

MINISTRY OF PARKS

**NIMPKISH RIVER
ECOLOGICAL RESERVE
EROSION PROTECTION PLAN**

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Photo 2: Kiyu Creek, Looking Downstream at the Channel Split

Photo 3: View Downstream in Nimpkish at North End of Island

Photo 4: View Upstream in Nimpkish at North End of Island

Photo 5: Eroding Bank, West Side of Island

Photo 6: Looking Upstream Along West Side of Island

Photo 7: Nimpkish R. Looking Downstream Along 1987 Berm

Photo 8: Main Cutoff Channel, Looking South Across Riprap and 1987 Berm

1 INTRODUCTION

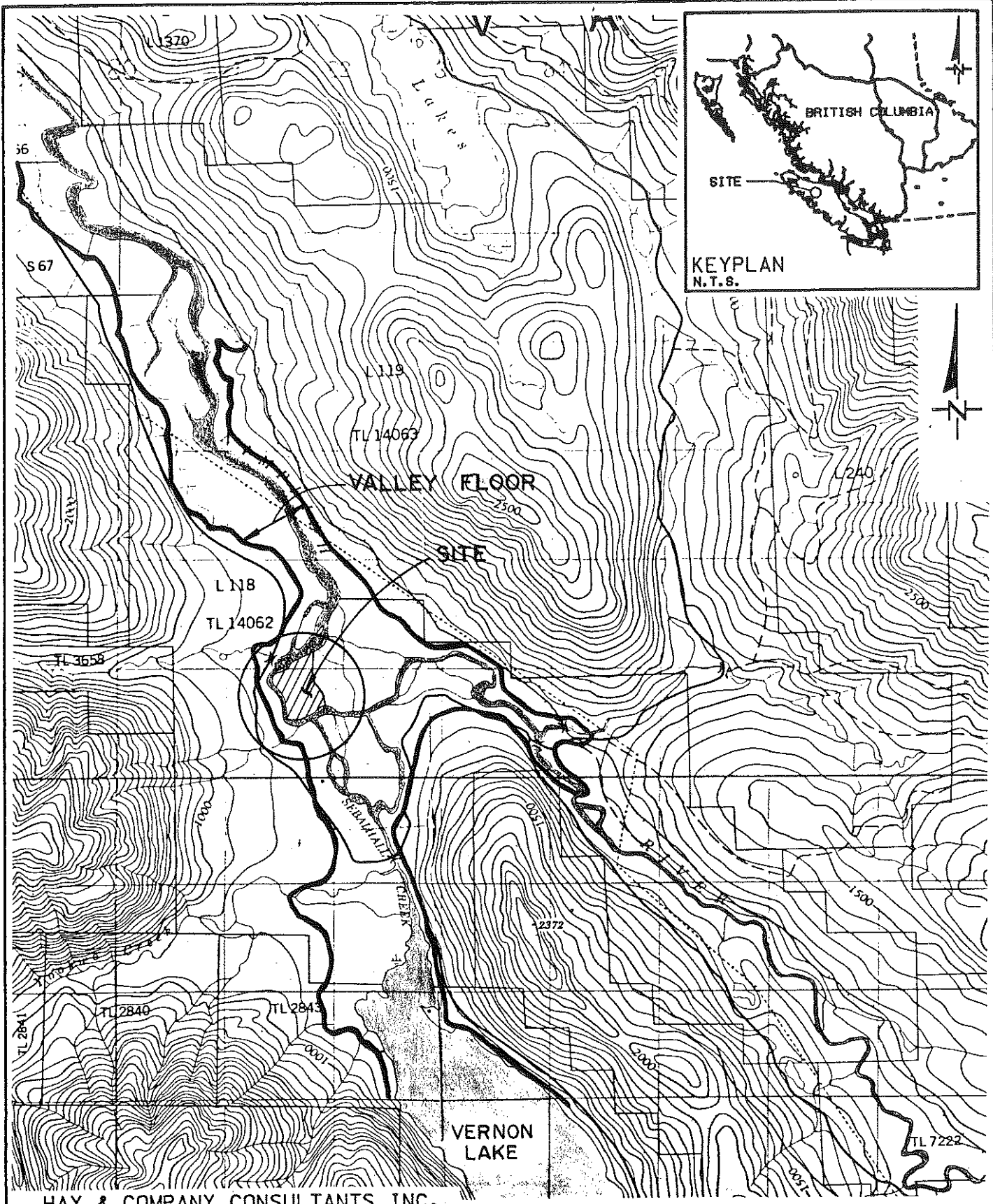
The Nimpkish River Ecological Reserve is a 17 hectare island supporting a stand of very tall Douglas firs. The island is located on the inside of a loop of the Nimpkish River near the outlet of Vernon Lake on north central Vancouver island, Figure 1. A secondary channel cutting through the neck of the loop has formed the island. The cutoff channel was re-activated in the mid 1980's as a result of a log jam damming the main channel just downstream of the south east corner of the island. The re-orientation of flow at the mouth resulted in severe local bank erosion at the southeast corner of the island with consequent loss of trees.

Repairs were executed in the summer of 1987 with backfilling of two erosion scallops, protecting the fill with riprap, and construction of a gravel faced debris backed berm across the entrance to the cutoff channel. The repairs were not executed within the framework of a long term plan but rather as a stop-gap measure to an immediate problem.

A brief report was subsequently prepared by Water Management Branch to address specific questions related to the stability of the island and to propose further remedial action. An additional report on the windfirmness of the island's trees was prepared by the Ministry of Environment which attributed the recent loss of trees to undercutting and bank erosion rather than direct blowdown.

The need for a long term implementation plan for protection of the island's heritage while maintaining its natural character was evident. Preparation of a multiphase erosion control plan was awarded to Hay & Company on February 23, 1990 under contract with the Ministry of Parks. The study was to address the following issues:

1. A review and analysis of existing information. The reserve warden will be contacted and his comments shall be incorporated in the analysis of the situation.
2. Recommendations for control work.
3. A phased prioritized work plan including a budget for each phase of the work.



HAY & COMPANY CONSULTANTS INC.

MINISTRY OF PARKS
 NIMPKISH RIVER
 ECOLOGICAL RESERVE

SITE
 LOCATION

FIG.
 1

PROJECT NO.

Copies of correspondence, memos and reports from the Ministry's files were provided along with some mapping and the 1984 airphotos. Contact was made with Water Management Branch to discuss the 1987 control works and obtain as-constructed drawings and cross-sections, and with the Department of Fisheries and Oceans in Nanaimo to discuss fish habitat issues. The site was visited and surveyed on March 21 and 22 as snow cover precluded an earlier visit. Discussions were held with the warden who happened to be visiting the site on March 21, 1990.

This report presents a brief synopsis of the geomorphology of the reach of river around the island, describes the present erosion processes and presents concepts for preservation of the island's resource in the context of a long term implementation plan. A draft of this report was reviewed by Dr. K. Klinka from a forest ecology perspective and his comments are attached in Appendix B.

2 GEOMORPHOLOGY

The island forming the Nimpkish ecological reserve occupies the left hand one third of a wide flat valley floor where the Vernon Lake valley joins the Nimpkish. The Nimpkish River enters the valley junction along the right hand side turning sharply left around the reserve and back to the right hand side forming a large U. Sebalhall Creek which drains Vernon Lake enters the Nimpkish at the upstream end of the reserve and extensive braiding and cutoff channels are evident across the floodplain. The island is so formed by an active cutoff channel across the neck of the U.

It is not clear whether the channel gradually progressed across the valley, in which case it has been in its present position for at least as long as the older trees, estimated at 670 years, or whether an avulsion resulted in a dramatic shift more recently.

The island experiences inundation and flow during extreme events when the floodplain is activated and during lesser events when some of the numerous overflow channels that criss-cross through the island experience flow. One of these channels along the west end of the island is presently active. The occasional inundation and flows through the island have prompted the outstanding growth.

Logging activities would appear to have had a significant impact on recent geomorphic developments as indicated in the airphoto record and reported by Water Management Branch. Major changes in channel width and location occurred after logging commenced in the late 1950's.

Logging activities typically render more sediments available to the streams and accentuate flood hydrograph peaks. The additional sediments and the

reduced time when sufficient power is available to transport the sediments has resulted in an increase in the resident sediment load of the streams. To compensate for these changes the stream channel widens, numerous bars are formed and the low flow channel negotiates a sinuous path across the stream bed. The majority of flows are now governed by the low flow channel, the position of which is affected by elements such as gravel bars, boulders, logs and debris, and the influence of tributary streams. These geomorphic developments lead to significant bank erosion as the stream migrates to a new state of equilibrium.

The channel in the vicinity of the Nimpkish River Ecological Reserve is likely still in a state of flux and further changes can be expected before a new equilibrium is established.

3 EROSION CONCERNS

The areas of present erosion around the perimeter of the island, Figure 2, are well documented in the Ministry's files and can be referred to as:

- A. the east half of the north side opposite Kiyu Creek (erosion along the north side),
- B. the north half of the west side (erosion along the west side), and
- C. the south east corner and part of the south side (the southeast corner). This area has been repaired and is not presently eroding.

There is also potential for erosion along the east side should the main cutoff channel be activated. For ease of discussion and preparation of remedial concepts, the erosion concerns have been divided into these areas.

3.1 Erosion Along the North Side - A

Kiyu Creek is a small tributary draining a valley west of the island with its mouth discharging into the Nimpkish River at the north west corner of the reserve. The stream splits into two channels, approximately 400 m upstream from the mouth, Photo 2, where it is partially controlled by an outcrop of dense till on the left side. The creek transports a significant sediment load of gravels and cobbles as evidenced by a large fan shaped bar across its dual mouth. The southern channel is presently active, and as evidenced in air photos the low flow channel shifted from the south side to the north sometime between 1967 and 1978. The channel then changed back to the south side between 1978 and 1984, Photos 3 and 4.



EXISTING SITE
CONDITIONS

FIG.
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