

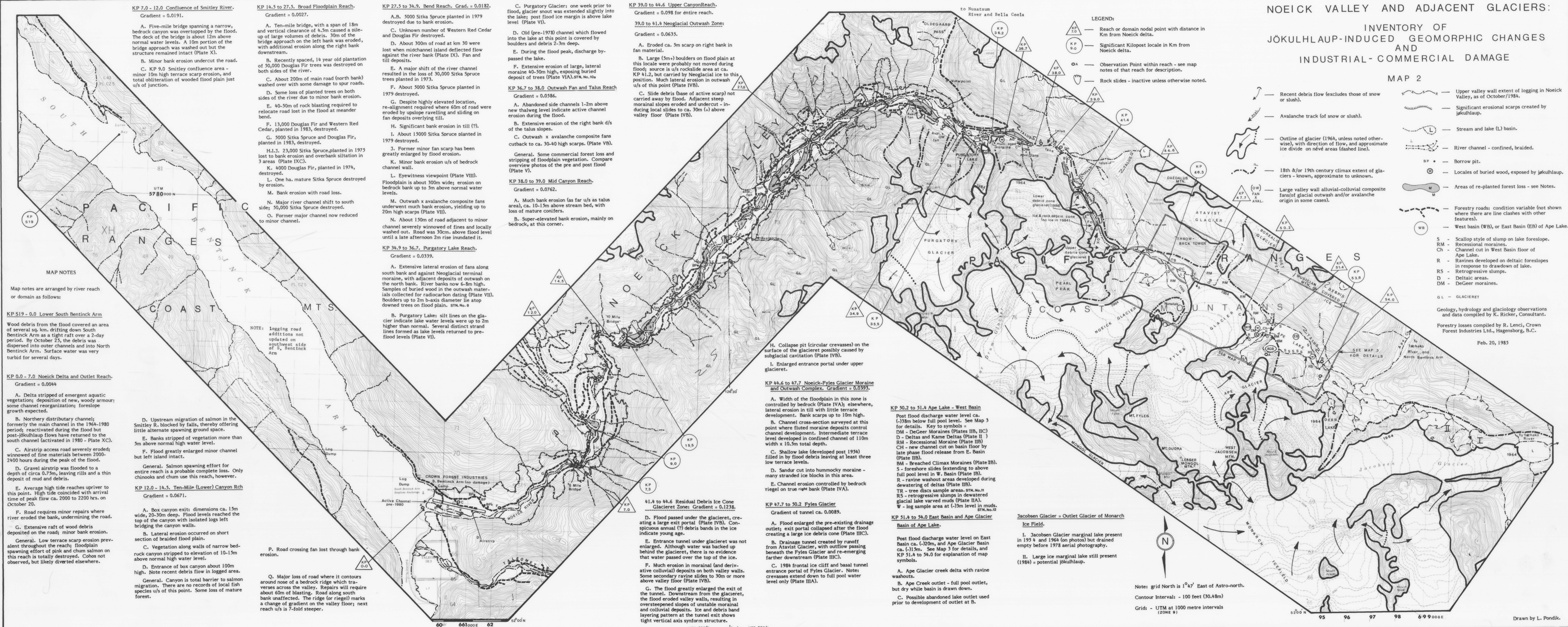
NOEICK VALLEY AND ADJACENT GLACIERS:
INVENTORY OF
JÖKULHLAUP-INDUCED GEOMORPHIC CHANGES
AND
INDUSTRIAL-COMMERCIAL DAMAGE

MAP 2

- Recent debris flow (excludes those of snow or slush).
- Avalanche track (of snow or slush).
- Outline of glacier (1969, unless noted otherwise), with direction of flow, and approximate ice divide on névé areas (dashed line).
- 18th &/or 19th century climax extent of glaciers - known, approximate to unknown.
- Large valley wall alluvial-colluvial composite fans (of glacial outwash and/or avalanche origin in some cases).
- Upper valley wall extent of logging in Noeick Valley, as of October/1984.
- Significant erosional scarps created by jökulhlaup.
- Stream and lake (L) basin.
- River channel - confined, braided.
- BP • — Borrow pit.
- ⊙ — Locales of buried wood, exposed by jökulhlaup.
- M — Areas of re-planted forest loss - see Notes.
- Forestry roads: condition variable (not shown where there are line clashes with other features).
- WB — West basin (WB), or East Basin (EB) of Ape Lake.
- S — Scallop style of slump on lake foreslope.
- RM — Recessional moraines.
- Ch — Channel cut in West Basin floor of Ape Lake.
- R — Ravines developed on deltaic foreslopes in response to drawdown of lake.
- RS — Retrogressive slumps.
- D — Deltaic areas.
- DM — DeGeer moraines.
- GL — GLACIERET

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Forestry losses compiled by R. Lenzi, Crown Forest Industries Ltd., Hagensborg, B.C.

Feb. 20, 1985



KP 7.0 - 12.0 Confluence of Smitley River.
Gradient = 0.0191.

A. Five-mile bridge spanning a narrow, bedrock canyon was overtopped by the flood. The deck of the bridge is about 12m above normal water levels. A 10m portion of the bridge approach was washed out but the structure remained intact (Plate X).

B. Minor bank erosion undercut the road.

C. KP 9.0 Smitley confluence area - minor 10m high terrace scarp erosion, and total obliteration of wooded flood plain just u/s of junction.

KP 14.5 to 27.5. Broad Floodplain Reach.
Gradient = 0.0027.

A. Ten-mile bridge, with a span of 18m and vertical clearance of 4.5m caused a pile-up of large volumes of debris. 30m of the bridge approach on the left bank was eroded, with additional erosion along the right bank downstream.

B. Recently spaced, 14 year old plantation of 30,000 Douglas Fir trees was destroyed on both sides of the river.

C. About 200m of main road (north bank) washed over with some damage to spur roads.

D. Some loss of planted trees on both sides of the river due to minor bank erosion.

E. 40-50m of rock blasting required to relocate road lost in the flood at meander bend.

F. 13,000 Douglas Fir and Western Red Cedar, planted in 1983, destroyed.

G. 5000 Sitka Spruce and Douglas Fir, planted in 1983, destroyed.

H.I. 23,000 Sitka Spruce, planted in 1975 lost to bank erosion and overbank siltation in 3 areas (Plate IXC).

K. 4000 Douglas Fir, planted in 1974, destroyed.

L. One ha. mature Sitka Spruce destroyed by erosion.

M. Bank erosion with road loss.

N. Major river channel shift to south side; 50,000 Sitka Spruce destroyed.

O. Former major channel now reduced to minor channel.

KP 27.5 to 34.9. Bend Reach. Grad. = 0.0182.

A.B. 5000 Sitka Spruce planted in 1979 destroyed due to bank erosion.

C. Unknown number of Western Red Cedar and Douglas Fir destroyed.

D. About 300m of road at km 30 were lost when midchannel island deflected flow against the river bank (Plate IX). Fan and till deposits.

E. A major shift of the river channel resulted in the loss of 30,000 Sitka Spruce trees planted in 1973.

F. About 5000 Sitka Spruce planted in 1979 destroyed.

G. Despite highly elevated location, re-alignment required where 60m of road were eroded by upslope raveling and sliding on fan deposits overlying till.

H. Significant bank erosion in till (?).

I. About 15000 Sitka Spruce planted in 1979 destroyed.

J. Former minor fan scarp has been greatly enlarged by flood erosion.

K. Minor bank erosion u/s of bedrock channel wall.

L. Eyewitness viewpoint (Plate VIII). Floodplain is about 300m wide; erosion on bedrock bank up to 5m above normal water levels.

M. Outwash x avalanche composite fans underwent much bank erosion, yielding up to 20m high scarps (Plate VII).

N. About 150m of road adjacent to minor channel severely winnowed of fines and locally washed out. Road was 30cm. above flood level until a late afternoon 2m rise inundated it.

KP 34.9 to 36.7. Purgatory Lake Reach.
Gradient = 0.0339.

A. Extensive lateral erosion of fins along south bank and against Neoglacial terminal moraine, with adjacent deposits of outwash on the north bank. River banks now 6-8m high. Samples of buried wood in the outwash materials collected for radiocarbon dating (Plate VII). Boulders up to 2m b-axis diameter lie atop downed trees on flood plain. STK No. 8

B. Purgatory Lake: silt lines on the glacier indicate lake water levels were up to 2m higher than normal. Several distinct strand lines formed as lake levels returned to pre-flood levels (Plate VI).

KP 36.7 to 38.0. Outwash Fan and Talus Reach
Gradient = 0.0586.

A. Abandoned side channels 1-2m above new thalweg level indicate active channel erosion during the flood.

B. Extensive erosion of the right bank d/s of the talus slopes.

C. Outwash x avalanche composite fans cutback to ca. 30-40 high scarps. (Plate VB).

D. Former minor fan scarp has been greatly enlarged by flood erosion.

E. Minor bank erosion u/s of bedrock channel wall.

KP 38.0 to 39.0. Mid Canyon Reach.
Gradient = 0.0762.

A. Much bank erosion (as far u/s as talus area), ca. 10-15m above stream bed, with loss of mature conifers.

B. Super-elevated bank erosion, mainly on bedrock, at this corner.

KP 39.0 to 44.6. Upper Canyon Reach.
Gradient = 0.098 for entire reach.

39.0 to 41.4 Neoglacial Outwash Zone:
Gradient = 0.0635.

A. Eroded ca. 5m scarp on right bank in fan material.

B. Large (5m+) boulders on flood plain at this locale were probably not moved during flood; source is u/s rockslide area at Ca. KP 41.2, but carried by Neoglacial ice to this position. Much lateral erosion in outwash u/s of this point (Plate IVB).

C. Slide debris (base of active scarp) not carried away by flood. Adjacent steep morainal slopes eroded and undercut - inducing local slides to ca. 30m (+) above valley floor (Plate IVB).

KP 41.4 to 44.6 Residual Debris Ice Cone Glacieret Zone:
Gradient = 0.1238.

D. Flood passed under the glacieret, creating a large exit portal (Plate IVB). Conspicuous annual (?) debris bands in the ice indicate young age.

E. Entrance tunnel under glacieret was not enlarged. Although water was backed up behind the glacieret, there is no evidence that water passed over the top of the ice.

F. Much erosion in morainal (and derivative colluvial) deposits on both valley walls. Some secondary ravine slides to 30m or more above valley floor (Plate IVB).

G. The flood greatly enlarged the exit of the tunnel. Downstream from the glacieret, the flood eroded valley walls, resulting in oversteepened slopes of unstable morainal and colluvial deposits. Ice and debris band layering pattern at the tunnel exit shows tight vertical axis symform structure.

KP 44.6 to 47.7. Noeick-Fyles Glacier Moraine and Outwash Complex.
Gradient = 0.0393.

A. Width of the floodplain in this zone is controlled by bedrock (Plate IVA); elsewhere, lateral erosion in till with little terrace development. Bank scarps up to 10m high.

B. Channel cross-section surveyed at this point where fluted moraine deposits control channel development. Intermediate terrace level developed in confined channel of 110m width x 10.5m total depth.

C. Shallow lake (developed post 1954) filled in by flood debris leaving at least three low terrace levels.

D. Sandur cut into hummocky moraine - many stranded ice blocks in this area.

E. Channel erosion controlled by bedrock riegel on true right bank (Plate IVA).

KP 47.7 to 50.2. Fyles Glacier
Gradient of tunnel ca. 0.0089.

A. Flood enlarged the pre-existing drainage outlet; exit portal collapsed after the flood creating a large ice debris cone (Plate IIIIC).

B. Drainage tunnel created by runoff from Atavist Glacier, with outflow passing beneath the Fyles Glacier and re-emerging farther downstream (Plate IIIIC).

C. 1984 frontal ice cliff and basal tunnel entrance portal of Fyles Glacier. Note: crevasses extend down to full pool water level only (Plate IIIA).

KP 50.2 to 51.4 Ape Lake - West Basin
Post flood discharge water level ca. (-)38m below full pool level. See Map 3 for details. Key to symbols = DM - DeGeer Moraines (Plates IIB, IIC) D - Deltas and Kame Deltas (Plate II) RM - Recessional Moraine (Plate IIB) CH - new channel cut on basin floor by late phase flood release from E. Basin (Plate IIB). BM - Breached Climax Moraines (Plate IIB). S - foreshore slides (extending to above full pool level in W. Basin (Plate IIB). R - ravine washout areas developed during dewatering of deltas (Plate IIB). TR - tree discs sample areas. STK No. 11 RS - retrogressive slumps in dewatered glacial lake varved muds (Plate IIA). W - log sample area at (-)3m level in muds. STK No. 21

KP 51.4 to 54.0 East Basin and Ape Glacier Basin of Ape Lake.
Post flood discharge water level on East Basin ca. (-)20m, and Ape Glacier Basin ca. (-)15m. See Map 3 for details, and KP 51.4 to 54.0 for explanation of map symbols.

A. Ape Glacier creek delta with ravine washouts.

B. Ape Creek outlet - full pool outlet, but dry while basin is drawn down.

C. Possible abandoned lake outlet used prior to development of outlet at B.

Jacobsen Glacier - Outlet Glacier of Monarch Basin of Ape Lake.
Ice Field.

I. Jacobsen Glacier marginal lake present in 1954 and 1964 (on photos) but drained empty before 1978 aerial photography.

II. Large ice marginal lake still present (1984) = potential jökulhlaup.

KP 51.9 - 0.0 Lower South Bentinck Arm
Wood debris from the flood covered an area of several sq. km. drifting down South Bentinck Arm as a tight raft over a 2-day period. By October 4, the debris was dispersed into outer channels and into North Bentinck Arm. Surface water was very turbid for several days.

KP 0.0 - 7.0 Noeick Delta and Outlet Reach.
Gradient = 0.0044

A. Delta stripped of emergent aquatic vegetation; deposition of new, woody armor; some channel reorganization; foreslope growth expected.

B. Northerly distributary channel; formerly the main channel in the 1964-1980 period; reactivated during the flood but post-jökulhlaup flows have returned to the south channel (activated in 1980 - Plate XC).

C. Airstrip access road severely eroded; winnowed of fine materials between 2000-2400 hours during the peak of the flood.

D. Gravel airstrip was flooded to a depth of circa 0.75m, leaving rills and a thin deposit of mud and debris.

E. Average high tide reaches upriver to this point. High tide coincided with arrival time of peak flow ca. 2000 to 2200 hrs. on October 20.

F. Road requires minor repairs where river eroded the bank, undermining the road.

G. Extensive raft of wood debris deposited on the road; minor bank erosion.

General. Low terrace scarp erosion prevalent throughout the reach; floodplain spanning effort of pink and chum salmon on this reach is totally destroyed. Cohos not observed, but likely diverted elsewhere.

D. Upstream migration of salmon in the Smitley R. blocked by falls, thereby offering little alternate spawning ground space.

E. Banks stripped of vegetation more than 5m above normal high water level.

F. Flood greatly enlarged minor channel but left island intact.

General. Salmon spawning effort for entire reach is a probable complete loss. Only chinooks and chum use this reach, however.

KP 12.0 - 14.5. Ten-Mile (Lower) Canyon Rch
Gradient = 0.0671.

A. Box canyon exit: dimensions ca. 15m wide, 20-30m deep. Flood levels reached the top of the canyon with isolated logs left bridging the canyon walls.

B. Lateral erosion occurred on short section of braided flood plain.

C. Vegetation along walls of narrow bedrock canyon stripped to elevation of 10-15m above normal high water level.

D. Entrance of box canyon about 100m high. Note recent debris flow in logged area.

General. Canyon is total barrier to salmon migration. There are no records of local fish species u/s of this point. Some loss of mature forest.

P. Road crossing fan lost through bank erosion.

Q. Major loss of road where it contours around nose of a bedrock ridge which traverses across the valley. Repairs will require about 60m of blasting. Road along south bank unaffected. The ridge (or riegel) marks a change of gradient on the valley floor; next reach u/s is 7-fold steeper.

NOTE: Logging road additions not updated on southeast side of S. Bentinck Arm

O.F. 1139 SOUTH BENTINCK ARM BRITISH COLUMBIA



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JACOBSEN GLACIER BRITISH COLUMBIA

All officially approved geographic names updated to 1984; those in quotation marks are unofficial.