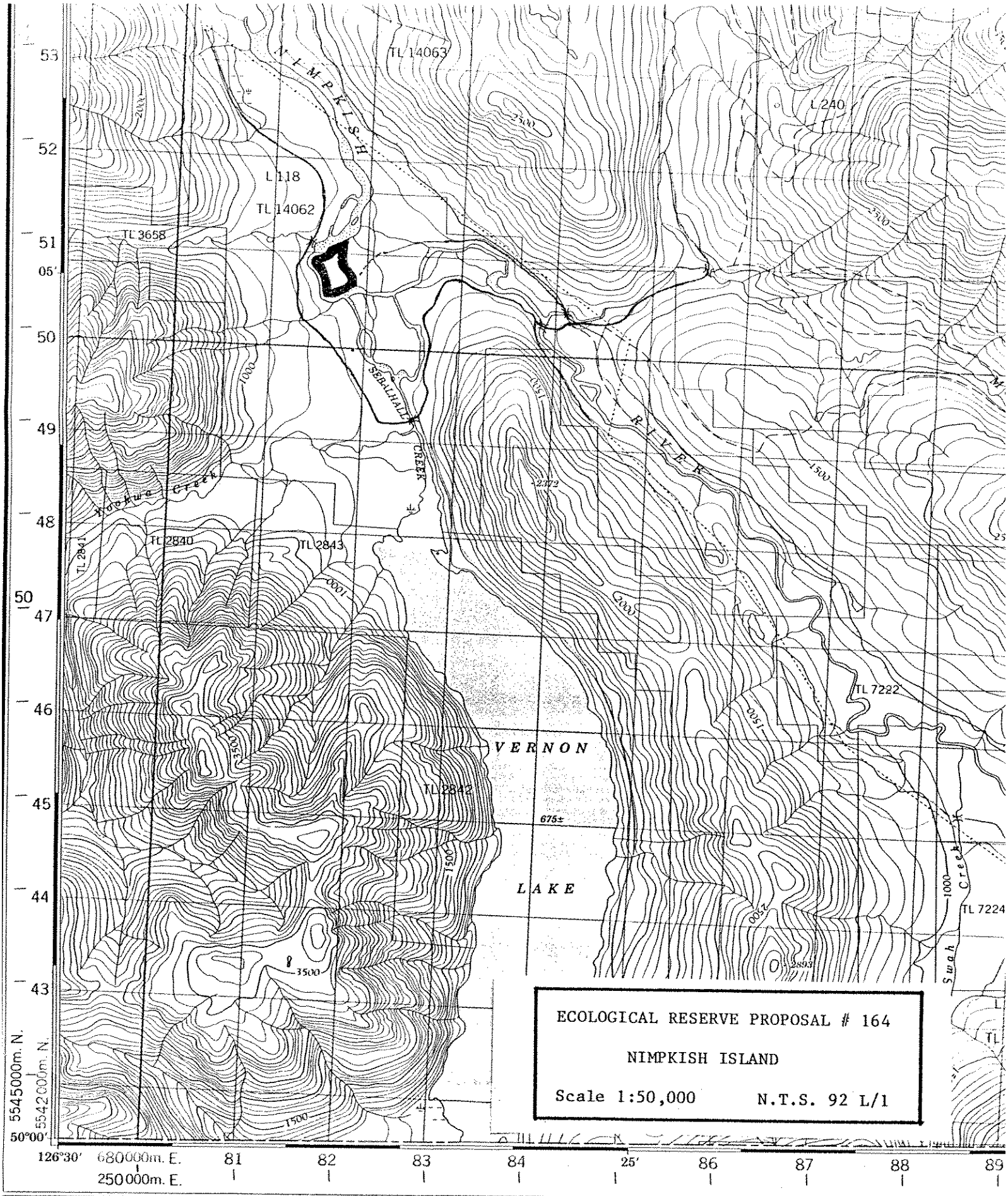
79Km
80Km
81Km
82Km
83Km
78Km



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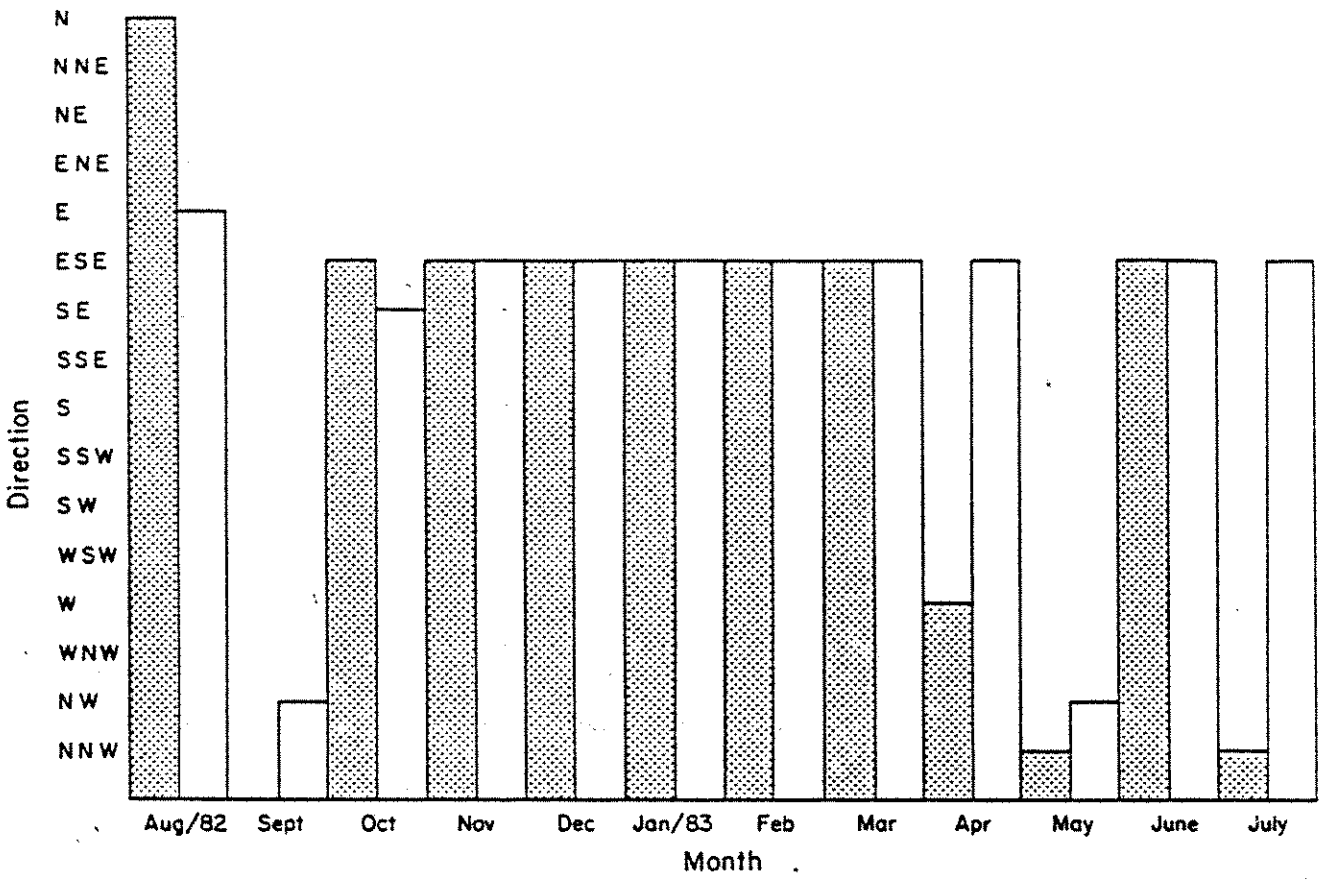
MAP #3

Table 1. Prevailing and Maximum Hourly Winds, Winter 1982-1983, Port Hardy Airport, AES Data.

Source: Holmes, 1985



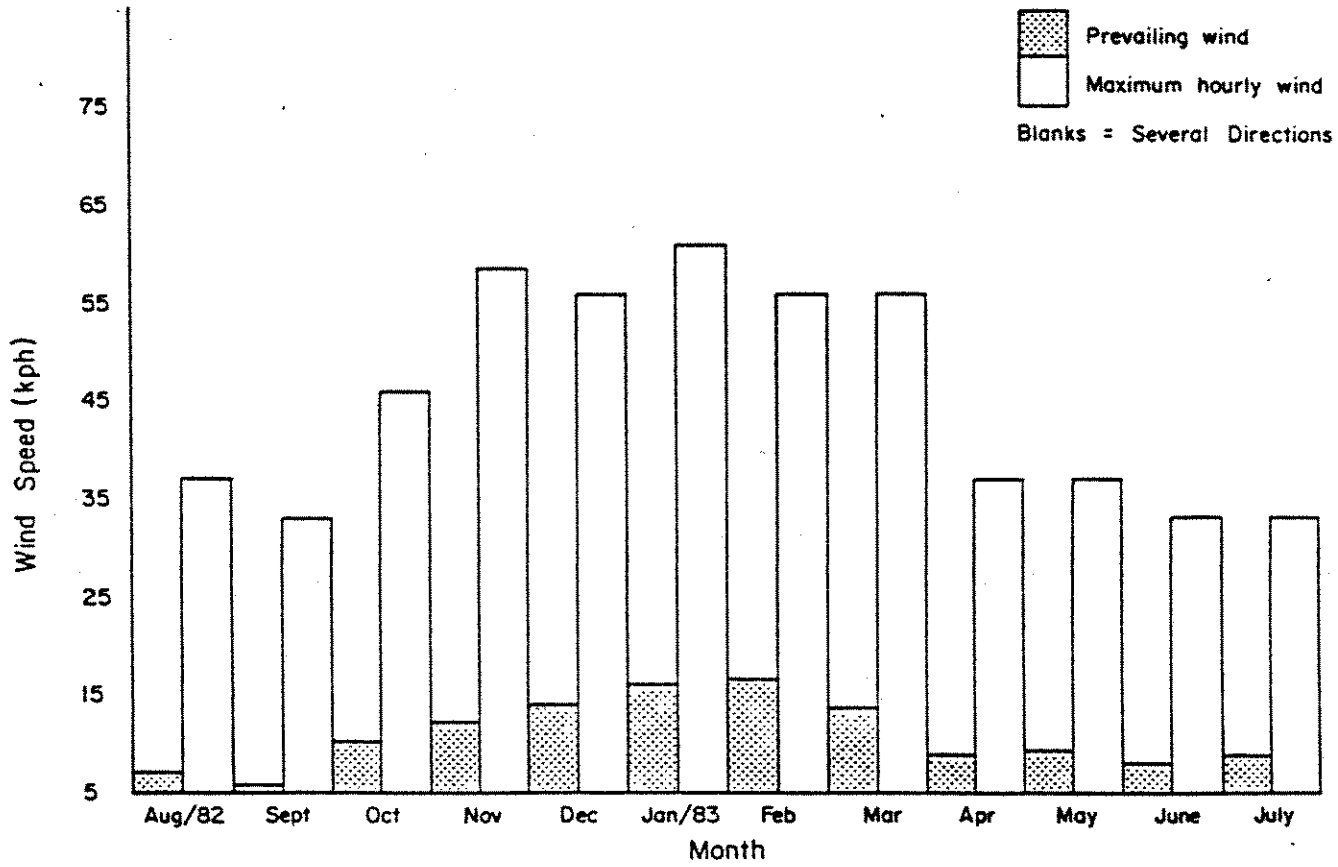


Table 2. Peak Gust Wind Speeds in Knots, Recorded at Port Hardy Weather office, Nov. 15 - Dec. 15, 1987

Date		Direction	Gust Speed (Knots)
November	15		<16
	16		<16
	17	SE	46
	18	E	59
	19	SE	30
	20	SE	30
	21		<16
	22		<16
	23	E	56
	24		<16
	25	E	34
	26	SE	59
	27	SE	44
	29	E	37
	30	SE	40
December	1	SE	38
	2	SE	26
	3	E	20
	4	SE	21
	5	E	40
	6	E	22
	7	SE	32
	8	E	47
	9	SE	32
	10	W	24
	11		<16
	12		<16
	13	SE	33
	14		<16

Note: 1 - Peak gust speed generally exceed sustained wind speed by approximately 10 knots.
2 - 1 knot = 1.87 kilometers per hour.

Table 3. Numbers, Volumes, Average Heights and Average Diameters of Trees on Nimpkish Island.

a) Total Number of Trees on Nimpkish Island by Species

Species	Number of Trees
Douglas Fir	766
Western Red Cedar	953
Western Hemlock	436
Grand Fir	9
Sitka Spruce	48
Western White Pine	31
Deciduous	335}
Broadleaf Maple	31}
Cypress	1
TOTAL	2,630

b) Volume of Trees on Nimpkish Island by Species (in thousand cubic feet at close utilization)

Species	Volume (mcf)
Douglas Fir	585
Western Red Cedar	302
Western Hemlock	25
Grand Fir	1
Sitka Spruce	14
Western White Pine	10
Deciduous	10
Broadleaf Maple	1
TOTAL	948

c) Average Heights and Diameters of Trees

Species	Average Height (in ft.)	Average Diameter (in inches)
Douglas Fir	217	50"
Western Red Cedar	141	39"
Western Hemlock	87	17"
Grand Fir	111	22"
Sitka Spruce	126	21"
Western White Pine	184	34"
Deciduous	67	14"
Broadleaf Maple	67	13"

Source: Joint Ministry of Forests and Canadian Forest Products 100% cruise of 1976 reported in Ministry of Forests report by A.C. Letain, March 8, 1977.

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APPENDIX I

Terms of Reference
Blowdown Study
Nimpkish Island

BACKGROUND: Nimpkish Island (ca. 16ha see map) has been a proposed ecological reserve since 1973/74. The island is what remains of an originally larger proposal. It was chosen as it was the only small area of tall trees with a naturally grown, windfirm boundary. After extensive clearcutting in the valley various large log jams formed in the main channel of the river near the upstream end of the island. These diverted most of the water into the narrow channel on the east side of the island, thereby undercutting the island's banks and causing large trees to fall into the channel. The loss of these trees amounted to an opening up of the natural forest fringe of the island. Bank erosion along the island's southeast edge has now been halted through construction. Since 1974, clearcuts have exposed the island first from the east, then from the north and northwest.

REQUIREMENTS: A professional assessment of the long-range windfirmness of the island forest is required. (A long-term hydrological assessment of the stability of the island with regards to river erosion and channel movements is conducted concurrently.)

The blow-down assessment is to be done under the assumption that the banks of the island remain stable. It should take in account (but must not be restricted to) the following points:

(1) Wind directions and intensities, as expected from valley configuration, wind channels and obstacles,

(2) Evidence and direction of past blow-down remaining on-site and in the vicinity,

(3) Present age, size and species of trees on the island,

(4) Soil conditions and rooting depth on the island, and

(5) Long-range cutting plans for timber still remaining to the southwest and south of the island.

The assessment is to be based on a one day visit to the island, on examinations of maps, air photos, and inquiries with Canadian Forest Products and/or the Port McNeill Forest District.

A brief written report outlining methods, results and recommendations is expected. The report should also include a prediction, what effect the partial or complete removal of the remaining timber to the southwest of the island would have on the island forest's stability.

Completion of the study by December 1, 1987, would be desirable.

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