

Flooding and Landslide Events Southern British Columbia 1808-2006

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1. Introduction

Landslides, snow avalanches and flooding events may have devastating impacts on property and can result in the loss of human life. Many such events have been recorded while others only remain in the memories of those affected.

A clear understanding of the magnitude and frequency of landslides, flooding and storm events may help in project planning, emergency planning and risk assessment. Thus the importance of storms, which create such events, is of interest to a wide audience ranging from emergency measure planners and foresters to engineers and historians. In order to understand current weather and possibly make predictions of future weather patterns, it is important to have a database of historical weather information.

Septer and Schwab (1995) have made an attempt to assemble and catalogue such information for northwestern British Columbia. Their report contains detailed historical information pertaining precipitation, floods, landslides and snow avalanches and damage caused by these.

2. Scope

The intent of this report is to produce a chronological list of flood events for the southern part of British Columbia. Together these two catalogues of historically important storm and flood events will provide a better understanding about the occurrence and magnitude of such devastating events in British Columbia.

The geographic area covered in this study is the southern half of British Columbia roughly from Bella Coola in the west to Quesnel in the Interior and on to the Alberta border in the east and includes Vancouver Island.

Some extreme wind and snow events have also been included even though these did not cause flooding or landslide damage. The June 23, 1946 earthquake has been described as well.

Unless stated otherwise, damage amounts are in dollar values of the time of the event.

3. Information reliability

Weather is one of the most common topics of conversation. Extreme events, such as heavy rainstorms, hurricanes, and subsequent damage get lot of coverage; first in the newspapers, and later in reports and articles in journals and books.

However, historically based information on weather events and their impacts is scattered throughout many different sources, including newspapers, diaries, ship logs, streamflow records.

Terminology used to describe mass wasting events may vary widely in newspaper accounts. In order to be consistent, no effort has been made to confirm the correctness of the terms used in the original reports.

Also as little as possible was changed in the original reporting. Eyewitness reports and many reported cases of "worst flooding on record" are all in quotation marks by the author. Such information must be taken at face value.

Consequently, the information contained in this report is only as good as originally reported. Thus all the information and quotations must stand on their own merit, without benefit of the author's analysis or comment, which could be influenced by personal opinions.

4. Community flooding and landslide archive

In a report with a time span and geographic area like this, many flood and storm events will have been missed. Personal memories, diaries, newspaper articles all contain valuable information on historical storm and flood events. This local knowledge may also make this report more accurate and help planners in future flood prevention measures.

Treating it as an open file, the author welcomes any new information to be included in future updates. Additional information about any missed events can be send to the author's address at P.O. Box 1000, Whaletown, BC, V0P 1Z0.

5. Some climatic features

The primary climatic features of the coastal region include relatively high annual precipitation with the wettest months occurring in fall and winter, and a relatively small annual range of temperature. Heaviest precipitation is caused by low-pressure systems imbedded in an intensified westerly flow move onto the coast, often in close succession. Moderate to strong southwesterly winds cause the heaviest rains.

Due to the complex interaction between atmospheric circulation patterns and major topographic features distributed along the coast which serve as barriers to the movement of air masses, local variations exist in precipitation and temperature. Henderson Lake on the west coast of Vancouver Island, for example, shows an unusual high precipitation. From November 1922 to May 1936, the Dominion Fish Hatchery operated a weather station at the north end of the 32-km long lake that lies in a northwest to southeast direction. The rain gauge was situated close to a high mountain situated to the north and east of the station. Though the average annual precipitation on the west coast of Vancouver Island is over 100 in. (250 cm), for the first eight years of operation Henderson Lake recorded an average annual precipitation of about 250 in. (625 cm). The heaviest monthly rainfall at Henderson Lake was recorded in December 1923 with 79.45 in. (2.02 m).

Relatively warm southwesterly flows of fall storms may well generate free convection once initial lift has occurred. Radar measurements over the lower Fraser Valley (Bonser 1982) have documented cells of much higher than normal precipitation within the frontal storms. The heaviest rainfall from these convective cells is quite local (Jackson et al. 1985). Most storms in mountainous western Canada are cyclonic, but are modified by orographic effects. Within these storms, cells of very intense rainfall as small as 5 km across exist. However, the course grid of weather stations might not record these.

Bruce (1961) clearly shows the large increases in rainfall amounts as one goes from the Western Fraser Delta-Boundary Bay area to the mountainous terrain north and east of Vancouver. Areas along west facing mountain slopes tend to have more clouds and subsequently receive more precipitation than the eastern faces of the mountains. The southeastern lowlands of Vancouver Island, the islands of the Straits of Georgia and the Fraser River estuary lie in the rain shadow of the Vancouver Island coast range and the Olympic Mountains in Washington state. Consequently, this is the driest zone of the coastal climatic region. It is also the warmest with more hours of bright sunshine during the summer.

The climate of the coastal region is controlled on a seasonal basis by macro-scale atmospheric processes. Storm tracks in the late fall, nicknamed "Pineapple Express" or "Hawaiian Express" start in the tropics but sweep away to the north and east and eventually may hit the British Columbia coast. But the jet stream has another branch that can send all that wind and rain over California, causing flooding and landslides there while not affecting British Columbia.

During the winter, vigorous circulation is produced by a strong temperature gradient between tropical and polar latitudes. During this period, low pressures over the Gulf of Alaska and high pressures in the interior combine to produce strong pressure gradients over British Columbia, Oregon and Washington and southerly surface winds prevail.

Winter storms are not the only destructive storms in British Columbia. In fact, the more devastating disturbances occur during the spring and fall months. High winds and pelting rain often combine to smash houses, trees, and down communication circuits, often causing millions of dollars of damage. One of the most damaging storms ever to hit the Pacific Northwest was typhoon "Freda" on October 11-12, 1962.

6. Flood events

In the study area, extreme floods do not result from the same flood producing mechanisms on all drainage basins. Some watersheds have a snowmelt-induced flood regime in spring or summer, some a rainfall-induced flood regime either as rainfall runoff only or as rain-on-snow runoff in fall or winter, while others have both of the two flood regimes. On most drainage basins in the coastal region, rainfall-induced floods occur in the fall and early winter. In spring and summer extreme floods primarily occur only on the main stem of major rivers that flow through the region. Areas in the coastal region that have both a fall/winter rainfall-induced and a spring/summer snowmelt-induced flood regime, extreme rainfall-induced floods are greater than those estimated on the same basin for snowmelt floods. Unit discharges of extreme floods on basins with only rainfall-induced flood regimes are greater than those on other basins in the coastal region with only snowmelt-induced flood regimes (Melone 1985).

Extreme weather events in the southern coast mountains, with its close proximity to the lower mainland, have always received much coverage in the media and reports. Recent flooding and debris torrents in

the steep catchments on the east shore of Howe Sound have resulted in costly damage to Highway 99, the tracks of the former BC Rail, and a number of settlements between West Vancouver-Squamish. The climate of the Howe Sound area is strongly influenced by topography and by the confined nature of the inlet. In 1956, the Pacific Great Eastern Railway (later renamed BC Rail) was completed along Howe Sound. Two years later, Highway 99 between North Vancouver-Squamish was opened. Soon after, settlement and associated development occurred in the area. Prior the 1950s, there are only a few reports of property damage or loss of life. Charles Creeks (also known as Strachan Creek or Strachan-2 Creek) is the most active of all the Howe Sound creek with six debris torrents in the 26 years between 1969-1985. The debris slides are controlled by a combination of topographic, geologic, and hydrometeorological factors.

Deforestation and particularly clear-cut logging and road building are often blamed for flooding and landslide events. Clear-cutting large areas on steep slopes plus poorly constructed logging roads, and the increase of logging at higher altitudes where the soils are fragile, increases the runoff in many areas. Throughout the report there are many such documented examples.

Following the devastating flooding that hit the Hatzic Valley in 1984, provincial Energy Minister Stephen Rogers conceded that the effects of clear-cut logging in the surrounding hills had aggravated the flooding. In a B.C. Forest Service report on the fatal June 1990 mudslide at Joe Rich, Forests Minister Claude Richmond noted that clear-cut logging had increased the peak rate of waterflow by about 20%. Another factor was water being redirected down an old logging road and road construction, which increased the drainage area that fed the mudslide.

Vancouver's North Shore flash floods are another example. The area extends fairly evenly along the north shore of Burrard Inlet and up lower slopes of the mountains facing Vancouver. Largely the Capilano, Seymour, Lynn, Mosquito and McKay watercourses drain the southern slopes of Dome and Grouse mountains.

Around 1925, extensive logging started along the upper Capilano and adjacent slopes of Hollyburn, Grouse, Dam and Crown. The civic authorities of Vancouver protested against damage done in their watershed by the removal of the protecting forest cover. The logging continued to such an extent that the areas were permanently damaged. The high-lead system of logging sped up the clear-cutting of the side slopes, and opening up these area for erosion.

The ski lifts on the North Shore mountains only aggravate the situation. Their ugly swaths run straight down the mountains creating channels for the rapid runoff of rain and melting snow. At the top of the older lift is the Grouse Mountain Ski Village, in which bare rock has replaced the forest floor. Here, timber was cut extensively and the topsoil has disappeared, probably to clog a culvert below, or fill a creek channel that formerly took care of peak runoff loads. At the lower end of this lift, the forest floor has been destroyed for the building of a power line.

Snowpacks in clearcuts melt more quickly, allowing the runoff to accelerate and compress in a shorter window. This altered hydrology directs greater volumes of runoff into channels, which then erode. The existing streams will become choked with debris torrents. The displaced sediment may cover the gravel in the creek's salmon spawning beds.

Harvest rates having exceeded long-term sustainable yields resulted in increased logging and road building across steep hillsides. Grappleyarders dragging logs across the relatively thin and fragile layer of topsoil. With the shade provided by forest cover gone from entire hillsides, the soil may easily wash away.

Scientific studies show that landslides occur up to 20 times more frequently in clearcuts and up to 300 times more frequently on logging roads than they do in previously intact natural forest. Of 34 new avalanches and debris torrents in the West Kootenay between May 1998 and December 1999, 82% occurred just below logging roads or clearcuts (*The Vancouver Sun*, November 22, 2001).

There is also increased speculation that recent major weather events may be the result of climate change. Global warming has resulted in a pronounced thinning and recession of glaciers causing debutting of unstable rock slopes. Other results include a possible degradation of mountain permafrost and in recent years an apparent increase in precipitation.

7. Type of flood events

a) Fall and winter rainstorms and rain-on-snow events

Warm fall and winter rainstorms are associated with rising freezing levels and can cause snowmelt (rain-on snow events). When added to a low return period rainfall, snowfall can result in large creek discharges.

Fall sees a transition between the quiet summer circulation and the vigorous winter one. The duration and frequency of the gales increases. Winds in excess of 40 mph (64.4 km/h) occur quite frequently in winter. Extreme rainfalls with a duration of one day or more are almost exclusively winter events. The duration of these individual storms is about one to two days while the interval between storms varies from one to five days as a rule.

The winter atmospheric circulation pattern causes numerous storms to develop rapidly in the northern Pacific Ocean and move in a northeasterly direction to the Gulf of Alaska where they dissipate. On a smaller scale, frontal systems break away from the storm centres and impinge upon the coast. They often bring strong southwesterly flows of warm moist air aloft (“Pineapple Express”) which are responsible for the heaviest rainfalls in the coastal region.

b) Summer rainstorms and floods

High-intensity summer rainstorms, though rare, do occur in the study area. During the summer, a weaker atmospheric circulation develops (Thomas 1977). The climate in the coastal region is then controlled by the dominance of a large high-pressure centre offshore, which expands northward. During this period, the pressure gradients are weaker than in the winter. Northwesterly winds prevail along most of the coast, and the frequency and intensity of Pacific storms is diminished (Melone 1985).

c) Spring runoff flooding

Spring runoff flooding is typically caused following a winter with an above normal snowpack, combined with a cold and late spring. A sudden warm spell in May especially when accompanied by above normal precipitation are the final ingredients for serious spring runoff flooding. High waters during this type of flooding may last for weeks. During the flood of 1894, for example, they lasted for six weeks. During the 1972 runoff, floodwaters of the Fraser River at Mission remained above the 20-ft. (6 m) danger level for 32 consecutive days.

During extreme spring runoff events, first communities hit are in the Interior are likely Princeton, Keremeos and Grand Forks. These are all in “flash flood” areas. Here, the rivers are narrow, shallow and close to the snowpacks, compared with the Fraser or Thompson rivers that are filled by tributaries.

d) Icejam floods

Ice jams affecting larger rivers can be divided in two general types: winter jams and break-up jams. In winter jams, “hanging dams” are formed when slush and frazil ice accumulations are drawn below surface ice cover. Break-up jams of moving river ice can be massive and destructive. They can occur at constricted places along channels, producing large stage rises upstream and destructive flooding downstream. Rivers that have major, early breaking tributaries are especially prone to major floods. These types of floods can occur from November to April.

Ice floes, which can weigh up to several tonnes, shift and jam, causing water to rise and breach the riverbanks. Ice jams can also block the river’s flow, forcing it sideways onto land. Ice chunks carried onto land by rising water levels can cause damage to nearby property and buildings.

e) Storm surges and/or tidal flooding

Storm surges, which give rise to water levels exceeding normal astronomical tides, are caused by winds driving waters shoreward and are often coupled with low pressure systems, which give rise to slight increases in sea levels. Contemporary landforms developed by coastal processes, such as deltas, spits, and backshore areas, are most vulnerable to storm surge flooding. Areas that have experienced storm surge and tidal flooding are Island View Beach on Vancouver Island, the West Vancouver foreshore and Boundary Bay. The heavily populated area of Lulu Island is provided protection against both coastal and river flooding.

f) Tsunamis

Most tsunamis are ocean-generated by underwater disturbances in the earth’s crust. They are triggered by earthquakes and, less commonly, submarine landslides and volcanic eruptions. Tsunamis, Japanese for “harbour waves” are also called seismic sea waves or as a common misnomer, tidal waves. Tsunamis triggered

by subduction earthquakes in the North Pacific Ocean are a hazard to some communities. Towns on western Vancouver Island, such as Port Alberni, Tofino and Ucluelet, are most vulnerable, especially to tsunamis produced by earthquakes on the Cascadia subduction zone. In comparison, the tsunami hazard in areas bordering the Strait of Georgia is relatively low.

Seismic sea waves comparable to those generated by the March 27, 1964 earthquake are rare. Of the 176 tsunamis recorded in the Pacific Ocean between 1900-1970, 35 caused damage near their sources, but only nine resulted in widespread destruction (Thompson 1981).

g) Glacial outburst floods

Glacial outburst floods are the result of the sudden release of water stored within or behind a glacier, often leading to high magnitude discharges of short-duration. The largest of these floods are usually associated with lakes created in valleys that are blocked by glaciers. In most instances, the occurrence of glacial outburst floods follows a prolonged period of glacier recession. As valley glaciers recede, areas upstream of the glacier may become ice-free while drainage remains blocked by the remaining valley ice. This ice may form a dam, impounding the local drainage and creating a lake with discharge flowing over the basin rim at the location with the lowest elevation which may or may not be formed by the glacier. With continued ablation of the ice, glacier thickness decreases until either the water impounded behind the ice, glacier is able to flow over the top or hydrostatic pressure in the lake is sufficient to force a passage beneath the glacier.

h) Dam burst flash floods

Of the approximately 2,500 dams operating in British Columbia some 400 have been classified as high or very high hazard (Ministry of Environment n.d.). Many dams have been constructed high in the mountains, often above population corridors containing highways, railways and settlements. When failing, even dams impounding small reservoirs can cause severe damage. Dam failures include man-made or natural ones while failing beaver dams can also cause considerable flooding damage.

8. Other storm related damage

a) Snow avalanches

Deep snow and steep slopes, the two basic ingredients for avalanches, are both abundant in British Columbia. Between the Pacific coast and the Rocky Mountain Divide there are an estimated 50,000 avalanche paths in which snowslides regularly reach the valley bottoms. In an average year, they produce an estimated 150,000 avalanches powerful enough to damage small buildings or bury a car. About 9,000 of these snowslides are capable of destroying large buildings (Schaerer 1983). More small avalanches, strong enough to cause injury and death to skiers, hikers and snowmobilers, run on the same and many additional slopes.

Prior to 1970, the majority of avalanche victims in British Columbia were railway, mine, and construction workers or travelers. Between 1885-1937, about 230 railway employees died in avalanche related accidents on the rail line through Rogers Pass alone (Schaerer 1983). While the number of fatalities and injuries due to avalanches in industry and on public roads has decreased, in recent years an increasing number of skiers, snowmobilers and mountain climbers are exposed to the hazard.

Also, property damage to electric transmission lines, mine buildings and equipment, ski lifts, bridges and vehicles continues to be high. In British Columbia, the early transmission lines were built in or close to the valley bottoms so they could be maintained from access roads built generally along the line. From time to time, these lines suffered major outages due to tower collapses caused by avalanches, debris slides and river erosion. More recently, lines in British Columbia are being located on high ground away from the valley bottom. Helicopter construction is being used extensively. The outage record of these lines is much better because they are not subject to the hazards of the valley bottom.

b) Landslides, debris flows, etc.

Most historical landslides in the study region have occurred during periods of intense precipitation in autumn and winter. Torrential fall and winter rains not only trigger landslides in the Vancouver region, but also

cause rock falls along transportation routes in the adjacent Coast Mountains. Low magnitude, high-frequency mass movements can be divided in three types: rockfalls, rock, debris and earth slides, and debris flows (including erosion along creeks). Two other types include snow avalanches and under water mass movements.

9. Organisation of storm events

All damage-causing events are organised chronologically starting with an 1808 event and ending with a storm event on December 27, 2006. Some extreme storm events have also been included even though they did not cause flooding or landslide damage.

For information for a specific watercourse or community, refer to Appendix 1 and 2, respectively. A list of streamflow gauging stations used in this report can be found in Appendix 3.

9. Chronological list of storm events

Mid May-mid June 1808

Source: Nisbet 1994 (pp. 126-128).

Details: David Thompson, fur trader, explorer, surveyor and mapmaker, reported flooding in western British Columbia that severely hampered travel. When he returned to the Kootenai lodges [in the Windermere-Kootenai Lake area], Thompson found his old campsite under water and learned that the route south to the Flathead country [south of the Canada-U.S. border] was also flooded. "May 19, All the paths that the Kootenais usually followed to Tobacco Plains [along Kootenay River at Canada-U.S. border] and Windermere Lake were flooded..." Entire days were spent throwing down trees to bridge the torrents of melt water. At several crossings they laboriously chopped down big spars only to watch them be sucked into the current and swept away as if they were jackstraws. They lost one fur bundle and Lussier's personal belongings while trying to line them across a roaring stream. By mid June, Thompson still encountered problems while canoeing down the Columbia River. At the beginning of a portage trail, though the spring runoff had swollen the river, there was still snow in the woods. The trail up Blaeberry River had not improved since the previous spring (Nisbet 1994).

Ca. 1830s

Source: Begby 1871 (p. 141); Evans 1997 (p. 187); Evans, unpublished data.

Details: Sometime in the 1830s, a landslide destroyed the Hudson's Bay Company's Fort Alexandria on the Fraser River. In a letter to the Royal Geographic Society Judge Begby reported this incident. He stated that a landslide caused a flood that swept away "the old fort with all its contents, and causing the loss of many of the Hudson's Bay Company's employees there." (Begby 1871). Material in the Hudson's Bay Company Archives in Winnipeg, Man. does not contain reference to the destruction of the fort as reported by Begby. The date is not given but it is probable that the event took place before 1840 (Evans 1997).

This is the earliest recorded destructive landslide event in the Cordillera that affected non-indigenous peoples (Evans, unpublished data). *1)

*1) The Canadian Cordillera is defined after Gabrielse and Yorath (1992) as extending from the base of the Continental slope in the western limit of undeformed strata underlying the Interior Plains, and from the Beaufort Sea in the north to the international boundary in the south.

Winter 1855-56

Source: Berger 1973; Brawner 1975; Mathews 1952; Moore and Mathews 1978; Hardy et al. 1978; Eisbacher 1983; Farquharson 1976; Terzaghi 1960a; Terzaghi 1960b; Nasmith 1972 (pp. 7-8); Jackson et al. 1985 (p. 4-28); Evans, unpublished data.

Details: During the winter of 1855-56, a major section of the ice-contact lava face below Barrier Lake, locally known as The Barrier, near Garbled Lake, failed. *1) The slide in the Rubble Creek Valley, 80 km north of Vancouver traveled as much as 4.6 km with a maximum drop of 1,060 m. According to Evans and Clague (1999), the debris avalanche estimated at 30-36 million m³ traveled 6 km down Rubble Creek to the Cheakamus Valley (Moore and Mathews 1978; Hardy et al. 1978). It occurred along a near-vertical composite

fracture zone, causing a stream of broken rock, 25 million m³ in volume, to move down Rubble Creek and into Cheakamus Valley (Moore and Mathews 1978). *2) Brawner (1975) believes that Barrier Rock was only a minor factor in the failure and that the main slide involved about 20-25 million yd.³ (15.3-19.2 million m³) of talus material that had built up in front of the rock. It is estimated that over two-thirds of all the talus originally below the Barrier was removed during the slide and much of the remaining talus is located away from the most probably flood areas (Brawner 1975).

The source of the landslides is The Barrier, a precipitous face forming the margin of a dacite lava flow erupted from Clinker Peak. Much of the debris has accumulated in a large fan at the mouth of Rubble Creek (Evans, unpublished data). The material ranging from silt to boulder size was saturated and flowed like “wet concrete” (Terzaghi 1960). In order for the talus to become saturated it would require a massive volume of water. Though the source of this water is unknown, some possibilities are suggested. Flooding from Garibaldi Lake could have occurred due to the collapse of one of two glacial lobes into the lake and development of a tidal wave, damming off the lake by ice flows or logs followed by a sudden washout or a slide near the outlet of the lake creating a dam which suddenly washed out. A 3-ft. (90 cm) lowering of Garibaldi Lake would supply over 25 million ft.³ (707,500 m³) of water supplying sufficient water for liquefaction. Or a large underground flow may have developed under the Barrier, which created a high hydrostatic head in the toe area of the talus, developed piping, liquefaction and retrogressive movement of the talus (Brawner 1975).

Major W. Downie, in his report to Governor Douglas on a proposed route, dated October 2, 1858, was the first to record the slide: “... about noon we struck into a lagoon, or large tract of overflowed land, the Indians say this was overflowed three years ago. We found the cause of it as we came along, a lake has broken away in the mountains, and swept away ridge after ridge, covering a whole forest of timber, with rocks and sand for a space of 6 or 7 square miles, changed the course of the river, and not left a stump to be seen, where the tall timber stood three years ago.” In 1947, the general opinion of local Indians was that the slide had occurred between fall hunting trips by the tribe “about 1860” and one old Indian remembered seeing the valley before the slide when he was very young (Father F.M. Patterson, Lillooet, 1947. In: Moore and Mathews 1978).

The slide material descended through the steep Rubble Creek Valley and buried the floor of the valley of the Cheakamus River over a length of about 2.5 mi. (4 km). The slide ponded the water of the Cheakamus River, creating Stillwater and Daisy lakes. The river re-established its course along the western edge of the slide, cutting a channel about 30 ft. (9m) deep and 100 ft. (30 m) wide. Downcutting was halted when the river cut into the crest of a buried rock spur about 2,000 ft. (600 m) downstream from the outlet of Stillwater Lake (Nasmith 1972).

Traces of debris along the fringes of the debris track and superelevation at bends of the Rubble Creek valley suggest that the front of the mobile mass descended at high velocity, locally in excess of 20 m/sec (72 km/h) and lapping some 80 m onto the valley walls (Moore and Mathews 1978). Tree ring data indicate that the slide occurred in the fall or winter of 1855-56. The climatic and hydrological conditions, seismicity, and precursory slope movements at the time of the Barrier collapse are unknown (Eisbacher 1983). The trigger mechanism has not been identified, but the presence of an exceedingly steep original slope of the lava front, attributed to ponding against latest Pleistocene ice occupying the valley below, was clearly a contributing factor. Both the precipitous headwall and a second ice-dammed lava front are considered to be potential sources for new slides. Some evidence suggests that previous slides have occurred here since the last glaciation, about 11,000 years ago.

Between 1955-57, for hydroelectric development BC Hydro constructed an earth and rockfill dam (Cheakamus Dam) across the Cheakamus River less than 1 km north of Rubble Creek. *3) The southeast abutment is located on the 1855-56 rock avalanche debris. Material obtained from a borrow pit in the 1855-56 debris was incorporated into the core of the dam (Terzaghi 1960a, 1960b). *4)

*1) The Rubble Creek basin has been the site of at least two large rock avalanches and several debris flows during the Holocene (Mathews 1952b; Moore and Mathews 1978; Hardy et al. 1978). Much of the debris has accumulated in a large fan at the mouth of Rubble Creek. Subsurface investigations indicate that the volume of the fan is between 156-186 million m³ and contains between 5-10 separate landslide units averaging 5 to 10 m in thickness (Hardy et al. 1978). Since 1856, coniferous forest has colonised most of the landslide surface and Rubble Creek has incised as much as 10 m into the apex of the fan (Jackson et al. 1985).

*2) This volume estimate is from Hardy et al. (1978). Earlier estimates ranged from 15-25 million m³ (Mathews 1952; Moore and Mathews 1978).

*3) The dam constructed across the main channel with earth and rockfill has a concrete gravity structure and spillway on the west abutment. It is unusual in that most of the earth embankment is built of the landslide debris known as Rubble Creek Wash and the entire west abutment is founded on the same material. The dam raises the level of Stillwater Lake and diverts water through a 6.5-mi. (10.4 km) rock tunnel into the Squamish Valley. From the tunnel exit on the east slope of the valley, the water descends through steel penstocks to a powerhouse at the foot of the slope operating under a head of about 1,125 ft. (337.5 m) (Nasmith 1972).

*4) Cleveland Holdings Ltd. prepared a subdivision on top of the debris of the 1855 slide. After spending about \$250,000 approval of the subdivision was denied by the Approving Officer of the Dept. of Highways. In 1973, the British Columbia Supreme Court halted development of the Rubble Creek fan, which had already involved the construction of several exclusive homes. The decision was appealed but Mr. Justice T.B. Berger rejected the appeal on the grounds that the developer was unable to establish convincingly that the site was safe (Farquharson 1976). Berger held that there was "a risk that reasonable men can not exclude that a disaster will occur within the life of the community" (Berger 1973). In 1981, Provincial Order-in-Council 1185 under the Emergency Program Act designated the Rubble Creek area too hazardous for human habitation. Property owners in the area were bought out, or relocated, at a cost of \$17 million (Evans 1992; Evans, unpublished data).

June 1862

(Spring runoff/flooding).

Source: *Daily Evening Press*, June 12, 1863 (p. 3); *British Columbian*, June 11 and 14, 1862.

Details: On June 11, the Fraser River was reported rising rapidly at Hope. On June 12, the river was still rising. Captains of the steamboats reported it "as high as it was ever observed before." The *Col. Moody* on her most recent trip to Hope got her rudder so much entangled in weeds as to become unmanageable. Between Hope-Yale the stream was exceedingly strong. On June 14, the Fraser River at New Westminster was 11 in. (28 cm) higher than "hitherto known." At Douglas, it inundated a large portion of the town, standing as deep as 16 in. (40.6 cm) in P. Smith & Co.'s store. The damage done was describes as being "trifling." The flooding of portions of the road on the portage caused much inconvenience.

Spring 1864

(Spring runoff/flooding).

Source: *Beautiful British Columbia Magazine*, summer 1987. p. 39.

Details: Spring floods in the Homathko River's Grand Canyon washed away much of the work done on Alfred Waddington's road from Bute Inlet to the Cariboo district goldfields. Part of the road hung from cables bolted into the walls of the canyon washed away. This forced routing the road to higher ground. (*Beautiful British Columbia Magazine*).

November 11-12, 1865

Source: *The Daily British Colonist*, November 16, 1865.

Details: On November 11-12, a tremendous rainstorm hit Yale and Douglas, causing streams to break their banks. On November 12, the Fraser River at Yale rose 7 ft. (2.1 m) in as many hours. Roads were destroyed and bridges, including the old Spuzzum bridge, swept away. The old Quoquhella (Coquihalla) bridge was swept away, together with about half of the new one. It was feared that many of the bridges on the new road were also lost. Several slides occurred on the road between Yale-Lytton, rendering it impassable for wagons. On the Douglas to Lillooet route the storm was equally severe. The road of the Douglas Portage was rendered impassable for teams. The bridge at the 16 Mile House was swept away.

May-June 1866

(Spring runoff/flooding).

Source: *British Columbian*, May 25 and June 6, 1866; *The Daily British Colonist*, June 7, 1866.

Details: During the second and third week of May, the Fraser River at Yale rose 30 ft. (9 m). On June 6, it reached a height of 50 ft. (15 m) above the high water mark at Yale. Many portions of the road between Yale-Lytton were inundated and impassable for vehicles. The waters of the Bonaparte River rose to unusual heights, causing considerable property damage.

May-June? 1867

(Spring runoff/flooding).

Source: *The Daily Colonist*, June 23, 1894.

Details: In 1867, according to an old Native Indian, the last of the Slocans, the Pend d'Oreille River near Sayward, Wash., reached levels some 30 ft. (9 m) above the high water mark reached during the 1894 flood.

Mid June 1869

(Spring runoff/flooding).

Source: Not available.

Details: In the middle of June, the Fraser River at Hope reached its highest stage at 22 ft. (6.6 m).

June 1870

(Spring runoff/flooding).

Source: *British Columbian*, June 4, 16 and 19, 1870; *The Daily British Colonist and Victoria Chronicle*, June 19, 1870.

Details: On June 4, the Fraser River at Hope was 19 ft. (5.7 m) above low water. *1) On June 16, large tracts of land were under water in the New Westminster district. On June 19, the river fell 6 ft. (1.8 m). In Chilliwack and Sumas farmlands were flooded, causing severe damage.

*1) In the middle of June 1869, the highest stage was 22 ft. (6.6 m).

1871

Source: *The Chilliwack Progress*, August 12, 1915.

Details: In 1871, a "big slice" of Mount Cheam dropped about 1,000 ft. (300 m), causing a quake in the Chilliwack area. *1)

*1) On August 11, 1915, another quake was felt in the Chilliwack area. It was not known whether the 1915 quake was caused by a real earthquake or by "the fall of a massive glacier in the mountains" (*The Chilliwack Progress*, August 12, 1915).

June 20-22, 1871

(Spring runoff/flooding).

Source: *The Daily British Colonist and Victoria Chronicle*, June 21, 1871; *British Columbian*, June 22, 1871.

Details: On June 20, the Fraser River at Yale was higher than it had been since 1866. The road between Yale-Lytton was flooded in several places. The post at 19 Mile was under 16 ft. (4.8 m) of water. With the warm weather the safety of the Boston Bar bridge was feared. The Alexandria bridge was closed for repairs. On June 22, the Fraser River at New Westminster reached within 3 in. (7.5 cm) of the high water mark.

November 15, 1871

(Storm surge flooding).

Source: *British Columbian*, (New Westminster) November 17, 1871; *The Daily British Colonist and Victoria Chronicle*, November 17, 1871.

Details: On November 17, a severe storm with winds blowing directly up-river caused flooding on the Fraser River. At Ladner's Farm, the breakers combed over the dikes, washing them away and flooding the land. Houses were surrounded by water and horses were standing in water up to their bellies.

The Light Ship suffered severe damage, having its lantern smashed, masts carried away and a portion of her deck torn up. The vessel had to be taken to New Westminster for repairs. The steamer *Enterprise*, arriving from New Westminster had to remain in the mouth of the river from 10 a.m. till 6 a.m. the next day due to the storm.

March 8-14, 1873

Source: *The Chilliwack Progress*, June 25, 1958; Bowman 1992; Webb n.d. (p. 4);

Details: According to a diary kept by Volkert Vedder, muddy water first began to appear in the [Luckukuk] creek on March 8. *1) This was an indication that some water from the Chilliwack River was entering the creek (Webb In: Bowman 1992).

On March 14, 1873, Horatio Webb wrote in his diary: "Muddy water in the creek this morning." This freshet took out about all the bridges of the trunk road just finished the year before from Rosedale to the Vedder Mountain, except the old Chilliwack bridge, the water having left the Chilliwack that night. *2) (Webb In: The Chilliwack Progress, June 25, 1958).

*1) Historically, several different channels have served as the main outlet of the Chilliwack River, including Chilliwack Creek, Luckakuck Creek, and Atchelitz Creek. At the arrival of the first European settlers, Chilliwack Creek was the main channel. The Chilukweyuk River, as it was originally called, was the main route used by the Chilliwack Indians, and by the Royal Engineers during their 1859 survey of the Canada-U.S. border. Since 1894, the former Vedder Creek has been the main outlet, and below the bridge at Vedder Crossing, it is known as the Vedder River (Bowman 1992).

*2) For years this water was evenly divided between the Vedder and the Luckukuck, as it is now called. Later it "swallowed up" the Little Coqualeetza. The Vedder gradually deepened its channel until 1894, when it got so deep that it left the Luckukuck channel dry. Springs starting up about a mile (1.6 km) below make the Luckukuck a nice clear spring-fed stream. The Vedder now takes all the water. (Webb In: The Chilliwack Progress, June 25, 1958). Coqualeetza Creek was the original name of the stream, which presently flows along the Vedder Road into Sardis. There it divided into two streams: Kitsey Sly Slough, which flowed northward into the Chilliwack River; and Luckakuck Creek, which went northwest also joining the Chilliwack River. After a beaver dam across Luckakuck Creek was broken up, this increased the flow of the Luckakuck and deepened it (Bowman 1992). In some places where the banks were only 2-3 ft. (60-90 cm), [the channel] got to be 8-10 ft. (2.4-3 m) deep (Webb n.d.).

June 1, 1873

Source: Evans, unpublished data.

Details: On June 1, heavy rain caused a debris flow in Clinton. About 100 m of street was buried by up to 3 m of debris. Several buildings were damaged causing \$51,000 damage. The debris flow was released by the breach of a dam or logjam in Mill Creek.

April 22-27, 1875

(Ice Jam flooding)

Source: *Daily British Colonist*, April 25, 1875; *The Mainland Guardian*, April 28, 1875.

Details: Around April 22, very wet weather caused snow slides on the road near Yale. Near China Bar Bluff the road broke away. The "up-stage" had to be packed round the break. Flooding occurred along the line of the wagon road between Quesnel-Bonaparte. The Bonaparte River was the "highest since white settlement started." Every bridge across the Bonaparte River was carried away, including the one at Cache Creek House. The stage stable at Cache Creek was swept away and all ranches in the river bottom were flooded. Bridges at the Australian Ranch, Deep Creek, and Bridge Creek were carried away.

A sudden change in weather caused flooding and the breaking away of an ice gorge high up the Fraser River. The ice wall coming down the river was over 30 ft. (9 m) high, overtopping the banks in many places. In the morning of April 22, at Lytton piles of ice 6-8 ft. (1.8-2.4 m) high on the banks caused the water in the river to rise 10-15 ft. (3.0-4.5 m) overnight. Levels reached a point 25 ft. (7.5 m) above the low water mark.

On April 27 at 6 a.m. the ice run on the [Fraser] river continued for nine hours, unparalleled this time of the year. Overnight April 26-27, the Fraser River rose at least 17 ft. (5.1 m), and was still rising to within 8 ft. (2.4 m) of last year's high water mark. The Fraser River at Soda Creek rose 30 ft. (9 m) in an hour and a half, carrying off a storehouse containing some 60,000 lbs. (27,240 kg) of bacon and flour. The ice also took the steamer *Victoria* of her ways at Alexandria and carried her some distance downstream.

July 1875

(Spring runoff/flooding).

Source: *British Columbian*, July 11, 1875.

Details: The Fraser River at Quesnelmouth (Quesnel) rose 4 ft. (1.2 m) "higher than was ever known before." It reached 33 ft. (9.9 m) above the low water mark, flooding several warehouses and other buildings.

October-November, 1875

(Rain-on-snow).

Source: Karanka and Associates 1995 (pp. 3-5); Quinn 1992; Orchard 1983.

Details: In the fall of 1875, it rained nearly every day from the middle of October until the middle of November. It then snowed for two days to a depth from 2 to 3 ft. (60-90 cm). A Chinook wind came up and the snow soon disappeared, even from the mountains (Orchard 1983). *1) The October precipitation amounts were above normal throughout the Pacific northwest, ranging from 207% of normal at Portland, Ore. to 116% at Sitka, Alaska. On October 18, New Westminster recorded 78.2 mm of rain, a maximum daily rainfall for the month (1859-1966) (Karanka and Associates 1995).

November precipitation was again above normal from British Columbia to southern California. Stations from Portland to San Diego, Calif. received 240%-310% of normal rainfall. New Westminster and Esquimalt recorded 135% and 150% of normal, respectively. Around the middle of November, cold weather arrived across the Pacific Northwest (Karanka and Associates 1995).

*1) The fall and winter of 1875-76 were associated with a La Nina, or anti-El Nino (Quinn 1992). Mountain snowcaps were deep, and flood levels on the lower Fraser and Columbia rivers in late June 1876, were the highest between 1847-1894 (Karanka and Associates 1995).

November 22, 1875

Source: *The Chilliwack Progress*, June 25, 1958; *New Westminster Mainland Guardian*, November 22, 24 and 27, 1875; *Nanaimo Free Press*, December 1, 1875; Karanka and associates 1995 (pp. 5-6 and 9); Webb n.d. (p. 7); Bowman 1992.

Details: A heavy rainstorm on November 22 caused the Chilliwack River to change its course. After the Chilliwack channel was blocked by a logjam, the water was diverted equally into the Vedder and Luckakuck channels. Overnight, the Luckakuck channel widened from 50 ft. (15 m) to 400 ft. (120 m). John Slicker, a neighbour of Horatio Webb's lost his life when the riverbank suddenly gave way (Bowman 1992). All of the community's bridges were washed away, forcing settlers to resort to canoes for transportation (Webb n.d.).

About November 22, the Chilliwack [River] was "the highest ever known," even up until this day.... That night the water in the Coqualeetza, as it was then called by the Indians.... rose very fast.... We stayed very late watching the stream rising and the banks washing away." (Horatio [Raish] Webb In: *The Chilliwack Progress*, June 25, 1958). *1)

A Langley correspondent described the weather on November 22 as "disagreeable" with two ft. (60 cm) of snow on the ground. On November 24, due to the cold snap, ships were only able to ascend the Fraser River as far as Farr's Landing. On November 27, there was 4 ft. (1.2 m) at the mouth of the Harrison River (*The New Westminster Guardian*, November 22, 24 and 27, 1875).

On November 28, a snowstorm hit Victoria and the lower mainland. Victoria reported 1 ft. (30 cm) of snow, which disappeared the next day. According to the *Nanaimo Free Press*, it was an "unusual severe snowstorm, nothing equal remembered."

New Westminster recorded 24.6 cm of snow on November 28, after already receiving 15.5 and 29.2 cm of snow on November 17 and 20, respectively, for a total of 69 cm (27 in.). In New Westminster, verandas collapsed and in Victoria the heavy snow smashed a Columbia Street storefront. Near the end of November, the Cariboo Road between Yale-Jackass Mountain was blocked by snowdrifts and Langley reported snowdrifts 7 ft. (2.1 m) deep (Karanka and Associates 1995).

*1) According to E. Karanka, the flood did not occur on November 22. That date is clearly improbable, given the weather conditions reported in anecdotal south coastal weather accounts and data from the New Westminster weather station for November 22 (Karanka and Associates 1995).

December 22, 1875

(Rain-on-snow and outburst flood?).

Source: *Victoria Daily Colonist*, December 25, 1875, January 1, 6 and 9, 1876; Karanka and Associates 1995 (pp. 8-10).

Details: On December 22, a great freshet occurred on the Chilliwack River and the eastern Fraser Valley. Various accounts that trickled in to newspapers over the next two weeks suggested that the flood damage across southern British Columbia was widespread (Karanka and Associates 1995). The bridges between Yale-Lytton and nearly all the bridges in the Kootenays were out by floods (*Victoria Daily Colonist*, January 1 and 6, 1876). The New Westminster to Hope Road was impassable. The bridges from Hope to Popkum were gone and the

streams impassable. With the exception of the Chilliwack and Luc-en-cuck (Luckakuck) bridges, there were no bridges left in place between Popkum-Sumas Lake (*Victoria Daily Colonist*, January 9, 1876).

According to the Native Indians, for the past 30 years never such a flood had been witnessed. It was believed that some lake in the mountains gave way from the sudden melting of the snow, as the water commenced falling an hour after reaching its peak.

Referring to the previous week, *The Victoria Colonist* of December 25 stated that high water gullied the Cowichan Flats and made the road impassable.

June 19-July 1, 1876

(Spring runoff/flooding).

Source: *Daily British Colonist*, June 22, 23, 24, 25 and 30, July 4, 1876; *British Columbian*, June 24, 25 and 28, July 1, 19 and 29, 1876; *Mainland Guardian*, June 28, 1876; *The Chilliwack Progress*, June 25, 1958; *The Vancouver World*, July 11, 1916; Pethick n.d. (pp. 91-134); Orchard 1983; Bowman 1992; Karanka and Associates 1995 (p. vi).

Details: In 1876, a serious flood on the Fraser River did considerable damage to crops, especially in the area between Chilliwack and the point where the Sumas River entered the Fraser. In late June, flood levels on the lower Fraser and Columbia rivers were the highest between 1847-1894 (Karanka and Associates 1995). On June 29, the river crested at 22 ft. 9 in. (6.83 m) on the gauge at Mission (*The Vancouver World*, July 11, 1916).

According to Horatio Webb, in 1876 settlers experienced their first big high water in the Fraser River. It overflowed nearly all their lands, except in the Sardis section, which was several feet above it. Most of the crops were lost and rail fences floated away. (Webb In: *The Chilliwack Progress*, June 25, 1958). *1)

According to Jack McCutcheon, it was the "highest water ever experienced by the white population up to that time." Early on June 19, the Fraser River was higher than ever before. Opposite New Westminster, the river was running 4 mph (6.4 km/h). Reports from Chilliwack and Sumas stated the water "higher than ever before." The whole Chilliwack-Sumas country was one vast lake. Cattle had taken refuge in the mountains. Pitt Meadows was flooded, making the river only a channel through a vast lake. Large areas not considered subject to flooding were under water. Much of it was under cultivation, and wheat and other crops were destroyed.

On June 20, the Boston Bar bridge, built in 1863 at a cost of \$45,000 was reported washed away. It crossed the Anderson River at the lower end of the village of Boston Bar. It had been built on bents and was 330 ft. (99 m) long and stood 34 ft. (10.2 m) above the bed. Two years previous, it had been completely repaired and a 60-ft. (18 m) truss span inserted in the middle of the channel. Roads above Yale sustained heavy damage. The Spences and Boston Bar bridges floated by Yale on June 21. On June 24, the road between Yale-Boston Bar on the Fraser was nearly totally submerged. Overnight June 22-23, the [Fraser] river rose 3 ft. (90 cm), bringing it 5 ft. (1.5 m) higher than ever before. Many farms between New Westminster-Yale were submerged.

On June 25, the Sitka Flat bridge was carried away and both the 7-Mile bridges were afloat. Spences bridge, earlier reported carried away, was still standing. The road between Yale-16-Mile House was flooded in seven different places and "more or less" washed away. Fifty miles (80 km) of the famous wagon road were reported to have disappeared completely. At Yale, the blacksmith shop and the Kimball and Gladwin and W.C. Mayes warehouses were secured with ropes and chains. Gordon's place, 1 mi. (1.6 km) below Yale, washed away.

On June 25, the Fraser River at Yale rose 9 in. (22.4 cm), reaching 70 feet (21 m) above the low water mark. It was 4 ft. (1.2 m) above the previous high witnessed by old-time residents in 1875 and still showed no sign of receding. The road between Lytton-Cook's Ferry (later known as Spences Bridge) on the Thompson was submerged.

On July 1, the *British Columbian* reported from Langley: "On Friday last (June 25), it rained unceasingly from dawn to day close.... On the left bank of the [Fraser] river the crops on the farms of Messrs. Robertson & Baker are completely submerged. On this side the damages are equally heavy.... The corporation will lose several bridges.... Indians [have] sought the green hillsides. Horn and hoof seem bewildered at the contracted limits of their domain, while dogs howl and moan as the waters creep and ripple up to their abodes."

On June 28, the floods reached "an unprecedented height within the recollection of the oldest white inhabitant." The water reached "higher than it had been for the last 20 years. The bridges.... so badly placed that nothing could save them when the high water came." The river peaked around June 29. On that date, there were still several feet of water on the prairies. Scarcely one of the old [bridges] remained standing on the trunk road. Some of the bridges lost included Sitka Flat, Anderson River at Boston Bar, 8-Mile bridge above Yale, and

probably the 4-Mile bridge. No information was available on the Lytton, Spences or Quesnelle (Quesnel) bridges.

On July 19, the *British Columbian* reported from Chilliwack... the hay crop is heavy, except where the high water remained for any length of time; there is a larger amount of completely spoiled with the sediment.... On the low parts of the Trunk road through here, the water has left a deposit about 2 ft. (60 cm) deep.... it was 4 ft. (1.2 m) immediately after the water receded.

*1) After the devastating floods of 1875 and 1876, the first of many schemes to control and divert the Chilliwack and Vedder rivers was devised. Edgar Dewdney proposed a permanent diversion of the Chilliwack River into the Luckakuck channel, with a series of dikes to protect the Sumas Prairie from the Fraser River floods (Bowman 1992).

The provincial government instructed Dewdney, a skilled engineer and a future lieutenant governor of the province, to report on what measures could be taken to prevent a repetition. Dewdney's report, dated November 27, 1876, was based on first-hand examination of the region most frequently flooded, and on interviews with long-time residents of the area, both white and Native Indian. Dewdney learned that the recent flood had mainly been caused by floodwaters of the Fraser River forcing their way up one of its tributaries, the Sumas River, instead of the Sumas feeding the Fraser, as was the case the rest of the year. The area of Sumas Lake, at the head of the Sumas River, would greatly be increased, inundating the surrounding low-lying land. There was some evidence that the problem had become more acute in the years prior to 1876. The district had been flooded more or less every year since its settlement. It had, however, only been the previous two years that the Fraser River started forcing its way up the Sumas River and sloughs had flooded the whole farming portion. Dewdney learned that there had recently been an important change in the system of waterways in the area. At one time, all the water of the Chilliwack River had been carried north into the Fraser River. However, in recent years, the original channel of the river had become choked with rocks and "brushwood," so that much of its flow was diverted westward into Vedder Creek, which in turn flowed into Sumas Lake. Consequently, in flood time, the lake received water from two sources, which greatly increased the amount of flooding in the area. (Pethick n.d.).

May-June? 1877

(Spring runoff/flooding).

Source: *The Daily British Colonist*, June 8 and 23, 1894.

Details: The dike at Matsqui, which was claimed to be poorly constructed, broke. *1)

According to Louis Morigner, a Colville Valley farmer, in 1877 the Pend d'Oreille River near Sayward, Wash. was as high as the 1882 level.

*1) A Victoria company attempted to patch the dike. During the 1894 flood, it was one of the first dikes to go (*The Daily Colonist*, June 8, 1894).

1878

(Spring runoff/flooding?).

Source: *The Daily British Colonist*, June 8 and 23, 1894.

Details: In 1878, the dike at Matsqui broke again.

May 28-June 1, 1879

(Spring runoff/flooding).

Source: *Daily British Colonist*, June 1, 1879; *Victoria Colonist*, June 1, 1879.

Details: On June 1, the Fraser River was still rising, reaching a point 2 ft. (60 cm) higher than in 1878. It flooded the greater part of Sumas and swept away the upper Luck-a-Kuck bridge opposite Mr. A.C. Well's farm. The bridge, which was built in the fall of 1877, drifted onto a sandbank a little downstream. There were plans to try and replace the bridge. The waters "sluiced away" acres of the Slicker farm. On May 28, the Alder Grove Mills was endangered.

January 30, 1880

Source: *The Daily British Colonist*, February 5 and 13, 1880; Evans 1982; Eisbacher 1983 (p. 11, 14); Evans 1992 (p. 77); B.C. Ministry of Energy, Mines and Petroleum Resources 1993.

Details: On January 30, a 30-m high embankment of the Fraser River at Haney failed along an approximately 300-m long head scarp. Retrogressive slumping and outward flow of the slide mass partly blocked the Fraser River. The slide, which occurred in glaciomarine deposits, resulted in one death and substantial property damage (Evans 1982, Eisbacher 1983). *1) The displacement wave killed the victim. The failure occurred in the Fort Langley Formation on the eroding north bank of the Fraser River. About 25 ac. (10 ha) of blue clay with a face 500 yd. (450 m) wide, carried with it the upper strata at the immediate edge of the bluff, vertically letting down the upper strata in the rear. For about 150 ft. (45 m) from where the bank broke away, large cracks were visible along the surface. Eyewitnesses reported that they heard the cracking of the ground and watched “as a great slow moving mass of earth and trees... slid slowly into the Fraser River” (*The Daily British Colonist*). Trees were still erect on the displaced mass when it came to rest in the Fraser River, suggesting a spreading type failure (Evans 1992). The slide partially blocked the Fraser River. The slide of about 20 ac. (8 ha) of Mr. Justice Howison’s land became a floating island. It caused a huge wave 70 ft. (21 m) in height. According to the B.C. Ministry of Energy, Mines and Petroleum Resources (1993) the displacement wave created by the Haney clay slide was 12 m high. It swept with great force onto the opposite side of the river, mowing down 15 ac. (6 ha) of trees. The rush of land into the river caused the water to rise nearly 20 ft. (6 m) to the top of the Howison wharf. The wave swept away the slip of the public wharf and Mr. Muench’s wharf. Messrs. Wise and Even’s fishpacking house was demolished. Bridges were demolished and all boats on the river for the next 9 mi. (14.4 km) were destroyed. Continuing its course upstream the 10-ft. (3 m) high wave 5 mi. (8 km) away, smashed every boat on the river. Meeting less resistance, the wave downstream rose to about 7 ft. (2.1 m) and soon died away.

*1) Excess pore pressures in sandy interbeds in the sensitive glaciomarine silts and clays and erosion at the toe of the slope by the Fraser River are probable causes of the slide. Today the scarp is skirted by a street named Cliff Drive. Slide debris is evident on the opposite bank of the Fraser River (Evans 1982).

May 25, 1880

(Spring runoff/flooding).

Source: *British Columbian*, May 26, 1880.

Details: On May 25, the Fraser River cut around one end of the recently made levee at the head of Hope Slough. It was expected that the whole levee would wash away. The weather continued cold and wet for this time of the year.

July 7, 1880

(Spring runoff/flooding?).

Source: *British Columbian*, July 7, 1880.

Details: The Matsqui dike gave away for about 30 ft. (9 m) at the upper end, again flooding the prairie. The completion of this important work had to be deferred for another season.

August 1, 1880

Source: *Daily British Colonist*, August 19, 1880; Stanton 1898; Cambie 1903; James 1942 (p. 165); Evans 1984; Evans 1992 (p. 78); Clague and Evans 1994 (p. 8); Evans, unpublished data.

Details: On August 1, a landslide took place at Cook’s Ferry near Spences Bridge. *1) A huge mass of Shawnikan Mountain was observed to be moving. Thousands of tons of earth and rock went into the channel of Thompson River. The course of the river was impeded and a large portion of the flat on the opposite side was covered by the slide. There were no injuries, but many fish were washed out of the river by the displacement. Local Native Indians salvaged the fish for drying and consumption. The source material was quaternary sediments (Clague and Evans 1994). The upstream lake formed by the 1880 landslide dam on the Thompson River flooded the present site of Ashcroft. A house floated away near the mouth of the Bonaparte River. Homes downstream were temporarily evacuated as a precaution against a possible outburst flood (Evans 1984; Evans, unpublished data).

*1) In 1865, H.M. Bannister of the Smithsonian Institution passed down the Thompson River on his return from an abortive attempt to reach Alaska as part of the Russian-American Expedition. On June 28, 1865 he noted in his diary (James 1942), “We passed Cooks ferry and camped 6 miles below a place called the Slide. I was told that the Indians say that many years ago an immense land-slide (sic) occurred here damming the waters of the river for many days. The relics of it are plainly seen, and it appeared to me that the whole side and

top of the mountain must have slid into the river from the mounds of earth and stones which remain.” It is almost certain that the slide referred to is the Drynoch Slide, located 6 mi. (9.6 km) south of Spences Bridge, a huge earthflow that today constricts the channel of the Thompson River (Evans, unpublished data).

In 1899 and 1905, more landslides occurred at the site. Unpublished notes by H.J. Cambie, consulting engineer to the CPR, indicate that these slides were thought to be caused by irrigation on the bench behind the landslide (Evans 1992). Irrigation on the bench land above the slide was initiated in 1868, prior to the completion of the Canadian Pacific Railway across the slide in 1885. Following the opening of the railway for traffic in 1886, the slide was continuously moving towards the river, forcing the rails out of position and frequently causing the track bed to drop from beneath the line. The movements took largely place in the summer months of July, August and September and necessitated regular repairs in this period involving “heavy and a constantly recurring expenditure” on behalf of the railway. The movement was considered to be directly linked to the ingress of water into the sliding slope from the irrigated field above which at the time were irrigated using wide ditches (Stanton 1898; Cambie 1903).

October 14, 1880

Source: *Daily British Colonist*, October 17, 19 and 21, 1880; *Victoria Daily Colonist*, September 24, 1897; Stanton 1898; Cambie 1902; Wallace 1987; Evans 1984; Evans 1992 (pp. 77-78); Clague and Evans 1994 (p. 9).

Details: On October 14 at 9 p.m., a landslide occurred 6 mi. (9.6 km) below Cache Creek, just south of Ashcroft in Thompson River valley. The slide consisted of fine gravel and loam and took place about 20 mi. (32 km) above Spences Bridge. Approximately 15 million m³ of Pleistocene glacial lake sediments on the east wall of the valley suddenly failed and flowed across Thompson River, stemming flow its flow. The Black Canyon landslide blocked the Thompson River completely and stopped the flow of water for approximately 44 hours. It dammed up the river to a height of 50 ft. (15 m). The water above the dam rose at a rate of 3 ft. (90 cm) an hour. Above the dam the water rose about 65 ft. (19.5 m), flooding the J.C. Barnes and John Craight farms. Barnes sustained the heaviest loss as the dwelling house and several buildings were carried away. His big granary with 100 tons of wheat sock inside was completely destroyed. Craight saved his house with great difficulty, but lost a large quantity of grain. Harper’s mill at the mouth of Bonaparte River was also damaged as all the buildings were “more or less” moved off their foundations.

The lake formed upstream of the blockage and attained a maximum depth of 18 m and a length of 14 km before it began to empty through a channel cut by workmen. Another source put the length of the lake at 18 km and a maximum volume of 42-145 million m³. By 8 p.m. on October 15, it had risen some 80 ft. (24 m). The dam was at least 150 ft. (45 m) high, extending for a distance of at least 0.5 mi. (800 m) from a point just below Willard’s Ranch on the left bank of the Thompson River. The dam left the river dry below and at Lytton the Fraser River fell 7 ft. (2.1 m).

Catastrophic breaching of the dam did not take place since the escaping waters gradually enlarged the spillway until the lake was empty (Evans 1992). It was feared that the rush of water would carry Spences Bridge away, but as the break was gradual no damage was done. A channel was cut along the top of the dam to prevent it breaking from the bottom. The lake began to empty through a channel cut by workmen across the top of the dam at approximately 5 p.m. on October 16. The escaping waters enlarged the spillway until, two days after the landslide, the lake was empty (Clague and Evans 1994). The waters of the Fraser River turned exceptionally murky and turbid. *2)

According to another source, the landslide that blocked a narrow gorge held for 30 hours. It caused great property damage and the loss on one life. The slide dammed the river “all the way from Savona to Ashcroft.” The overflowing water reached an “altitude” of 40 ft. (12 m) leaving a high water mark at Harper’s on the third storey (*Victoria Daily Colonist*, September 24, 1897).

*1) Other landslides, which disrupted the CPR track along the Thompson River, were also thought to be caused by irrigation. The railway company sought compensation through litigation (Cambie 1902; Wallace 1987; Evans 1992). On September 19, 1897, another slide occurred into the Thompson River near Ashcroft. Further upstream, this one could not be attributed to irrigation (*Victoria Daily Times*, September 27, 1897).

*2) The Native Indians had no recollection of an occurrence of a similar nature. Since the great mudslide, which happened many, many years ago, nothing compared in magnitude took place (*Daily British Colonist*). On September 25, 1982, another slide occurred at the same location.

October 1881

Source: Drysdale 1914; Stanton 1897 (pp. 7-8); B.C. Ministry of Energy, Mines and Petroleum Resources 1993.

Details: In October 1881, an irrigation water reservoir 2 mi. (3.2 km) distant in the hills broke its dam spreading over the already well-soaked upper benches (Stanton 1897). A few miles below Ashcroft on the east side of the valley, about 150 ac. (60 ha) of benchland, probably weighing about 100 million tons, collapsed. It suddenly sank vertically in one movement to a depth at the back edge of over 400 ft. (120 m). The lower portion of the slide about 2,000 ft. (600 m) wide was forced entirely across the Thompson River, a distance of 800-1,000 ft. (240-300 m). Abutting against the steep bluff on the opposite side, it filled the whole inner gorge of the valley and formed a dam fully 160 ft. (48 m) high. For several days the flow of the river completely stopped, enabling people to walk dry-shod across the riverbed below the dam. *1) The dam formed a lake over 12 mi. (19.2 km) in length, roughly estimated to have contained some 7,000 million ft.³ (198 million m³). (Stanton 1897). As soon as the water rose and formed an outlet, it swept away the slide material, causing a terrific flood in the valley below (Stanton 1897; Drysdale 1914). All of the arable land above the north slide was carried down by the first break (Stanton 1897). *2) According to the B.C. Ministry of Energy, Mines and Petroleum Resources (1993), the Ashcroft silt slide displaced some 15 million m³ of material, blocking the Thompson River for two days.

*1) In the autumn, the Thompson River carries 15,000-20,000 ft.³/s (424.8-566.3 m³/s) of water (Stanton 1897).

*2) The north slide has a maximum width at its widest portion of nearly 0.5 mi. (800 m) and a length back from the river approaching 0.75 mi. (1.2 km) and extends over an area of 155 ac. (62 ha) (Stanton 1897).

June 7-14, 1882

(Spring runoff flooding).

Source: *Mainland Guardian*, June 7 and 14, 1882; *Daily British Colonist*, June 8, 9, 10, 11, 13 and 15, 1882; *The Daily Colonist*, June 23, 1894; *British Columbian*, June 10, 14 and 21, 1882; *The Vancouver World*, July 11, 1916; *Kamloops Sentinel*, June 1, 1928; *The Chilliwack Progress*, June 25, 1958.

Details: During the 1882 runoff, the water in the Fraser River came 1 ft. (30 cm) higher [than in 1876] and "lots of damage was done" (Horatio Webb In: *The Chilliwack Progress*, June 25, 1958). Compared to the 1876 flood, the water reached higher levels and was more destructive. The Fraser River level at the suspension bridge at Yale and at various other points was reported 2 or 3 in. (5-7.5 cm) higher than the unprecedented flood in 1876. Between the No. 1-No. 2 tunnels, the water encroached upon the railway and the track had to be shifted. Large areas at Chilliwack and Sumas were flooded. On June 7, the whole valley was covered with water. Crops were destroyed, bridges washed away, and the roads blocked with floating logs.

According to J.B. Leighton of Savona, the flood of 1882 was the "first real high water that was noted by the white people in the Kamloops district" (*Kamloops Sentinel*, June 1, 1928). The high water allowed John Tait, Hudson's Bay Company manager at Kamloops, to charter the *S.S. Peerless* for a picnic. The steamer went down to the lake and came up the sloyugh to the Mission Flat and cruised around over two-thirds of the Flat.

On June 14, the *British Columbian* reported: "In the Chilliwack, Sumas and other settlements there is utter ruin everywhere on the lower lands.... Everywhere ruin and consternation reign." The flood damage at these two settlements was estimated at \$100,000. The consequential damage would probably reach \$500,000. In some parts of Chilliwack, water levels were at least 18 in. (45 cm) higher than in 1876. In others it was not as high due to the change of the current in the Fraser River at the head of Hope Slough. On June 8, orchards and farms at Sumas were all under water. Several houses were submerged to their second stories. There was evidence that at least one house with its contents was carried off.

On June 10, the Cariboo Road near Yale and up the line was reported badly damaged. It had its banks, walls and cribs washed away. The railway company, which suffered severely from the high water, opened the old trail over the mountains between Chapman's Bar-Boston Bar in order to pack rice and food for the workmen. On June 11, the river was still rising about 10 in. (25.4 cm) a day. Water levels reached some 3 in. (7.5 cm) higher than in 1876. In Sumas Prairie alone, some 30,000 ac. (12,000 ha) of arable land were flooded. The wagon road was gone in several places and the 4-Mile bridge went out. The suspension bridge was endangered as the approach on the far side went out. The railway washed away in many places. The trestle

bridge at 3-Mile post lost its bents. A force of men was employed to put new bents in. Camp 13 was under water. It was a common sight to see houses and bridges flow past Yale every day. Water levels reached the top of Kimball and Gladwin's warehouse door. Barnard's Stables were under 4 ft. (1.2 m) of water. The horses were taken to the old stables on the hill. On June 12, water levels were still rising, bringing the stage to 13 in. (33 cm) above the 1876 flood level. Chilliwack and Sumas were completely under water. Several head of stock drowned and the rest was starving. On the Trunk Road 2 mi. (3.2 km) back from the river, water was 2 ft. (60 cm) deep. Bridges between [Sumas]-Popkum were all carried away and the suspension bridge at Yale was endangered. After June 12 the water levels began to drop. On June 14, the Fraser River crested at 23 ft. 10 in. (7.15 m) on the gauge at Mission (*The Vancouver World*).

Flooding also occurred elsewhere. According to Mr. Hardmann, an old placer miner, the Pend d'Oreille River flooded the Sayward, Wash. townsite. Previous floods were recorded on this site in 1877 and 1867 (*The Daily Colonist*, June 23, 1894).

November 28-29, 1883

(Rain-on-snow).

Source: *The Mainland Guardian*, December 1, 1883.

Details: On November 28-29, heavy rain combined with temperatures "as mild as in May," caused the Fraser River to rise 4-6 ft. (1.2-1.8 m). The road to Port Moody was made impassable, the mud being several feet deep. On the Hastings Road, the long bridge was completely submerged. The Brunette bridge was carried away. The Coquitlam bridge may also have been carried away.

October 19, 1886

Source: Evans, unpublished data.

Details: On October 19, a landslide came down along the left bank of the Thompson River Valley, 4 km south of Ashcroft. The site of the first documented derailment by a landslide became known as the Goddard Slide. A steam engine, tender, and baggage car of a westbound CPR passenger express train were derailed. The landslide was 575 m long and took place minutes after a trackman had passed the spot. The failure surface is seated in glaciolacustrine silts (Evans, unpublished data).

1887

Source: *Daily British Columbian*, January 31, 1899.

Details: In 1887 during the first year of rail line construction, 12 lives were lost by a large slide at a point 8 mi. (12.8 km) east of Vancouver.

1888

Source: B.C. Ministry of Energy, Mines and Petroleum Resources 1993; Evans 1992 (p. 83).

Details: In 1888, a high magnitude catastrophic landslide occurred at Ashcroft. The 15 million-m³ silt slide blocked the Thompson River for two days.

May 1890

(Spring runoff/flooding).

Source: *British Columbian*, May 14, 19 and 21, 1890.

Details: On May 14, the Fraser River was reported to overflow its banks at Fort Langley. Flooding was reported on May 19 in Matsqui, Sumas, Pitt Meadows, McGillivray's place, and Miller's Point. On May 21, water levels in the Fraser River at Chilliwack were "the highest known for this early in the season." Sumas was almost completely flooded.

December 1-2, 1890

(Rain-on-snow).

Source: *Victoria Daily Colonist*, December 14, 1890.

Details: The Port Moody-Coquitlam area reported a "freshet" caused by mild weather and copious rains melting the remains of the recent snow.

December 11-21, 1890

(Rain-on-snow).

Source: *The Daily Colonist*, December 18, 27 and 31, 1890; Rogers 1992 (p. 49).

Details: Between December 11-21, heavy rain and snow caused flooding and landslides on southern Vancouver Island. A cloudburst dumped about 4 in. (100 mm) of rain in the area. Rain on December 11-13 was followed by snow on December 14, with 2 in. (5 cm) at lake level. Torrential rain on December 16 caused a debris slide described as “a pile of destruction” 20 ft. (6 m) wide and about 50 yd. (45 m) in extent. The slide blocked a road and held up two freight teams. The freight was ferried across swollen creeks and a trail was later cleared around the slide. The heavy rain continued from December 17-21.

In the Cowichan Lake area, the Chemainus and Koksilah rivers caused flooding at Cowichan Lake and Cowichan Flats. Though the water levels of the Chemainus and Koksilah rivers began falling on December 17, the Cowichan River continued to rise. All four government bridges on the three rivers were reported gone. A two span Howe truss railway bridge with arches of 150 and 180 ft. (45 m and 54 m) long was battered by logs in the river and demolished. This very substantial structure was built in 1884 at a cost of more than \$100,000.

On December 20, Cowichan Lake peaked 9 ft. (2.7 m) above its normal level. Cabins on the lake were washed away and the communications were cut. Roads were damaged and bridges swept away. At the hotel, the river overflowed its banks, spreading to within a few feet from the front steps. Of 7 million feet of timber, belonging to the Cowichan mill, awaiting river drive not more than 100 logs remained along the upper course of the river. Telegraph communications were interrupted for half a day. Many outbuildings and fences were wrecked or floated away. Damage was estimated at a quarter million dollars.

On December 18, *Victoria Daily Colonist* reported: “The waterspout theory is gaining ground among those anxious to account for the origin of the flood, as such a deluge has never been experienced in Vancouver Island.”

May 1892

(Spring runoff/flooding).

Source: *British Columbian*, May 28 and 31, 1892.

Details: On May 28, the water levels in the Fraser River [at New Westminster] were reported to have risen 12 in. (30 cm) in 36 hours. They reached a higher stage than at any time since the freshet set in. On May 31, it was reported from Port Kells that the Fraser River was rising rapidly. The sloughs were overflowing and much of the prairies were submerged. On the same date the *British Columbian* reported from Fort Langley, “The continued steady rise of the Fraser is covering our prairie rapidly with its annual silvery water sheet.”

January 25-February 9, 1893

(Rain-on-snow?).

Source: *The Daily Colonist*, February 10, 1893; February 13, 1916.

Details: Between January 25-February 8, Victoria recorded 53.25 in. (135.3 cm) of snow. Warm rain on February 9, caused the snow to melt.

During the first week of February, the roof of ABC Company’s Canoe Pass cannery and a large warehouse at Ladner’s Landing collapsed under the weight of the snow. The Fraser River was reported open from Port Guichon to its mouth. It was frozen over all the rest of the way to Hope. Efforts made on February 7 and 8 to cut a passage across the river for the ferry steamer but work progressed very slowly.

The weather turned mild again and a big thaw was in progress. If the thaw would come too swiftly, it was feared that much damage would be done roads and bridges through the district. The bridge built by the government the previous year over Hatzic Slough was destroyed by the ice. When the tide rose after ice had formed, it lifted the piles right out of the ground. In New Westminster till February 9, some 25 in. (62.5 cm) of snow had fallen.

May-June 1894

(Spring Runoff/flooding).

Source: *Chilliwack Progress*, May 30, 1894; *British Columbian*, (New Westminster) May 28, 29, 30 and 31; June 4 and 13, 1894; *The Daily Colonist*, May 29 and 30; June 1, 2, 3, 5, 6, 7, 8, 9, 10, 12, 13, 14, 15 and 17, 1894; *The Inland Sentinel*, May 25; June 1, 8, 15 and 22, 1894; *Kamloops Sentinel*, June 1, 1928; *The British Columbian*, January 30, 1935; *The Vancouver World*, July 11, 1916; *The Vancouver Province*, April 25; 1936; July 8, 1944; *The Province*, June 9, 1948; *The Daily Alaska Empire*, May 29, 1948; *The Chilliwack Progress*, June 25, 1958; *The Columbian*, June 8, 1970; *Canadian Geographic/Emergency Preparedness Canada* 1996; Orchard 1983; Hutchison 1950; Lang 1967 (p. 75); Affleck 1994; Pethick n.d. (pp. 91-134); Province of British Columbia, Sessional Papers 1894-95. Report of Col., the Hon. James Baker, Provincial Secretary,

Victoria B.C. October 10, 1894; Province of British Columbia, Sessional Papers 1896. Public Works Report for 1895; Province of British Columbia, Sessional Papers 1898. Dyking Schemes for flooded lands, Fraser River. F.J.L. Tytler, C.E.; Province of British Columbia, Sessional Papers 1898. Synopsis of Dyking operations 1898. F.J.L. Tytler, C.E; Fraser Basin Management Board 1994 (p. vi).

Details: The “Great Flood of 1894” in the Northwest continued for 57 days (*The Daily Alaska Empire*, May 29, 1948). According to old-time resident R.L. Reid, in the Lower Mainland, the 1894 flood lasted for six weeks (*The British Columbian*, January 30, 1935). For 33 days the river level remained above the 20-ft. level and 17 days above the 24-ft. level. The flood was the largest, with the Fraser River running at an estimated 16,990 m³/s, compared to the second largest in 1948 with a measured volume of 15,180 m³/s (Fraser Basin Management Board 1994). Though exact damage estimates are unknown, had the flood struck the lower Fraser in 1972, it could have cost damages of \$1.8 billion (*Canadian Geographic*/Emergency Preparedness Canada 1996). The 1894 spring runoff flood was “the greatest flood known to the early white men” (Hutchison 1950). This flood surpassed that of 1948 in practically every area of southern British Columbia (Affleck 1994). Rapid snowmelt caused province-wide flooding.

This flood was caused by a cold summer the previous year when snow failed to melt at higher elevations (*The Columbian*, June 8, 1970). During the winter 1893-94, record snowfalls were recorded in many of British Columbia’s Interior mountains (Affleck 1994). The spring of 1894 was cold and wet. Of the first 15 days in May, ten were wet. In the remaining fortnight there were 11 fine warm days. Towards the end of May hot weather suddenly succeeded the cold weather. In Chilliwack on May 18, the thermometer registered 78° F (25.6° C), on May 23 it was 89° F (31.7° C) and on May 25, 93° F (33.9° C). At Quesnel and Fort George, temperatures from 90-105° F (32.2-40.6° C) were recorded.

It is generally believed to be the greatest Fraser River flood of the 19th century when the floodplain was sparsely populated and developed. Though the Fraser River rose day after day, the residents of the cities in the lower Fraser Valley only became flood conscious when their train service was suspended. Otway Wilkie, a pioneer of British Columbia since 1878 and who had been farming in the Langley Prairie since 1885, said: “I had seen the flood of ’82 when the height at Mission showed 23 ft. 8 in. Another flood as bad as that isn’t likely to happen in a century!” Floodwaters on the Fraser and Columbia Rivers swept away houses and barns, and drowned seven people and much livestock. Extensive flooding occurred in the Fraser Valley. Though the Fraser River is 1,050 mi. (1,680 km) long, all the damage was done in the 100 mi. (160 km) between Ladner-Yale. It was the highest [flood] by far, as it swept the whole valley, from one end to the other.

During the “Great Chilliwack Flood,” the Fraser River at Mission peaked on June 5 at 25 ft. 9 in. (7.73 m) (*The Vancouver World*). Places that till then considered safe from any flood were this year under several feet of water. Almost all bridges were swept away near Chilliwack. Records indicate that at the time of the flooding there were essentially no dykes in the Chilliwack, Sumas and Nicomen areas, and that in the Agassiz District the CPR embankment formed the only protection for the area north of the railway. Floodwaters were reported to have covered the portion of Agassiz to the south of the railway and to have breached the embankment. (Province of British Columbia. Sessional Papers 1898.).

In the Chilliwack district, inundation was widespread with the whole of the lower grounds reported to be deep under water. Col. James Baker, Provincial Secretary, reported that on the evening of June 4 he was able to pull in a boat up to the Queen’s Hotel. (Province of British Columbia. Sessional Papers 1894-95).

The steamers *Gladys*, *Transfer*, *Rithet*, *Wm. Irving* and later the *Courser* were used to rescue settlers and as much of their stock as possible. The New Westminster Board of Trade arranged for the snagboat *Samson* to assist. Surrey settlers commuted between Peterson Hill-New Westminster by rowboat. Some appreciable portion of the flow of the Fraser River passed through the sloughs or former river channels, which area generally parallel to the main channel on the south bank. Records indicate that the steamer *Gladys* and the government steamer *Courser* proceeded up Hope and Camp Sloughs, Plan No. 525, to rescue livestock. It is also recorded that considerable difficulty was experienced in getting livestock on board since they had to swim and the strength of the current was a source of danger. (Province of British Columbia. Sessional Papers 1894-95; Province of British Columbia. Sessional Papers 1896).

The government sent Col. Baker with a steamer to assist the settlers who had to move off their farms (Horatio Webb In: *The Chilliwack Progress*, June 25, 1958). Col. Baker analysed the situation and reported steps to deal with it. The disaster area he described as, “about 100 by 15 miles, the greater part of which was under water, with bridges gone and communication by rail, telegraph and ordinary steamer stopped.” On his return to New Westminster, he reported two things were needed immediately: fodder for starving cattle and seed to re-sow the fields as soon as the flood subsided. (Pethick n.d.) *1)

In New Westminster, the Brunette and Royal City mills closed. The west end to the International Hotel on 13th was flooded with muddy water. On the road to Sapperton, ex-Mayor Keary's garden was swamped, and 14 in. (35 cm) of water covered the floor of the mill.

On May 26, Chilliwack recorded 89° F (31.7° C). That same day, the Kootenay River flooded all the bottomlands, turning the country in one vast lake. A steamer could sail from the head of Kootenay Lake to 10 mi. (16 km) south of the boundary, a distance of 60 mi. (96 km). The water was within 1 ft. (30 cm) of flooding the highest bottomland.

On May 31 in Chilliwack, the fairgrounds were flooded with water reaching the Leland house. Ditches along the road into town flooded, invading cellars and basements. The water at the landing was reported as only 15 in. (37.5 cm) below the high mark of 1882. On May 27, the floodwaters claimed the life of a small child in Langley village. On the same day the Matsqui dike, extending 3.5 mi. (5.6 km) and built to protect the low-lying land on the south side from the tides, sustained some breaks. Later, 1.5 mi. (2.4 km) below, the railway bridge gave way. This day, the Camp Slough and DeWolf's bridges were reported washed out.

On May 28, it was cloudy and cool, and the rapid rise was checked. The Fraser River was rising at 1.75 in. (4.45 cm) per hour. It overflowed its bank at Chilliwack Landing and spread toward the town. On the same day, the water in Kootenay Lake was rapidly rising, passing the previous year's high water mark. Overnight, it rose 13 in. (33 cm), making it flush with the wharf. Expecting flooding at Pilot Bay, the sawmill machinery was taken apart and moved to a safer place.

On May 29, *The Colonist* reported that in the largely uninhabited area above Yale, where the Fraser River flowed through a rocky gorge, several bridges and fillings had had been washed out. The paper warned its readers that it might be "a day or two yet" before a train would reach Vancouver. (Pethick n.d.)

On May 29, the Hope Slough dike broke, causing severe flooding in Chilliwack. When the Hope Slough dam (dike?) went out, many Fraser Valley farms were flooded and thousands of acres of grain destroyed. The Chilliwack municipality alone sustained some \$100,000 damage. On May 29, sections of the lower part of Westminster were flooded, forcing many people to leave their homes. On May 30, the Luck-a-Kuk [Luckakuck Creek] and Chilliwack rivers overflowed their banks. The Luck-A-Kuk cut through into its old channel, flooding many farms. Bridges were wholly or partially swept away and some cattle drowned (*The Chilliwack Progress* In: Orchard 1983).

Two farmers were charged with attempting to divert the Chilliwack River into the Luk-a-kuk, a stream running north into the Fraser River, and away from Vedder Creek and the Sumas area. They were really only attempting to restore the Chilliwack River to its original course. *The Colonist* reported, "there has been trouble for years over this log jam. One section of the community is anxious to see it removed, and the other is equally anxious to keep it there." (Pethick n.d.)

The as yet unfinished Pitt Meadows dike could not restrain the water. The Pitt Meadow bridge and the wooden bridge at North Arm were both lost. On Nicomen Island, some 50 ranches were under water and fences and barns were carried away. The *S.S. Transfer*, drawing 4 ft. of water, passed at will over the island. At Garner's hop ranch in Dewdney, the water was half way up the hop poles. Two more washouts were reported on the CPR rail line. At Maria Island, the track washed away. Waves 5 ft. (1.5 m) high were sweeping over the site where workmen were trying to bridge the break.

Between North Bend-Yale, several railway bridges washed away. Due to a break in the Hatzic dike, railway traffic was interrupted. At Hatzic, the water was 30 ft. (9 m) deep. When the Hatzic embankment caved in, the water temporarily fell 10 in. (25 cm) from the rush of water over the prairie. A carpenter named McTavish drowned despite the efforts of Capt. Marshall of the *Empress of India* to rescue him. At Hatzic Prairie, some 300 yd. (270 m) of track washed away and a large force of men were employed by the Canadian National Railway (CNR) in driving piles on which to construct a temporary track. As soon as the Matsqui and Hatzic flats were filled up with water, the river started to rise again.

At Mission City, the public wharf lifted by the rising waters was secured and towed back. The British Columbia Dyking and Drainage Co. had a large force of men and an engine clearing debris piling up against the bridge at Mission City. A bridge between Seabird Bluff-Yale washed away and a bridge at Seabird Bluff was swept out. The floodgates in the dike at Riverside, opposite Mission, gave way. The depth of water on the Matsqui Prairie increased to 6 ft. (1.8 m). Water in the Harrison River rose 10 ft. (3 m). High waters of the Fraser River backed up the Harrison River, completely submerging the small village of Harrison. The bridges over the Nicola River and Ruby Creek washed away. The bridge across the Nicola River was damaged. It was reported swaying as a train passed over it and half an hour later floodwaters carried part of it away. Both east

and westbound passenger trains were held at Kamloops, causing delay to passengers. At Chilliwack Landing, the river overflowed its banks. The water stretched inland nearly to Centreville village.

Only two patches of Nicomen Island were not flooded yet. Water levels in Vedder Creek reached record heights, doing much damage to its banks. In one location the stream cut away 6 ac. (2.4 ha) of land. The lower part of Langley was completely under water. At McDonald's Landing, the water was up to the top of the windows of the deserted houses. The approaches of the Mission railway bridge washed out.

Around May 29 after two weeks of warm weather, flooding was reported in Salmon Arm. Nearly the whole valley was flooded and several of the settlers had to leave their homes the previous week. James D. Gordon's bridge washed away and the government bridge on the road to Thos. Shaw's Ranch was expected to go shortly. The roads were flooded and the bridges and culverts were afloat.

At Golden, the approaches of the government bridge washed away forcing people to detour by the smelter bridge. The tramway bridge was also carried away. On June 4, floodwater flowed over the bank at the bridge and 2 ft. (60 cm) of water rushed between the Kootenay House and the railway station.

Flooding and mudslides cut the CRR (CPR?) line and "caused a longer lay out in train service in British Columbia than ever before." Floods on the Columbia River were interrupting rail traffic at Golden. On May 24, the passenger train was delayed for several days at the Illecillewaet River. Floodwaters on the Illecillewaet and at Golden carried away bridges on the CPR line. Other slides and washouts interrupted train traffic until June 14. High water and debris on the Illecillewaet River swept away the bridge at the 13th crossing of the CPR railway. Late on June 21, the bridge at 13th crossing of the Illecillewaet River was completed.

At Clanwilliam, a mudslide buried about 600 ft. (180 m) of track to a depth of 8 ft. (2.4 m) or more. Immediately on completion of a temporary track laid over this slide, a second slide came down. It buried this false track 6 ft. (1.8 m) deep to length of 300 ft. (90 m). Water levels in Eagle River, which the track crosses five times, were almost level with the track. Some of the smaller bridges washed away and piles (pilings) were displaced. In some places the track was under 8-12 in. (20-25 cm) of water. East of Donald, between Rogers Pass-Golden, "seemed to be the point of serious trouble." On June 6, part of the bridge across Vick's (Vic?) Creek was carried away.

On May 31 in Vancouver, the Fraser River with large amounts of debris backed up into Burrard Inlet. The wharf at Brunette Sawmills was closed due to flooding. The Ross-McLaren mill had its floor under water. Opposite Port Hammond a large tract of lowland is submerged. At Port Haney, the water was 1 ft. (30 cm) above the wharf. Below Derby townsite the river flooded meadows half a mile (800 m) inland. Heavy flood damage occurred around Langley. The steamer landing was covered with several feet of water and a ferry had to be established between the Warf and the Hudson's Bay Company's store. Langley Native Indians moved all their stock from the rancherie opposite Langley and were standing by for evacuation. In the village, the sawmill had been rendered inoperative by the high water. Hosak's gristmill and freight house were under 3 ft. (90 cm) of water. The Commercial Hotel was cut off and the diningroom was relocated to the old post office building. Captain McLennan's wharf was 9 in. (22.9 cm) under water. The gravel road at Salmon River was flooded with 4 ft. (1.2 m) of water for about 1 mi. (1.6 km) and nearly impassable. The Salmon River bridge opposite Mackie's was afloat. The break in the Langley dike about a mile (1.6 km) from the village on May 27, caused 1,200 ac. (480 ha) of grazing lands to be flooded. This dike was only built last year and was completely flooded. Carter, Rawlison and McMillans's prairies were all under water.

In the morning of June 1, the dike at Henry Kipp's farm broke letting the water into the town of Chilliwack from that side. By 8 p.m., water had completely covered the ground about John Henderson's house and Cooke's Presbyterian Church. The weather in the Cariboo remained hot with the Fraser River tributaries continuing to pour water into the already overflowing river.

On June 1, the Fraser River at North Bend surpassed the high water level of 1882 by 1 ft. (30 cm) and was still rising, though less rapidly than on May 29. Overnight, the water levels at Mission and Langley rose 3 in. (7.5 cm) and 4 in. (10 cm), respectively. The rail line between North Bend-Spences Bridge was open. West of Harrison, water covered the track for a distance to a depth of 3 ft. (90 cm), preventing trains getting through it. Overnight the water rose 14 in. (35.6 cm) over the CPR track 3 mi. (4.8 km) west of Mission, but trains passed through the flood without difficulty. On the Whatcom line, no repairs could be made until the water dropped. The bridge at Mission had its approaches on both sides partially washed away but was still standing. A close watch was kept on the bridge. The piers made out of piles over 70 ft. (21 m) long, were under constant pressure of the floating debris. The tug *Constance* was employed above the bridge, intercepting the larger trees and towing them away. The water rose nearly 6 in. (15 cm) at the railway bridge and more than 1 ft. (30 cm) a short distance below where the dike was covered in several places. A large number of cattle were gathered on the narrow strip of dry land along the top of the dike. On the CPR main line and on Hatzic Prairie large gangs

of men were employed repairing the tracks. *2) At Hatzic, both the rail- and telegraph line were damaged. Poles along the embankment washed away, carrying the line into the water. The rail line between Hatzic-Wharnock, 10 mi. (16 km) closer to Vancouver, though not in very good condition was passable. Pending the construction of a bridge replacing the one lost at Agassiz, the CPR made temporary terminal facilities at Wharnock, from where connections were made with Ruby Creek by boat. A construction gang was at work at Wharnock, building a good landing and other requisites for the terminal point. The steamer *Transfer* left for Mission and Ruby Creek to pick up passengers and mail delayed for eight days by the destruction of the CPR line.

Matsqui was completely under water to the foothills. Farmhouses above Langley were surrounded by water. Langley was only accessible by steamer, as the wagon roads were washed away in so many places that they were impassable. On the Whatcom branch line, engine 154 was stalled on the Mission bridge and could not be moved. The bridge embankments washed away and the track was flooded for 2-3 mi. (3.2-4.8 km). The Whatcom branch was separated from the main line at Mission. On the main line a few miles east of this point a serious washout occurred at Hatzic Slough. The rail line from Mission to Maclures was under water and sustained damage. On Barnston Island, some 200 head of cattle were in immediate danger of perishing. At Richmond, the newly completed bridge on the North Arm was endangered. The water scoured out the fillings round the piles. The wires between Agassiz-Yale were still down. Near Big Bend, the bridge over the Anderson River was swept away. At Lytton, at the mouth of the Thompson River, the bridge was endangered. Despite efforts to save the bridge, it weakened by driftwood tearing out braces and truss rods. On June at 1 a.m., it went out "with a terrific crash" and settled down on the Lytton side. "The pier turned over and it was gone." (*The Kamloops Inland Sentinel*, June 22, 1894).

The steamer *Rithet* arrived from Victoria delayed for several hours. The previous day she was detained in Plumper Pass by the heavy weather in the Gulf. On her way up river, opposite Annieville Cannery, the ship struck two snags. The drift got tangled up in the wheel, of which several paddles broke off. Due to the interruption in rail traffic, Vancouver was threatened with a beef shortage. The Government passed an order-in-council, permitting the importation of cattle into the province from the U.S., to be slaughtered immediately on arrival at the boundary.

On June 2 at Chilliwack, it was said to be 3 in. (7.5 cm) higher than in the flood of 1882. On June 2, the Fraser River at Yale exceeded the 1882 high water level by 25 in. (62.5 cm). Floodwaters continued to rise until June 4. On June 6 at Matsqui, the water was reported 3.5 ft. (1.05 m) above the high water mark of 1882.

Dikes at Little Prairie and Hatzic were destroyed and the Matsqui dike was partially destroyed. Railway and telegraphic communications were interrupted. At Matsqui, the water was up to the tops of the telegraph poles. CPR and Great Northern trains were interrupted. Substantial structures, including the CPR bridges at Revelstoke and Mission City were threatened. The Donald Trestle, the second longest on the CPR went out.

Mail from Vancouver and Victoria for eastern points were forwarded via San Francisco. Railway authorities in Washington State assured passengers there was no hope getting through any of the northern lines for some time. Passengers having left for the east via Northern Pacific and Great Northern several days previous had to return.

Extensive flooding occurred at Port Haney, Millside, Brownsville Flats, Chilliwack Landing, Matsqui Prairie, Nicomen Island and Harrison Reserve. Lulu Island, Westham Island and Nicomen Island were completely flooded. By June 3, very little dry land was to be seen anywhere throughout the broad Chilliwack farming district. The CNR line at Mission was under 14 in. (35 cm) of water. The Dominion Government wharf on Westham Island opposite Steveston collapsed. The rush of water scoured out the filling around the piles. On the wharf were a boiler, engine and derrick, and 600 tons of rock, which was used to anchor the mattress being laid down to improve the channel. During the night, water overtopped Dike No. 2 of the B.C Dyking Co. at Pitt Meadows. Inflowing water cut away some of the embankments afterwards.

On the night of June 2 following a hot day with a maximum temperature of 90° F (32.2° C), temperatures suddenly dropped. For two hours starting 10 p.m., a storm went through accompanied by thunder and lightning. June 3, was cool and wet with rain.

In the Fort Steele district, four bridges were carried away. The cost to replace them was \$25,000. This was the highest water since 1871. On account of the high water, about 150 Native Indians at the St. Eugene mission were unable to mine.

The rail line between Wharnock-Katz Landing was in such a condition that it would take several weeks to repair it. Surveyor H.J. Cambie of the CPR remarked: "Never did I behold such pitiful scenes and such helpless people. The ranchers seemed dazed by the complete ruin, which had overtaken them, and allowed

their cattle to perish before their eyes when they could as easily have taken them to a place of safety. The ranchers are homeless and without food, and in many cases the end will come soon if they are not rescued.” Workmen found a small raft floating on the Fraser River at Ruby Creek, carrying the dead bodies of an entire family of five. The bodies were found securely tied together. The steamer *Erie* with a scow in tow, left Westminster to remove cattle from Bulwer’s landing. The central portion of Lulu Island was flooded, first through a break near Scott’s mill and later at extreme high tide over the dike itself. Two days before the Fraser River peaked at 25 ft. 8 in. (7.82 m), the embankment at Otway Wilkie’s farm at Langley Prairie gave way. Directly behind his place and nearly 1 ft. (30 cm) lower, was a 1,000 ac. (400 ha) prairie. Within five minutes, it was completely inundated. Floodwaters carried away his fences, his orchard of 70 trees, and his topsoil to Langley Prairie. Though his prized Berkshire pigs drowned, Wilkie escaped by boat with his wife and their six children. Long-time Surrey/White Rock resident Harry Weaver remembers seeing “stacks of hay rushing along with sheep marooned on top.” (Weaver In: Lang 1967)

On June 4, the Fraser River at Langley exceeded the 1882 high water mark by 10 in. (25 cm). On that day, temperatures of 105° F (40.5° C) in the shade were registered at interior points. During the tide in the morning, the Fraser River opposite Westminster was higher “than in the memory of the earliest white settler.” With a velocity of 6 mph (9.6 km/h) it registered 13 ft. 9.5 in. above the low water mark, being 1.5 in. (3.75 cm) above the high point of 1882. The water reached the electric light powerhouse, putting the city of Westminster in total darkness. Every wharf along the riverfront was flooded, some of them to a depth of 10 in. (25 cm). The streets in the west-end, the tramway line and the Royal City Mills wharves were all submerged. At Sapperton, the river was flowing through the Brunette sawmill, covering the floor to a depth of 14 in. (35.6 cm). The dike surrounding Westham Island broke on Alexander Ewen’s ranch, inflicting heavy damage. The damage to the Ewen’s ranch by the break of McGillivray’s dike alone was estimated at \$5,000-10,000. The water washed out 200 ft. (60 m) of dike. In less than half an hour, 2 ac. (.8 ha) of ranch washed away and the remainder of the ranch flooded. Water overtopped the No. 1 dike at Pitt Meadows, followed by the dike surrounding 500 ac. (200 ha) of land belonging to John Wilson. The inflowing water cut some of the embankments afterwards. Some 20,000 ac. (8,000 ha) were flooded. Serious washouts were reported at various points, halting two trains, which left Katz Landing on June 3 and 4.

According to J.B. Leighton of Savona, the flood of 1894 was the second high water that was noted by the white people in the Kamloops district. Floodwaters took out five bridges in the area: at Kamloops, Savona, Ashcroft, Spences Bridge and Lyton (*Kamloops Sentinel*, June 1, 1928).

Damage also occurred on the Columbia, Thompson, White and Kettle rivers. All bridges on the Kettle River were lost and at Golden a number of ranches were buried (flooded?). Mission Creek flooded the whole valley. The Spillumcheen and Spilkameen rivers came through the Indian village, burying it 70 ft. (21 m). Bridges at Yale and over Ruby Creek and Nicola River went out, a train at the latter barely escaping. A series of washouts on the CPR line west of the Rocky Mountains severed train connections with eastern Canada for 41 days. During that period, CPR used Katz Landing as their terminus (Reid In: *The British Columbian*, January 30, 1935). The CPR estimated its loss at \$1 million.

Kootenay Lake rose to unprecedented heights, causing waters to surge back into the Kootenay Flats and obliterated the large land reclamation project underway. Golden was flooded and Anthracite, a town some 50 mi. (80 km) east was half swept away (Affleck 1994).

Around May 25, a small mudslide was reported at Albert Canyon near Revelstoke. On May 25, a slide came down during the night on the Three Forks side of the box canyon. A larger slide occurred in the afternoon of May 27 at the same location. The snow piled up over the wagon road to a height of 60 ft. (18 m). The canyon bridge sustained at least \$500 damage. Most of the work done by engineer Gillette and his gang was swept away during the flood (*Nelson Tribune In*: [Victoria] *Daily Colonist*, June 1, 1894).

During the last week of May, following the rains of the previous week, warm weather prevailed in the Okanagan Valley and Upper Nicola. Up to that time, the weather had been very cool. Tappen Siding had reported “rain almost every day.” Temperatures were between 80-90° F (26.7-32.2° C) in the shade. Early June the warm weather continued in the Interior. Between June 1-6, Kamloops reported maximum temperatures of 84.8° F (29.3° C), 91.2° F (32.9° C), 93.2° F (34.0° C), 79.5° F (26.4° C), 75.2° F (24.0° C) and 84.4° F (29.1° C), respectively. Flooding caused severe damage to crops in the valley north of Kamloops. Around June 1 at Salmon Arm, nearly the whole valley was flooded. The previous week several of the settlers had to leave their homes because of the flooding.

On June 3, it was reported that along the old Cariboo Road every bridge had been swept away and the road itself destroyed for a considerable distance. During the night (May 3-4?), the bridge over the Thompson River at Ashcroft, built at a cost of \$17,000 was swept away. Washouts were reported at Spatsum [Spuzzum?]

and at Thompson's Siding and several bad washouts occurred on the Thompson River above Kamloops. At Gladwin, the trestle was torn out and the tracks damaged in several places. The government bridges at Spences Bridge, Savona, Ashcroft and Lytton washed away. The bridge on the Cariboo wagon road near Yale was the first to go, then the one across the Nicola River at Spences Bridge. On the morning of June 2, the steel bridge at Ashcroft on the Cariboo road went out and on June 3 the Savona bridge. On June 7 train passengers saw it floating downstream. A number of bridges in the upper country required rebuilding.

The high water interfered with the mining operations in all sections of southern Kootenay. On Forty-nine Creek, the Nelson Hydraulic Company was unable to begin sluicing. The Poorman mill on Eagle Creek was forced to shut down. On Toad Mountain, 3 ft. (90 cm) of snow disappeared in three days. The water interfered with work in all the shafts. On Salmon River, the Kleinschmidt Company suspended operations. On Sheep Creek, a tributary of Salmon River, Hill & Co. had their sluice boxes washed away. At the Dardanelles mine, in the Slocan, the pumps had to be pulled out. At the Homestake Mine, 600 lbs. (272 kg) of ore ready for shipment washed away. Four miles (6.4 km) of trail from the mine to the North Thompson sustained considerable damage and some of the bridges on the trail were carried away. The road to the brickyard had 18 in. (45 cm) of water over it. "To the knowledge of old-timers," Carpenter Creek had never been so high. Cottonwood-Smith Creek turned into a river and the outlet into a lake. Trout Creek, Lower Okanagan, was higher "than in the memory of man" and the water in Boundary Creek was higher "than any time during the past 20 years." The bridges at McLaren's and Ingram's were carried away as was the bridge over the Kettle River at Spraggett's. The one at the south fork had both approaches cut off but the structure remained intact.

On the afternoon of June 3, a big windstorm followed by a heavy rain passing over Canoe Creek caused much damage, blowing down hundreds of trees. Much damage was also done at Ainsworth, Pilot Bay and Crawford Bay. At Balfour, the water was up to the second story of the hotel and in some parts the water was 6 ft. (1.8 m) deep in the streets. The cloudburst near Ashcroft caused additional damage. On June 3, the storm on Sicamous Lake was "the roughest that had been seen for many years and some narrow escapes were reported." Near Fort Steele, a severe thunderstorm with wind passed over, "throwing down trees on all sides." The same storm swept over Nelson.

Cloudbursts were reported from several locations, including in the valley north of the Indian Reserve. On the afternoon of June 3, a freak tornado swept north over Kootenay Lake. It demolished much of the lower part of Kaslo, which was being reconstructed following a severe fire on February 25, 1894 (Affleck 1994). All the houses below Third Street were swept away and the \$8,000-wharf was destroyed. About 100 people who lived in the small houses were made homeless. The Galena Trading Company's store collapsed and disappeared, causing an \$8,000 loss. On June 4 at about 2 a.m., the bridge across the creek was carried away at an estimate loss of \$100,000. At Kaslo, the water had been rising at the rate of an inch an hour and when the cloudburst struck the town for half an hour "there was a terrible scene." According to *The Inland Sentinel*, "sand, lumber, tin cans, light stoves, and almost everything moveable were whirled about the streets." One occupant of a rowboat washed away and the body never recovered. While camping in a gulch off Five-Mile (Asher) Creek, a tributary of Trout Lake, three men drowned by the sudden rise of the creek, possibly after a logjam in the creek broke. At the Wigwam, two "Italians" were caught in driftwood; one of the men drowned.

Between June 1-3, the North Thompson River dropped about 30 in. (75 cm) but the heavy rains on the afternoon of June 3 would send it up again. After a rapid rise it appeared to have peaked on June 6. The North Thompson River surpassed the high water level of 1876. At the mouth of the North Thompson River, the water "rose higher than ever known before." Along the road up the North Thompson, a culvert washed out at the Potter ranch. Along the canyon, "where the rush of the water was severe," the road was carried away into the river in three places, covering a distance of 1.5 mi. (2.4 km). The recently bridges at Louis Creek and Barrier (Barriere) River held. Farmers in the area reported grain and vegetable crop losses due to the flooding.

Summary flood damage till June 5: The suspension bridge on the wagon road near Spuzzum washed away. After the dikes at Pitt Meadows went down, some 50,000 ac. (20,000 ha) of prime farmland flooded. One of the Lulu Island dikes went down and a second one was feared to go out also. Nicomen Island, about 12 mi. (19.2 km) long and from 1-2 mi. (1.6-3.2 km) wide was flooded. Most of the livestock from the island was taken to Sumas Mountain, directly across the river. The ranchers established camps around the base of the mountain. The steamboat landing at Chilliwack was totally submerged. Around Chilliwack, up the Hope Slough and across the Sumas Prairie all farmland was flooded. Late in the afternoon, 200 ft. (60 m) of the new South Arm bridge between Richmond-Vancouver was carried away. The dike surrounding Deas Island gave way, threatening Brodie's Cannery. The water washed out many pilings, letting about 50 ft. (15 m) of one of the buildings into the river. The road between Kamloops-Yale was reported to be "in worse condition than

ever.” On the branch line from Enderby to the main line, the whole track was washed away, making the line inoperable for some time.

The Columbia River was higher than ever before, flooding ranch buildings from Revelstoke to Nakusp. The bridge across the Columbia River about 1.5 mi. (2.4 km) this side of Revelstoke was endangered. The swift water caused much bank erosion near Revelstoke. Water washed very heavily on the east pier of the bridge at Revelstoke. In about three or four days, south of the bridge the bank on the east side washed away about 20 ft. (6 m). Water rose to the windows of a house on the west bank forcing the occupants to evacuate.

About 20 mi. (32 km) below Revelstoke three successive mudslides came down, covering the rail line for nearly 0.5 mi. (800 m). They originated from a hill slope at least 4 mi. (6.4 km) from the track, travelling across a wide valley and up the opposite slope. The force of the slides that all happened in the same location, bent the rails and “broke the huge timbers into matchwood.” The railway and freight sheds at Nelson were shut off and could only be reached by boat. At Nicola, a couple of spans of the railway bridge were carried away. Below Agassiz, the track was made impassable and only the tops of the telegraph poles indicated the location of the line. Yale registered temperatures of 93° F (33.8° C). Two-thirds of the old Cariboo road was flooded and the suspension bridge near Ashcroft was endangered. *3) The left end went up and was badly damaged. The bridge was reported destroyed along with the Savona and Spences bridges swept away. The Alexandria bridge above Yale at Spuzzum, built by the Royal Engineers in 1864 to serve the Cariboo miners, was reported to have collapsed and partly gone. At the crest of the flood, the Alexandria suspension bridge was within inches of being swept away (Affleck 1994). Though it was badly damaged, it did not wash out (*The Province*, June 9, 1948). *4) The bridge across Camp Slough was also carried away. The Indians’ charge for ferrying railway workmen across the river at Agassiz was said to have been as high as \$10 a head.

On June 5, the water levels started to drop slightly. Though scarcely noticeable at Chilliwack, with cooler weather floodwaters peaked on June 5. At Hope Slough near Hope, water levels were reported to have fallen 6 in. (15 cm). On the outskirts of Chilliwack, it receded only 1 in. (2.5 cm). From Yale a drop of 18 in. (45.7 cm) was reported during the previous 27 hours, and at Hope the river dropped about 5 in. (12.5 cm). The river had reached about 2 ft. (60 cm) above the 1882 mark. The Indians living below at Katz Landing and above at Union Bar were vacating their houses and removing their belongings to the mountains. The Coquihalla River was very high and the bridge across it was expected to go out. According to the road superintendent the Hope-Similkameen trail sustained heavy damage by washouts, and was not expected to be reopened till June 10. He also reported 10 ft. (3 m) of snow at the summit of the mountain.

June 6 was again cooler. At Chilliwack, the temperature dropped to 58° F (14.4° C) and rain came on at night. The water level dropped 5.5 in. (13.8 cm) in Chilliwack and 1.5 ft. (45 cm) at Katz Landing during the night. During the evening of June 6, Richard London’s wharf on Westham Island was swept away. A few minutes later, the bank caved in taking 600 ft. (180 m) of dike with it. Later the dike lower down gave way, flooding several farms. The low-lying farms at Keatsey were also flooded.

On June 7, water at Chilliwack dropped about 2 in. (5 cm) and was reported to have receded 1.5 ft. (45 cm) at Yale. Later on June 7, the Fraser River started to rise again. Overnight, the water at Katz Landing and Spuzzum rose 4 in. (10 cm) and 7 in. (17.5 cm), respectively. The morning high tide at New Westminster brought the water level an inch (2.5 cm) higher than the record set the previous day. This new record brought the mark of 1894 to 5 in. (12.5 cm) above the 1882 high water level.

Summary flood damages Fraser Valley by June 8: At Brownsville, the loss to the milk ranchers was about \$1,000. In the Langley municipality, 30 farmers lost all their crops. The loss was estimated at \$2,500 for bridges, \$15,000 for crops and \$15,000 for personal belongings. At Matsqui, the loss in crops, livestock etc. was estimated at \$10,000; fences, fruit trees etc. \$6,000 and bridges \$1,800. At Sumas 2,500 ac. (1,000 ha) of crops were lost, valued at \$20,000. The loss of personal belongings etc. amounted to another \$20,000. In Chilliwack, the oldest settlement on the Fraser River, the entire crop estimated at \$300,000 was lost with an additional loss of \$10,000 for chattels, bridges etc. In the Richmond municipality, the damage to the North Arm bridge was about \$2,000 and 100 ac. (40 ha) of delta land were flooded at a loss of \$7,000. In Coquitlam, the loss by crops, fences etc. was \$8,000. At Maple Ridge, \$30,000 damage occurred at Pitt Meadows. At Mission, the loss of chattels, houses and crops was estimated at \$50,000. In Dewdney, where the first flood damage occurred at Hatzic, crops, cattle and personal belongings etc. were destroyed to a value of \$35,000. On Nicomen Island, the loss on fences, buildings and livestock etc. was \$50,000. Between 12 mi. (19.2 km) between Nicomen and the Yale district, the loss to hop farms was at least \$8,000. In the Yale district, including Ruby Creek, Katz Landing and Hope, after which the valley narrows, precluding settlement, the loss was estimated at \$8,000. The losses mentioned amounted to nearly half a million dollars (*The Daily Colonist*, June 8, 1894).

During June 8, the water levels up-river continued to rise: at Kamloops 1.5 in. (3.75 cm), Ashcroft 3 in. (7.5 cm), Gladwin 12 in. (30 cm), North Bend 3 in. (7.5 cm). The Fraser River peaked on June 9, holding at that level for several days (McCutcheon In: Orchard 1983). The maximum discharge of the Fraser River at Hope was estimated at 600,000 cfs (16,990 m³/s). At Katz Landing, it remained unchanged while downstream the levels dropped: at Mission 2.25 in. (5.6 cm) and Westminster 3 in. (7.5 cm). From this date on, the high tides were also dropping.

On June 9, telegraphic communications were still interrupted in many places. At Maria Island, the workers had to divert the line from the railway track. The re-routing required the building of a mile or more of extra line. During the evening the bridge and its approaches over the North Thompson at Lytton were washed away.

Despite a heavy gale blowing up river, water levels continued to fall at all points as far as Chilliwack, where it fell 2 in. (5 cm) overnight and a total of 9 in. (22.5 cm) since the Fraser River peaked. Harrison Lake was falling 2 in. (5 cm) daily. Water levels at Langley fell 7 in. (17.5 cm) overnight.

During the second week of June, the North Thompson River had fallen about 10 ft. (3 m) from where it marked on June 6. The fall was almost as rapid as the rise. Overnight June 11-12, the Fraser River at New Westminster dropped 5 in. (12.5 cm) and at Chilliwack 18 in. (45.7 cm). On June 14, the Findlay, Durham and Brodie's cannery on Deas Island was completely destroyed. The main building, and wharf went into the river, carrying with it some valuable machinery, thousands of cans, as well as several tons of tin and other stock. On June 14, the Great Northern resumed its train service, with the first train for Seattle in three weeks leaving early that day. CPR resumed its train service the same day with an eastbound train and the Northern Pacific Railway resumed service on June 15.

It was early July before the last of the floodwaters had disappeared from the low-lying lands of Chilliwack town and district. The retreating waters left behind a scene of ruin and desolation. Everything that had been covered by floodwaters was thickly coated with a deposit of mud. All sown grain, vegetables and flowers were destroyed. Small trees and bushes, especially raspberries, and many fruit orchard trees were spoiled. The provincial government came to the rescue of the farmers, supplying millet, oats, barley, potatoes and turnips free of charge. With warm weather beginning on June 13 together with a full moon on June 17, posed new threats.

*1) Following the flood, Premier Davie informed Prime Minister John Thompson that, "plainly the lesson of the floods is the necessity of a comprehensive system of dyking, which will include the whole inundated area of the Fraser Valley." Davie suggested a joint effort in this regard, beginning with a detailed survey of the Fraser River. In the fall, the federal government agreed to pay half the cost of such a survey. Engineer Frederick Tyler, who in 1896 made a careful examination of the area recommended an elaborate system of dykes, dams and pumps, "all the work to be of the best quality." He also recommended deepening and dredging the channel of the Fraser River. In 1898, the first dyke at Maple Ridge was completed, that at Matsqui in 1900, and the two dykes in the Chilliwack area in 1901. Local farmers, who were paid wages for their efforts, did much of the work. (Pethick n.d.) As part of various dyking schemes by 1898, the damming of Hope, Camp, Half-Moon and Greyell sloughs and the dyking of the intervening spaces was reported to be nearly completed. (Province of British Columbia. Sessional Papers 1898).

*2) The so-called Hatzic dyke was an embankment of the CPR. It was situated about 3 mi. (4.8 km) above the bridge on the opposite side. The CPR ran across Hatzic Prairie about midway between the river and the hills. It was much higher than the Matsqui dike, with very low land on both sides. In 1893, the CPR proposed to form a dike by filling in the high trestle about 0.5 mi. (800 m) long (*The Daily Colonist*, June 2, 1894).

*3) Until another bridge was erected at the same location in 1927, the Caribou Road became known as "the road with a hole in the middle." (*The Columbian*, June 8, 1970).

*4) The bridge built at a cost of \$45,000 did 63 years service before being replaced in 1926 by a steel and concrete structure of the same design. When it was dismantled the cables were found as sound as when they were put up (*The Province*, June 9, 1948).

June 14, 1894

Source: *The Daily Colonist*, June 23, 1894.

On June 14, Kaslo was hit by a severe storm, claiming the life of Mrs. D.C. Gregory. The storm came up between 4-5 o'clock and was preceded by a number of hot waves followed by a terrible gale. It filled the air with debris, churned the lake into a heavy sea and blew buildings into the water. The Galena Trading Co.'s store, Byers hardware store, the government wharf, and some 70 houses were swept away. Property damage amounted to \$100,000. A logjam dammed the Kaslo River and scores of cabins along its banks were ruined.

October 29, 1894

Source: *The Daily Colonist*, November 3, 1894.

Details: On October 29 at 6:30 a.m. after several days of continuous heavy rain, a landslide occurred on the northeast end of Vancouver Island at Shooshartie Bay, Cape Commerell. The debris flow came down from a steep more than 300 ft. (90 m) high hillside, at the bottom of which the cabins of the little commonwealth co-operative colony were situated. The slide killed William Kipling, one of the residents.

January 9-13, 1895

(Rain-on-snow and tidal flooding).

Source: *The Chilliwack Progress*, January 9, 1895; *The Daily Colonist*, January 15, 1895.

Details: On January 9, Chilliwack reported at least 15 in. (38.1 cm) of snow during the past week. The snowfall at the first of the year was general all over the continent.

Warm weather combined with heavy rains caused snowmelt and subsequent flooding. High tides and a strong westerly wind backed up the Fraser River, flooding the low lands near the mouth of the river. *1) Reports that the water rose 6 ft. (1.8 m) at the Mission bridge may be doubtful. Waters on the Upper Fraser River were reported to have risen rapidly. On January 12, the Coquitlam River rose sharply, flooding the wooden traffic bridge on the wagon road. Hurling fragments threatened the piers of the railway bridge below. Two large booms broke away on the Coquitlam River, setting some million feet (28,000 m³) of lumber adrift. The steamer *Transfer*, in winter quarters on the Coquitlam, was struck by floating logs and set adrift. The tug *Eva* towed the vessel back to safety. At New Westminster, the water rose to nearly the top of the wharves. Except for a few flooded cellars, no damage was done. At South Westminster, the low land was inundated right back to the hills. Lulu Island had its dikes washed away in many places and was covered with water. The pits in which the ranchers had stored their roots were flooded and their crops were destroyed. The water ruined large lots of potatoes, which were readily bringing \$13 to \$15 per ton. The tide flooded some small ranch houses and the floors of numerous barns. Nearly all the bridges were swept away and the roads were badly damaged. Sea Island was flooded to a depth of 3.5 ft. (1.05 m). At Steveston, the water flooded the floors of the canneries and several settlers had to leave their homes. Most of the plank roads were swept away.

In the Delta district, people moved around in small boats between Ladner's Landing-Boundary Bay. A big winter flood occurred along the Ladner waterfront. The greatest damage in Vancouver occurred in the evening of January 13. The water rose 16 ft. (4.8 m) and was driven ashore by the westerly wind. The water nearly reached the railway tracks on the wharf, making it the highest tide known for years. The water came within an inch (2.5 cm) of the Vancouver Steamship Co.'s wharf. The cellars of the warehouses of the Major & Eldridge Provision Company and Champion & White were flooded.

Capilano Creek, from which Vancouver drew its water supply, turned into a raging torrent. The water was 7 ft. (2.1 m) above the dam, pouring over in a regular waterfall. A gang of men was keeping the driftwood from damaging the water main. In West of Vancouver at English Bay, winds and high tides caused damage to many summer cottages. One residence with all its contents was swept into the bay, as did the bathing sheds. A dairyman escaped unharmed when, while crossing a bridge with a team and wagon, the structure was swept downstream.

Mudslides in the mountains caused considerable trouble to the railways. The Great Northern Railway had its train service into South Westminster interrupted since January 11, due to landslides along their line in Washington. The tides did not affect the CPR line. On June 13, the trains delayed by the snow in the mountains were moving again on schedule.

*1) Eighteen years previous there was a similar freshet (W.B. Townsend In: *The Daily Colonist*).

June 13, 1895

(Spring runoff/flooding).

Source: *The Vancouver World*, July 11, 1916.

Details: On June 13, the Fraser River peaked at Mission at 19 ft. 8 in. (5.9 m).

January 4-6, 1896

(Rain-on-snow and tidal flooding).

Source: *The Daily Columbian*, January 6, 7, 8, 9 and 10, 1896; *Victoria Daily Colonist*, January 8 and 9, 1896.

Details: New Westminster recorded 5.21 in. (132.3 mm) of rain in 31 hours ending 2 p.m. on January 5. It was one of the heaviest rainfalls in the 24 years of recording by Captain Pelle. Adding to this the snow on the ground that melted, in 31 hours aggregated 5.10 in. (129.5 mm) of water for a total of 10.31 in. (262.91 mm). The snow melted so rapidly that the gutters could not carry the water away fast enough. It overflowed streets, cutting big channels in some places "deep enough to float a canoe." Rapid melting of snow and the heavy rain on the night of January 4 did more damage to New Westminster streets "than ever before in the history of the city." The city's water supply was also cut off. At a point about 0.5 mi. (800 m) from Westminster Junction where the line runs along Scott's Creek, one of the joints gave way. The usually shallow creek, swollen into a raging torrent submerged the pipe, which was carried across the creek by girders. The water forced out the pipe and cut the supply from the reservoir. Water from the pipeline flowed into the creek, adding to this torrent. On the forenoon of January 5, it was impossible to reach the Junction by road, as even the railway line was flooded for a considerable distance by the overflow of Scott's Creek and Coquitlam River. When finally reached late on January 5, 3 ft. (90 cm) of water was running over the pipe though the flood was receding. At first daylight on January 6, it was only covered by 1 ft. (30 cm) of water. As the outflow from the reservoir inadvertently had not been cut off, New Westminster was without water supply on January 6 and had its fire protection practically cut off. Though the break was repaired later on January 6, the pipe at Steeple Bluff remained empty, indicating a break further up the system. Then suddenly the system filled with water and by 6 p.m. the whole upper portion of the city was supplied.

Uptown, where the snow was deep, water even flowed over sidewalks. Debris clogged gutters and culverts at street crossings. Worst damage occurred on Carnarvon Street where a section of more than 60 ft. (18 m) wide between Herring's Opera House and Sixth was cut out. The trouble was caused when the drain under the cribbing choked up. Water pouring down the ravine, being dammed by crib work and unable to find an outlet, soon rose to nearly level with the street. It was decided to cut an opening through the street to allow the water to pass. This work was hardly commenced when the collapse of the street occurred. The flood went roaring down a vacant lot adjoining Mr. James Cunningham's building. The outlets lower down were too small to cope with this sudden rush and the water soon found its way into the area behind the Public Library building and the Duncan-McColl block, the basements of which were quickly flooded. Water also cut into the foundations of Columbia Street after the Carnarvon Street washout happened. The water also damaged cribbing near the Crescent. Numerous cut up streets were reported from all parts of the city. A defect in the 6th Street gutter allowed a lot of water to enter the Douglas-Elliott block basement. Worst damage occurred early on January 5 and before noon the most critical stage was past.

Port Moody also experienced the "heaviest and most destructive rainstorm known here for many years." Washouts cut the railway embankments in several places and carried off a lot of lumber belonging to the mill into the inlet.

On the CPR rail line between Hastings-Port Haney, landslides occurred. The most serious interruption occurred on January 7 about 6 mi. (9.6 km) (west of Port Haney?) where a large rockslide came down. The large mass of rock filled a cut in the line to a depth of 20 ft. (6 m). On January 8, the rail service to Whatcom was resumed.

On January 5, there was 4 ft. (1.2 m) of snow on the level between Junction-Coquitlam and with the rain and snow melting the river rose steadily. The Coquitlam River, which was about as high as during the freshet season, overflowed its banks, causing major trouble at the Junction. Water was reported up to the kitchen floor in Kelly's Hotel. Waters in Scott's Creek initially dropped on January 6 until the water main was uncovered, but later experienced another freshet. On January 8, the pipe was under 3 ft. (90 cm) of water with the creek still rising. Driftwood coming down the Coquitlam River and jamming against CPR bridge threatened this recently built structure. Some of the uprooted trees caught in the jam were 5 ft. (1.5 m) in diameter and over 100 ft. (30 m) long. The area between Kelly's Hotel and the tracks was covered with water. Dynamite eventually saved the bridge. The force of the dynamite explosion pressed downwards forcing the logs beneath the surface allowing the current to carry the under the jam and below the bridge. Late on January 8, the river started dropping.

At Langley, the flats along the Salmon River were covered with water for several days. On January 9, the Serpentine flats were inundated with 4.5 ft. (1.35 m) of water over the Yale Road where it crosses the flats. Vehicular traffic was cut off since January 4. Due to the flooding, many settlers were unable to reach the

Clayton post office. The flooding at Serpentine flats was mainly due to the unusually high tides at the time. On January 10, floodwaters were reported falling.

On Vancouver Island, the freshets caused more serious damage than on the Lower Mainland. Serious floods were reported from half a dozen places on the Esquimalt and Nanaimo (E&N) railway. In the neighbourhood of Cowichan flats, large areas were under water. The most costly incident of the freshet this far was the carrying out of the Cowichan wagon bridge on January 7. The structure was relatively new and considered one of the best bridges on the island. On January 8, the railway bridge across the Koksilah River was flooded. Consequently, the northbound train did not arrive at Duncan until noon.

*1) The reservoir was set up in such a way that when the main pipe would break, its outflow would automatically be checked. During the previous summer, a new 6-in. (15 cm) main had been connected with the distribution outflow pipe through which the water went to waste.

1896

Source: *The Vancouver Daily Province*, September 6, 1906.

Details: In 1896, when the Capilano River rose suddenly during a period of heavy rains, several hundred feet of pipeline washed out. The connection between the dam and the reservoir was interrupted for almost a week (*The Vancouver Daily Province*, September 6, 1906).

June 15, 1896

(Tsunami).

Source: *The Daily Colonist*, June 21, 1896; *Alberni Valley Times*, February 12, 1979.

Details: The tsunami that caused devastation of the coastal cities of Japan on June 15 was also felt on the coast of British Columbia. *The Daily Colonist* reported, "A similar disturbance of the sea created no little alarm along the entire seaboard of Vancouver Island sweeping the length of the west coast but fortunately doing no serious damage to the settlements.... For upwards of three hours the waters rushed inland for miles moving to and fro at a velocity of eight miles (12.8 km/h) per hour. The steamer *Maude* was at Kyuquot during the few hours of inundation. All the sea skirting land was submerged to a depth of four to five feet. (1.2-1.5 m)."

Following the 1964 tsunami that hit Port Alberni, city councilor George McKnight attempted to discover more about the effects of this wave. He talked with Hereditary Chief of the Tseshasht, Adam Shewish. The chief pointed out that Indians of that time were unlikely to have taken more than passing note of such an event, especially as their longhomes would have been on higher ground (*Alberni Valley Times*, February 12, 1979).

July 4-7, 1896

(Spring runoff/flooding).

Source: *The Daily Colonist*, July 7, 1896; Orchard 1983.

Details: Though the spring runoff flood of 1896 was a large one, it was not quite as destructive as the previous floods. On July 4 in Chilliwack, the water came over the bank, flooding all the farms close to the river. Farms situated some miles back from the river were also affected. Dewdney and Nicomen Island and all low-lying places along the river were flooded. Steamers were plying inland to take ranchers and their stock to safety. During the night of July 5-6, the Matsqui dike broke in three places, inundating the prairie. A number of low-lying ranches in Pitt Meadows were partially flooded. The damage was considered by many as severe as during the great flood of 1894, except fencing which as yet had not suffered. On July 6, the Fraser River was within 2 ft. in. (68.6 cm) of the high water mark of 1894. On July 7, it was reported from the interior that the river at different points had started to recede.

November 12-13, 1896

Source: *The Daily Columbian*, November 13, 14, 16, 17, 18, 20, 21 and 23, 1896; *The Daily Colonist*, November 14 and 15, 1896; Parkin 1993.

Details: On November 12-13, heavy rains seriously interfered with vehicular and railway traffic on both Vancouver Island and the mainland. Several bad washouts between Kamloops-New Westminster prevented the Pacific Express getting through.

The Koksilah, Cowichan and Chemainus rivers, Waugh Creek and Goldstream all flooded their banks. Of all places on Vancouver Island, Sooke was most severely hit. Otter Point reported "a fierce westerly gale accompanied by torrents of rain." On November 14, rivers near Sooke were reported "running at a

tremendous rate.” Near Sooke, the government road bridge at Milne’s and a second bridge were carried away on November 12. *2) Until it could be repaired or replaced, it was proposed to establish a ferry. Muir Creek bridge and 300 yd. (270 m) of telegraph wire were also swept away. Telegraphic communication with Otter Point was only restored by 3 p.m. on November 14.

On November 12 (?), the E&N train from Nanaimo arrived 3.5 hours late due to the trestle bridge across the Niagara Canyon, a little above Goldstream being carried away. *1) Both the north and south bound passengers had to walk a little more than a mile to the trains waiting at either end of the break. The fallen trestle was one of the highest on the line. It was scheduled to be replaced by a steel and stone structure.

Heavy snow, snow avalanches and mudslides blocked the rail line in the Interior for 10 days. It was the longest break in communications with the east since the first year the CPR started operating. CPR Superintendent H. Abbott reported that the storm, which caused the blockade was “the most extensive the company experienced on this division.” Between Yale-Lytton, a “succession of slides, which were coming on top of the 3 ft. (90 cm) of snow already on the track, piled up in many places to a depth of 40 ft. (12 m).”

On October 13, 20 in. (50 cm) of snow was reported at Yale. Due to “a bad mudslide” between Yale-North Bend, the westbound train was held at North Bend. About 150 travelers delayed at North Bend were sleeping in the trains or being boarded at the CPR hotel. Many more were waiting in Kamloops and other points along the line. On the evening of November 17, 4 ft. (1.2 m) of snow was reported “on the level” at North Bend. On the morning of November 20, still 11 mi. (17.6 km) of snow had to be cleared off the tracks west of North Bend, including several slides. In some places the snow was 3 ft. deep and frozen solid. Between North Bend-Spuzzum, mudslides damaged the rail line. Snow also blocked the railway in the mountains west of Banff. On November 20 at 1:30 a.m., the first train arrived from the east with a portion of the delayed mail of the preceding 10 days.

On the mainland, telegraphic communications were also cut. Messages for the east had to be sent round by way of San Francisco. During a storm on November 13, the four-masted schooner *Puritan* was swept on Bonilla Point on the west coast of Vancouver Island. Though the ship was a total wreck, the crew of about 10-12 men escaped. They were observed with a small boat on the beach by the American tug *Richard Holyoke*. The weather was too rough to make a landing.

*1) The loss of the Niagara Canyon trestle closed the E&N for 11 weeks, and resulted in significant revenue loss and temporary layoffs (Parkin 1993).

*2) The bridge at Milne’s was a 300-ft. (90 m) timber structure built some nine years previous at a cost of \$2,500. Muir Creek bridge had been only put in the previous year at “heavy cost” (*The Daily Columbian*, November 16, 1896).

April 20, 1897

Source: *The Daily News-Advertiser*, April 21, 1897.

Details: On April 20 at 2:30 a.m., a debris avalanche killed seven members of a work gang on the Red Mountain Railway 8 mi. (12.8 km) “down the line” from Rossland. The victims were asleep in a tent pitched on a gentle slope when the slide completely covered them. Although there was some snow in the slide, the main mass consisted of rocks, dirt and trees.

Killed were foreman Chas. Olsen and labourers Thomas King, Dan McCafferty, Pat Desmond, Robt. McWinnery and John Coulon, while Max Englehardt was fatally wounded. One of the survivors, awakened by the noise, took it to have been caused by a car off the track. One survivor was found pinned down by a tree, practically uninjured. Another one was saved by a kitchen table, under which he had been asleep.

September 19, 1897

Source: *Victoria Daily Times*, September 27, 1897; *Daily Colonist*, September 24 and 27, 1897.

Details: On September 19 (?) at about 2 p.m., an Ashcroft resident noticed a “great volume of dust” rising from the riverbank 1 mi. (1.6 km) below town on the opposite bank of the river. An “enormous mass of earth” had sunk down many feet. The area involved seemed to be 150 ac. (60 ha) or more. The top of the middle section of the slide was higher than the ground immediately behind. Domes and pyramids formed “resembling the ones seen in the Dakota Bad Lands. A Native Indian burying ground occupied one side of the moving slide. On September 21, bodies were removed and taken to solid ground and buried again.

For a couple of days, the slide appeared to be stationary and there seemed little danger of the entire mass suddenly sliding down into the river bed and temporarily damming the water. The slide gradually pushed

its way into the Thompson River, being washed away by the current. Acting as a wedge, it evidently had pushed the entire riverbank for nearly 0.5 mi. (800 m) into the stream.

On September 22 at 1 a.m. the “big gravel mountain” started to move. The slide awoke sleeping Ashcroft residents with “loud thunder-like rumblings.” A large portion of “pine clad mountain” broke off and started with a “rumble like thunder” towards the Thompson River. The section first in motion was about 0.5 mi.² (1.3 km²) and some 400 or 500 ft. (120-150 m) high. The motion was slow at first but increased as the immense strip of land advanced towards the river. Within two hours the Thompson River was said to have risen 9 in. (22.5 cm) (*Daily Colonist*, September 24 and 27, 1897).

Victoria Daily Times reported, “The character of the slide seems to be the same as on the opposite side of the river where so much trouble has been had by the CPR in keeping their track in shape. The present slide can in no way be attributed to the use of water as there are no streams within a long distance and no irrigation is being done within several miles (*Victoria Daily Times*, September 27, 1897).

January 31, 1899

Source: *The Revelstoke Herald*, February 1, 1899; *Daily Columbian*, January 31, February 1, 1899; Jon Whelan In: *Mountain Heritage Magazine*, Vol. 3 No. 4, winter 2000-2001 (pp.14-15); Environment Canada 1986.

Details: On January 31 at 4 p.m., a snowslide struck a railway station/boarding house Rogers Pass in the nearby Selkirk Mountains. *The Revelstoke Herald* reported: “A terrible accident... seven people killed, one seriously injured... A snowslide sweeps away the station and round house and buries eight people alive... All the bodies have been found except one...” (*The Revelstoke Herald*, February 1, 1899). Killed inside the station were the day operator, his wife and two children, a Chinese cook and the night operator, asleep upstairs. A wiper, who was inside the Engine house, died when the tender of engine 409 overturned and crushed him. As tragic as these deaths were, the death toll could have been much higher. When this avalanche came down, most employees were west of the Roger Pass clearing the snow and debris that covered the tracks as a result of earlier snowslides (Whelan 2000).

The accident at the isolated station approximately 2 mi. (3.2 km) from the summit of Rogers Pass (Snowshed # 15) also seriously injured two people and was the worst snowslide accident on the CPR line since 1887. Two boarding cars were overturned and rolled numerous times. Chinese labourers inside were tumbled around but only suffered minor injuries. It also cut telegraph communications and the curtailment of press dispatches at the *Daily Columbian*. Throughout the day, slides caused trouble on the line east of Glacier and a number of snow sheds suffered damage. Both the Atlantic and Pacific expresses were held at Donald and Glacier until the track was cleared. *1)

*1) As a result of the slide, all station, yard and locomotive facilities were moved to a safer location, about 1 mi. (1.6 km) to the east. Construction of the new facilities was started as soon as conditions permitted and were in use by the fall of 1899. This site has proven to be in an avalanche free area. The present commercial and government maintenance complex at Rogers Pass is located on this same site (Whelan 2000).

July 10-13, 1899

(Spring runoff/flooding).

Source: *The Daily Columbian*, July 14, 1899; *The Vancouver World*, July 11, 1916.

Details: On July 10 and 11, the Fraser River at Quesnel rose 3 and 2 in. (7.5 and 5 cm), respectively. On July 9 and 12 the river level remained constant. On July 10 (?), the river at Lillooet rose 3 in. again approaching the high water mark. On July 9, 11 and 12 water levels at Lillooet remained constant.

Between July 12-13, the Fraser River at Sumas rose 1 in. (2.5 cm) in 48 hours reaching 34 ft. 1 in. (10.23 m). On July 13, the Fraser River peaked at the Mission gauge at 19 ft. 1 in. (5.73 m).

December 31, 1899

Source: Stanton 1898; Evans 1984; Evans 1986a; Clague and Evans 1994.

Details: On December 31, a landslide occurred near Spences Bridge, damming the Thompson River with quaternary sediments (Stanton 1898; Evans 1984; Evans 1968a; Clague and Evans 1994).

March 9-11, 1900

Source: *The Daily Columbian*, March 10, 11, 12 and 13, 1900; Evans, unpublished data.

Details: On March 9-10, exceptionally heavy and continuous rain caused considerable damage and inconvenience in New Westminster. During the rains which lasted 36 hours, close to 5 in. (125 mm) fell in a

24-hour period alone. Overflow from congested surface drains cut out channels through roadbeds. Though basements in the area flooded, the threatened washout opposite the Library building did not occur. Some damage occurred in West End, a chronic trouble spot, near the old slaughterhouse ravine on 6th Avenue. A similar washout occurred at Sapperton.

In Vancouver, basements and ground floors of several of the larger business blocks flooded with water from overflowing street drains. Considerable damage was done to stock. Railway and road traffic was much impeded in the district. On March 9, a serious washout between Vancouver-Westminster Junction delayed the eastbound CPR Express for several hours. About a mile (1.6 km) was reportedly buried by a mudslide. Trains arriving from the east had to stop frequently in the mountain sections to avoid collision with boulders on the track loosened by the excessive rain. Above Port Haney in the troublesome cuts in Maple Ridge, the embankment was said to be running down onto the track "like thick soup." Consequently, on March 10 the trains were running late. Country roads also sustained damage particularly on flats. In many places, the corduroy sections were afloat. Roads crossing the Serpentine River valley were all flooded. On the Coast Meridian Road water was 5 ft. (1.5 m) deep.

On March 11 in the Kaslo area, a landslide at Sandon demolished six houses. One man was missing and presumed buried in the rubble. Others were injured, three of whom seriously. According to Evans (unpublished data), the rockslides caused four deaths.

The GNR rail line was cut by a rockslide near Fairhaven, Wash. On March 12, traffic was still interrupted on this line.

June 25-27, 1900

(Spring runoff/flooding).

Source: *Victoria Daily Colonist*, June 26, 28 and 29; July 7, 1900; *The Province*, June 26, 27, 28 and 29; July 2, 1900; *The Vancouver World*, July 11, 1916.

Details: Following two weeks of heavy rain "in the lower country," sudden warm weather and recent rain melting snow caused the Fraser River and its tributaries from the delta to Ashcroft to rise. *The Westminster Columbian* commented that if the Fraser River flood would come at all, it would be a partial one and of short duration. The snowpack was less than that during the winter of 1893-94. Apart from a few farmers who lost portions of their crops, the flooding did no serious damage. Some damage was caused in the Chilliwack Valley when the Fraser River backed up creeks and sloughs flooding low-lying areas of protected land. River levels reached marks higher than any since 1894.

On June 24 at Westham Island, George London lost 1.5 ac. (0.6 ha) situated outside the dike. On June 28, the Fraser River at Soda Creek reported its highest water, which dropped 1 ft. (30 cm) the next day. On June 25, with slightly cooler weather, there was little or no change in the river. Around June 25 at Lillooet, some small trail bridges washed away and some lower lying areas of the Fraser River were partially inundated. One farmer reported 50 ac. (20 ha) of wheat under water. On June 26, the Fraser River at the Thompson River junction at Lillooet was higher than it had been in a number of years. At the junction it reached a point 44 ft. (13.2 m) above the low water mark and passed the highest point reached in 1899. On the road from Lillooet to Bridge River mines and on the Golden Cache Road all the bridges were down. Hot weather caused the Fraser River to rise rapidly from the delta up to Ashcroft. At Ashcroft, the waters of the Thompson also rose rapidly. During the previous few days, Harrison Lake rose several feet. At the lower end of the lake, the St. Alice Hotel, headquarters of the well-known Harrison Hot Springs, was practically an island. On June 25, the last stage just made it out crossing the bridge over the "slough" on the road at the hotel property for the 4 mi. (6.4 km) trip to Harrison station on the CPR line.

On June 26, the steamer *Robert Duinsmuir* reported the Fraser River practically filled with driftwood. Below New Westminster, the vessel had a hard time steering clear of floating logs and snags. Even far out in the gulf the current was very strong and for miles out discoloured by the muddy water from the Fraser River. According to the officers of the *Duinsmuir*, the first week of salmon fishing would be seriously interfered with unless the Fraser River would rapidly subside. On June 27, the Fraser River peaked at the Mission gauge at 21 ft. 1 in. (6.33 m). With slightly cooler weather the Fraser River started to drop at Lillooet and at Yale it dropped 1 ft. (30 cm) in 24 hours, while at Soda Creek it showed no change.

Warm weather caused the Squamish valley to flood with 5-6 ft. (1.5-1.8 m) of water. Several small buildings were washed away and some settlers were forced to live almost entirely in the upper parts of their homes. Damage was estimated at \$40-50,000. Dewdney was completely submerged.

The railroad was flooded from Revelstoke to Arrowhead and floodwaters destroyed much of the track.

May 8, 1902

(Fatal debris slide).

Source: *The Vancouver Province*, May 9, 1902.

Details: On May 8, a debris slide consisting of rock, earth and ice came down near Kaslo in the Rambler McGuigan basin. It destroyed a packing camp and caused the loss of a 20-mule packtrain with mine supplies. The packing camp was overwhelmed by a debris avalanche resulting in the death of one man and 20 mules that were in the process of being unloaded. The men took refuge in some old mine workings whilst the blacksmith's shop, cook tent, and sleeping camp were all buried under tons of rock, earth, and shreds of a small glacier. Total loss amounted to \$4,000 in property destroyed and \$2,000 worth of lost supplies (*The Vancouver Province*, May 9, 1902).

February 28, 1903

Source: Evans, unpublished data.

Details: On February 28, a rockfall near Arrowhead caused displacement waves in Upper Arrowhead Lake. The waves damaged the piling on the CPR wharf at Arrowhead (Evans, unpublished data).

April 1, 1903

Source: Evans, unpublished data.

Details: On April 1, a slide (?) near Rossland destroyed a section of Le Roi Avenue and the Washington Street viaduct on the CPR line. The two slips caused by excessive seepage occurred at 3 a.m. and noon.

June 13-17, 1903

(Spring runoff/flooding).

Source: *The Vancouver Daily Province*, June 15, 16 and 17, 1903; *The Vancouver World*, July 11, 1916.

Details: On June 13, the Fraser River came up 1 ft. (30 cm) and continued to rise. Nearly all the low-lying undyked land along the banks was under water. On June 14, the Pitt Meadows dike in No. 2 District broke. The flooded section was inside the CPR track and over a thousand ac. (400 ha) was under water. A young man of Upper Sumas drowned. The Fraser River bridge works suffered serious damage. The operations had been suspended several days previous due to high water. The false work around No. 3 pier, including the large wharf on which the men worked, was lifted from its position and carried downstream. Temporary piles standing in the river "swayed from side to side like small sticks." The water reached its highest point at full tide early in the forenoon. On June 15 at 8 a.m., the Fraser River reached the 34 ft. 9-in. mark, after rising 3 in. (7.5 cm) during the previous 24 hours. During the same period the Fraser River rose at Soda Creek and Quesnel 9 in. (22.5 cm) and 5 in. (12.5 cm), respectively.

The steamer *Hamlin* was sent from New Westminster to assist in the removal of the settlers from Nicomen Island, which was partly under water. The previous week a large part of the stock had been driven off the island over the two bridges to the mainland. The *Hamlin* removed over 400 head of stock to the mainland. On June 16, due to a still rising Fraser River sawmills started to shut down because of the high water. The Brunette sawmills at New Westminster shut down and all lumber was removed off their wharves to higher ground. Other mills were suffering from the high water. Royal City [New Westminster] mills was only able to run part of the day or during low tide. Lower tides somewhat relieved the situation. The highest tide occurred on June 11, but the tides were now falling several inches each day. On June 16, the Fraser River rose 5 in. (12.5 cm) at Ashcroft in 24 hours and 3 in. (7.5 cm) in 12 hours at Yale. Above Pitt Meadows hundreds of acres were flooded and east of Mission City people had to move household effects to higher ground after water invaded their lower floors. Between Pitt Meadows to above Harrison, farmlands adjacent to the river were inundated in many places. Harrison River was reported raging and houses there afloat.

Around June 17 with cooler weather, the river levels started falling. Though at 8 a.m. the Fraser River at Yale still rose 2 in. (5 cm) in 12 hours, it dropped 1 in. (2.5 cm) at Quesnel and was at a standstill at Soda Creek. On June 18, the Fraser River peaked at the Mission gauge at 22 ft. 6 in. (6.75 m) (*The Vancouver World*).

April 15-20, 1904

(Flash flood).

Source: *The Vancouver Daily Province*, April 16, 1904; *Victoria Daily Colonist*, April 16, 1904.

Details: On April 15, Trail Creek rose suddenly, by nightfall reaching the highest level known. Six small buildings washed away and several bridges were damaged. Though by early April 16, the creek had receded

considerably, orchards and gardens along the creek were damaged.

Warm weather since early April caused many snowslides in the mountains west of Revelstoke. Late on April 15 following 10 days of warm weather, a large slide on the tracks near Revelstoke disrupted train traffic. Mails arrived late at Vancouver and passengers came via the Crows Nest Pass branch. On April 16 by 2 p.m., the track at Notch Hill and all slides east of Revelstoke were cleared and the bridge at the Loop reopened for traffic.

Heavy snow caused the Read Mountain railway between Rossland-Northport and other lines to be blocked by snow slides. Flooding was reported from the Kootenay country. The unprecedented heavy snowfall of the previous winter created the worst conditions in the mountains in the history of the railroad. The slides caused damage and interruption of rail traffic. Victoria received no mail for four days.

August 13, 1905

Source: *The Vancouver Daily Province*, August 14, 15 and 16, 1905; *Na-na-kwa*, No. 29, October 1905; *Times Colonist*, September 17, 1980; Drysdale 1914; Evans 1992 (p. 78); B.C. Ministry of Energy, Mines and Petroleum Resources 1993; Clague and Evans 1994; Evans, unpublished data.

Details: On August 13 at 3:30 p.m., a landslide occurred about 1 mi. (1.6 km) south of Spences Bridge a short distance below the town on the west side of the valley. A large mass consisting mainly of Pleistocene glaciolacustrine silt suddenly broke away from the valley wall at the base of Arthur's Seat Mountain and descended at great velocity to Thompson River, filling the valley bottom from bank to bank. (Evans 1992).

The slide material formed a dam causing a large wave 10-15 ft. (3-4.5 m) high to sweep up the river against the current, carrying all before it. The slide, which came down on the opposite side of the river from Spences Bridge and subsequent "tidal" wave wiped out an Indian village of about 100 Salish Indians on the Thompson River. The wave overwhelmed the Rancherie (Indian ranch) on the flat below the town of Spences Bridge. The wave destroyed everything in its path including an Anglican Church. The slide came down about 10 minutes after most of the village's Indians had left the church. Had it occurred 10 minutes earlier, the death toll would have been much larger. "... All would undoubtedly have been killed or drowned," (*The Vancouver Daily Province*).

The houses were swept away and the residents had no warning to escape (*Na-na-kwa*). A ferry used to cross the river was destroyed. The church was torn from its foundation and its roof carried for 200 yd. (180 m). The altar apparently remained intact. A gravestone was carried 200 yd. from its original location and by chance halted upright on a pile of sagebrush. (*Times Colonist*, September 17, 1980). A horse tied to a hitching post at the rancherie had its tie rope broken, and was carried upstream 300 yd. (270 m). It was finally thrown ashore on the northern bank of the river, where it managed to get its forefeet in the gravel bank and hold on until the waters receded (*The Vancouver Daily Province*, August 15, 1905; Drysdale 1914).

The wave swept up the river more than 2 mi. (3.2 km). "... for a distance of fully a quarter of a mile (the Thompson River) was lifted from the bed of the stream and hurled against the Indian rancherie, the waters rebounded from the high bank behind the flat on which stood the Indian houses, and swept in a southeasterly direction along the flat, carrying away everything. At the eastern end of the flat the bank lowered and the waters rushed over the Indian graveyard, uprooting the fence around the family plots and hurling gravestones around..." (*The Vancouver Daily Province*, August 15, 1905). In half an hour the swift flowing river was converted into a lake, widening from 0.25-1 mi. (400-1,600 m). The water rose between 70-80 ft. (21-24 m). After the first wave it came up almost 1 ft. (30 cm) a minute. At one time it was 5 ft. (1.5 m) over the railway tracks at the opposite side of the river. The river was completely dammed for four or five hours. By 8 p.m., it had receded to about halfway up the bank.

It is uncertain how many people died in the slide and the flooding that occurred after the river was blocked. Ten Indians were first reported killed and another 13 injured. The *Vancouver Province* reported the day after that 15 had died, and a brief account written 49 years later said 14. Five Indians were buried alive in the slide (Drysdale 1914) and three men and a woman out fishing were drowned. A later report in *Na-na-kwa* put the total number of fatalities at 18. The B.C. Ministry of Energy, Mines and Petroleum Resources (1993) also puts the death toll at 18. A historic sites plaque by the Trans-Canada Highway puts the toll at five in the slide and 13 in the flood. (*Times Colonist*, September 17, 1980). Probably amongst the first to be killed was around 90-year old Chief Lillooet. The bodies of three men and a woman, who were out fishing in a boat when caught by the wave, were probably never found.

The antecedent conditions are not clearly known. However, unpublished notes by H.J. Cambie, consulting engineer to the CPR, indicate that previous landslides had occurred at the site in 1880 and 1899. *1) These slides and the 1905 slide were thought by Cambie to be caused by irrigation on the bench behind

the landslide (Evans 1992 p. 78). The loose sands underlying the high gravel bank had been washed out gradually as a result of irrigation carried out on the top of the bank. It was thought that water from the irrigation ditches gradually worked out the loose lower sands and the heavier top material then slid away (*The Vancouver Daily Province*, August 15, 1905).

*1) Within recent years (prior to 1912), three slides occurred in almost the same place, but the most disastrous slide was the one that occurred on August 13, 1905. A few miles north of Drynock, the railway traverses a much older landslide composed of older volcanic and sedimentary materials (Drysdale 1914).

September 15-16, 1905

Source: *The Daily Colonist*, September 16, 1905; Eisbacher and Clague 1981.

Details: On September 15 and 16, an ocean storm moved eastward across the province causing rainfall along the straits and adjacent districts. The rainstorm with a maximum daily precipitation of 69 mm in the downtown Vancouver area caused landslides in the Vancouver region (Eisbacher and Clague 1981). The rain put a temporary stop to the lawn tennis tournament. Several ranchers in Delta suffered losses to the grain exposed to the heavy rains. On September 16 in Victoria, a severe electric storm in the afternoon knocked a telephone connection on Third Avenue and fused a power line on the corner of Third Avenue/Third Street.

October 10-13, 1905

Source: *The Daily Columbian*, October 11, 13 and 14, 1905; *Victoria Daily Colonist*, October 13, 1905.

Details: During the second week of October, Victoria experienced the "heaviest rain and windstorm in years." On October 11, the barometer fell and rain became general over Vancouver Island, the Lower mainland and west of the Cascades.

At Comox, flooding caused minor damage to farms. Between Courtenay-Comox, where it crosses the big slough, 30 ft. (9 m) of government dike gave way. The undermining of the embankment close to the floodgates caused the break. Floodwaters did considerable damage to the adjoining property and halted traffic on the lower road between Courtenay-Comox for some time. Damage was estimated well into the thousands of dollars.

September 5-9, 1906

Source: *The Daily Columbian*, September 7, 8, 10, 11, 12 and 13, 1906; *The Vancouver Daily Province*, September 6 and 10, 1906; Jackson et al. 1985 (pp. 4-11); B.C. Ministry of Environment 1975; Ward and Skermer 1992 (p. 356).

Details: On September 6, one of the earliest documented floods in Vancouver's history was described as "the worst in 10 years" with "the city road under 3 ft. (90 cm) of water for hundreds of feet." Precipitation records for Vancouver PMO station showed a peak rainfall of 79.5 mm for the 24-hour period preceding the flood (Ward and Skermer 1992).

Overnight September 5-6, rainfall on Vancouver Island at points between Jordan River-Port Renfrew was much heavier than on the Lower Mainland. During the excessive rain one live was lost. At Otter Point, a Native Indian drowned while the second occupant of the canoe washed onto one of the BC Packers Assoc. traps nearby. Near Port Renfrew, Gordon River rose to a height of 10 ft. (3 m) overflowing its banks.

On September 6 at 10 a.m., the Capilano River was in full flood and higher than it had been in years. A large amount of debris poured down the Capilano River into First Narrows, endangering shipping. At the Narrows, the water was reported literally choked with floating debris. At noon before a strong ebb tide, much was carried into English Bay, but drifted back into the harbour during the early afternoon. Seven feet (2.1 m) of water poured over the city waterworks dam. The flat above the dam where a new pipe was being laid was under several feet of water. The rising water drove the workmen from their camps and teams and camp supplies had to be rushed to higher ground. Immediately below the dam, the city road was under 3 ft. (90 cm) of water and impassable. Along the line of this road from the canyon of the Capilano to the dam numerous streams run into the river. Several bridges on the side streams were carried away. The rain, which continued to fall all day on September 7, did not seem to have done more damage at the Capilano water works plant. The Capilano River was receding and *The Daily Columbian* called damage done to the water system "trifling."

Near Stave Lake, a large area was submerged in several feet of water and roads and bridges were washed away. Hon. Richard McBride and party, who had been camping there for a week, took refuge in Cyr's logging camp. Reports of destruction of dams and works at Stave Lake being constructed by Stave Lake Power Co. were probably unfounded, as the company had not yet proceeded with construction of dams.

The Civic Engineering department received a rush of complaints of the blocking of surface drains. One of the worst occurred near Ramsay's candy factory in the East-end. Other complaints came in from the Melbourne Hotel, the Strand, the Mining Exchange and other points in the business part. In the West-end the drains of several private parties had to be attended to.

Debris in high water washed out all fences at the Bon Accord hatchery at the head of Pitt River and in 7-Mile Creek. All fish corralled there went free. Water in the creek was 8 ft. (2.4 m) above normal. BCER Co.'s dam at Coquitlam Lake was leaking at the bottom. The dam erected by the Vancouver Power Co. at the outlet of Coquitlam Lake was holding back a body of water 7 mi. (11.2 km) long and 1-2 mi. (1.6-3.2 km) wide and many feet deep, threatened the settlers in Coquitlam Valley.

On September 8, there was 12 ft. (3.6 m) of water on the Squamish road. Communications with the ranching section of the Squamish and Britannia valleys were cut off by high water. The greatest damage may have occurred to the hop ranches 5-7 mi. (8-11.2 km) up the Squamish Valley from the wharf on Howe Sound. High waters washed away a small bridge crossing the east mouth of the Squamish River near Madill's Ranch. The bridge about 2 mi. (3.2 km) from the mouth of the stream was torn from its anchorage and swept down into the sound. On September 8, it was seen floating in the vicinity of Britannia. In order to carry this bridge away, the water had to rise at least 10 ft. (3 m) above its normal level. The relatively new bridge had been built only a short time previous. The upper bridge was slightly damaged at one end. The bridge over the Cheakamus River washed away and the road was cut in many places. On September 10, the river went down considerably. As the water had come in very quietly, very few hop poles washed away.

On September 10, a flood on Britannia Creek caused extensive damage in the new mining settlement. Due to a logjam in its channel, the creek shifted its course at the apex of its fan. The pile-up of stumps and trees may have been a consequence of the development of the extensive mine property (Jackson et al 1985). At Britannia Beach, the water roared down the valley. At the upper end of the flat near some Chinese shacks, the creek was blocked by debris and changed its course striking down the centre of the flat. In order that the creek might be returned to its usual course, the Britannia Company had a gang of men at work on September 9, blasting the obstruction in the creek, causing it to turn over the flat when the rush of water came. At Britannia Beach, floodwaters tore down the assayer's house and power plant (B.C. Ministry of Environment 1975). The water tore right through the house. Its resident escaped uninjured, but lost all possessions. Boulders were left piled 6 ft. (1.8 m) high in front of the house. Some of the rocks were reported to weigh at least 1.5 tons. At the time the creek broke its bank, some accident happened to the electrical plant of the camp. On the morning of September 9, the hotel at Britannia was surrounded by 4 ft. (1.2 m) of water. One employee of the mining camp was swept away by the torrent, only saved by a picket fence near the beach.

Westbound train No. 97 was delayed for 12 hours by a small slide a short distance east of Rogers Pass and derailed.

November 1, 1906

(Rain-on-snow).

Source: *The Vancouver Province*, November 1, 1906.

Details: Late October, Chinook winds and heavy rain on a big snowfall in the mountains of the Tulameen and Similkameen watersheds caused a very heavy flood on the Similkameen River. Floodwaters broke the boom at Hedley Lumber Co., sweeping away 2 million ft.³ (56,600 m³) of logs. Of the entire cut only 500,000 ft.³ (14,150 m³) in the chute was saved. The bridge at Granite Creek was almost carried away by the unusual fall flood in the Similkameen River. One of the piers was undermined and the entire filling scoured out. It was only the efforts of firemen stationed on the piers with pike poles pushing off trees and logs that saved the bridge. The flood was described as the "worst in seven years." Otter and Hedley flats were flooded. Hedley residents enjoying fine weather and unaware of the storm in the mountains feared a cloudburst had occurred and that Hedley would be flooded out.

November 10-14, 1906

(Rain-on-snow).

Source: *Victoria Daily Times*, November 19, 1906; *The Daily Colonist*, November 18, 1906; *The Daily Province*, November 16, 1906; Evans, unpublished data.

Details: On November 10, a debris flow in Knight Inlet killed two loggers. The debris flow was released by the breach of a slide dam in a creek above the victims' cabin (Evans, unpublished data).

Between November 12-14, "rainstorms of unprecedented severity" along the west coast of Vancouver

Island caused rivers and creeks to swell. On November 14, Chinook winds melting snow in the mountains caused the Vedder River to rise to “about as high as ever.” The Cultus Creek bridge, the only bridge across the Vedder River, was weakened by the floodwater. On November with the advance of colder weather the rain ceased and the danger of flooding passed.

February 19, 1907

Source: Evans, unpublished data.

Details: On February 19, a rockfall came down on the Seton Lake Hatchery near Lillooet. Two houses and the Seton Lake sawmill were destroyed and ten weirs and pools of the salmon hatchery were damaged (Evans, unpublished data).

March 11, 1908

(Subaqueous slope failure).

Source: Evans, unpublished data.

Details: On March 11, a subaqueous landslide and displacement waves in Shelter Bay, Upper Arrow Lake destroyed over 8 km of logging road. Some 2.5 ha of land disappeared into the lake. The wave generated by the landslide broke on the beach at Galena Bay.

June 16-17, 1908

(Spring runoff/flooding).

Source: *The Daily News*, June 14, 16 and 17, 1908; *The Vancouver World*, July 11, 1916.

Details: On June 16, after a two-day cool spell, hot weather and melting of the unusual snow pack caused the Fraser River to rise again considerably. Bottomlands flooded causing considerable damage to the hay crop being harvested. In some places crops such as oats were under 2 ft. (60 cm) of water. Most damage was done at Nicomen Island, where the dam (dyke) burst and around Mission. It was the dairy farmers that suffered most. Cattle had to be moved to higher pastures and river steamers encountered difficulties making landings. Butter prices rose due to the business being at a standstill. The river full of driftwood inconvenienced fishermen just before the opening of the season. On June 15, the Fraser River peaked at the Mission gauge at 20 ft. (6 m). By June 17, the floods in the Fraser Valley were subsiding.

Though *The Daily News* reports the damage to property in the Fraser Valley as light, *The Seattle Times* describes it as follows, “15,000 acres of farm and pasture land are overflowed, crops worth thousands of dollars are ruined and several scores of ranchers have been driven to seek shelter on high land by the flooding of Sumas Prairie, just across the line in British Columbia. The water is still rising and the slightly higher lands on the American side are now in danger of submersion.”

July 13-15, 1908

(Spring runoff/flooding?).

Source: *Victoria Daily Times*, July 15, 1908; *The Daily Columbian*, July 14 and 15, 1908.

Details: On July 13, a New Westminster city employee lost his life after falling from some piling of the Lulu Island bridge. The victim had been engaged in shoving driftwood from the piers with a pike pole. The strong current carried the man’s body away.

On July 14 at Sumas Prairie, some 30,000 ac. (12,000 ha) were inundated. Houses in low lands were flooded to the second story windows and garden crops were ruined. Cattle had to be driven onto higher ground. A month earlier, the same area had been hit by less severe flooding, which caused less damage to the ranchers.

By July 15, the Fraser River was again flooding portions of low-lying land. Continued hot weather during the previous two weeks caused the rise. The river reached levels within 10 in. (25 cm) of the highest water reached earlier that year. With cooler weather On July 15, the Fraser River dropped slightly.

October 24-31, 1908

Source: *Victoria Daily Colonist*, October 31, 1908; *The Daily Columbian*, October 31, 1908; *The Daily News*, October 30 and 31, 1908; *The Empire*, November 14, 1908.

Details: For the week ending October 31, Vancouver recorded 7.53 in. (191.3 mm) of rain. On October 29 at 1 p.m., the flood still raging on the Capilano River reached its height. At the time, the creek was flowing over the floor of the bridge at the intake pool. A crest of 7 ft. (2.1 m) was noted at the dam where the old intake was located.

Flooding caused a considerable amount of damage in the business part of Vancouver. Basements flooded in the vicinity of Powell and Alexander streets, near the intersection of Columbia Avenue and Carall Street. Basements of the Grand Trunk Pacific and Europe hotels and Knowles & Macaulay's warehouse flooded 1.5 ft. (45 cm) and more. The same trouble was reported at the intersection of Hawks Avenue and Hastings Street. Sections of the new wood block paving being laid on Pender Street between Burrard-Thurlow streets lifted and floated by the flood of water.

On October 28, the trains were delayed for several hours due to a very heavy snowstorm near Fernie. Due to a snowslide on the track, engine 501 while running to Michel, derailed and flipped over after passing McDougall's spur at a rate of 25 mph (40 km/h).

On October 31, a section man employed by the BC Electric Company (BCER) on the cutting of a new grade beyond Collingwood, was killed by a landslide that came down there in the early afternoon.

November 1-4, 1908

Source: *The Chilliwack Progress*, November 11, 1908; Eisbacher and Clague 1981.

Details: A rainstorm with a maximum daily precipitation of 64 mm in the downtown Vancouver area caused landslides in the Vancouver region (Eisbacher and Clague 1981).

Late on November 7, due to a washout on the CPR rail line between Ruskin-Mission Junction train traffic was interrupted. The train scheduled to leave for Seattle early on November 10 was cancelled and the transcontinental was held up at the other side of the break.

November 16-21, 1908

Source: *The Daily Columbian*, November 17 and 21, 1908.

Details: Rainfalls caused "phenomenally" high water flooding many basements in Vancouver. At Campbell River, freshets washed out the booming grounds of International Lumber Co. and seven booms were lost. At least half the logs lost in the washout were recovered.

December 12, 1908

(Storm surge flooding).

Source: *The Vancouver Daily Province*, December 14, 1908.

Details: On the morning of December 12, southern gales up to the velocity of a hurricane drove the sea over the dikes lining the Squamish River for about 1 mi. (1.6 km). According to residents having lived at the lower Squamish Valley, the flooding tide was "a full 4 ft. (1.2 m) higher than the highest recorded since the settlement of the valley." The dikes were reported broken in several spots. As in most places the water simply poured over the tops of the embankments, no great amount of damage was done other than many drift logs that were deposited in the farmer's fields.

January 15, 1909

Source: *The Daily Province*, January 16, 1909; *The Vancouver Sun*, August 6, 1999.

Details: On January 15 in a blinding snowstorm, a train hit a snowslide on the tracks. Two locomotives and six railway cars went 100 ft. (30 m) down the embankment to the brink of the Fraser River. The two engineers on the train, James Foster and Clifford Carscadden died in the accident. *1)

*1) Foster had survived an earlier train wreck, and several days earlier was reported to have said: "If I get mixed up in another accident, I will not jump, no matter what the result. The railway company looks to me to run the engine and protect the passengers and I will stick to my post" (*The Daily Province*).

October 1909

Source: Shelford and Shelford 1988 (p. 69).

Details: In October British Columbia experienced "two of the wettest days on record." One morning, a debris slide came down near a logging camp on Powell Lake, approximately 90 mi. (144 km) from Vancouver. The camp was at the mouth of a small creek at this point from which the camp's water supply was piped. The area around the creek had been logged off and the ground was strewn with short chunks of logs, treetops, and other debris. The runoff water gradually formed a debris jam. A large head of water built up behind the dam until it burst. Though the huge mass of logs and water rushed down the creek bed towards the camp, there was no damage or casualties. The men ran along the different floats to stay out of way of the slide and some even jumped into the lake. The only thing that saved the camp was the fact that the bed of the creek opened out as it

got to the lake, thus greatly reducing the pressure behind the debris. The rush of water completely cleaned out the creek bed. A few big cedar stumps only stopped the huge pile of debris about 10 ft. (3 m) from the camp office and quite close to the main camp itself. The only real inconvenience caused by the slide was that each day going to work, the loggers had to climb over the huge pile of debris (Shelford and Shelford 1988).

November 27-30, 1909

Source: *The Chilliwack Progress*, December 1 and 8, 1909; *The (Victoria) Daily Colonist*, November 30; December 1, 1909; *The Vancouver Daily Province*, November 28, 29 and 30; December 1, 1909; Eisbacher 1983 (p. 11); Eisbacher and Clague 1981; Bowman 1992.

Details: At the end of November, the New Westminster district experienced the “most severe rainstorm for over 25 years” with nearly 7 in. (177.8 mm) of rain falling in 48 hours. In 24 hours ending November 28 at 5 p.m., almost 4.5 in. (111 mm) of rain fell in the Vancouver area. *1) On November 28, a “cloudburst” dropped 4.5 in. (114.3 mm) of rain. In Vancouver, a large section of Broadway between Heather-Bridge (now Cambie) streets washed away. A huge amount of material was literally sluiced away into False Creek. Heather Street Creek did serious damage on 9th Avenue on the night of November 27-28. On the afternoon of November 29, it broke through the 9th Avenue embankment at Heather Street and worked its way to False Creek. The flood backed up at 9th Avenue, in its downward course wrecked the 8th Avenue bridge over the creek. At 7th Avenue, where several buildings were feared to be swept away the crest passed without doing damage. The occupants of several houses along the edge of the ravine were asked to evacuate. One residence at 8th and Heather had a portion of its foundations swept away. Temporary repairs included building a trestle 52 ft. (15.6 m) wide (long?) over the cut along 9th Avenue. The cave in measured a width of 30 ft. (9 m) and a depth of 20 ft. (6 m). The city engineer stated that his department had been working for some time on a large drain down Laurel Street, which would take some of the water now coming down Heather Street. This drain had so far been extended only as far as 10th Avenue, and had been of no service during the emergency on November 27-28 (*The Vancouver Daily Province*, November 30, 1909).

On November 27 and 28, flooding caused considerable damage in all parts of the district. Near Seymour Creek, extensive landslides occurred along the pipeline road. On November 28, a break occurred in the Seymour Creek system, which affected the water supply in every part of Vancouver’s higher levels, including the district south of Ninth Avenue and the higher part of Grandview. The residents of Hastings who take city water were also cut off. The break occurred in the shore connections of the submerged main on the north side of the inlet. The creek scoured out the bed at its mouth and undermined the shore mains for a considerable distance. Four lengths of pipe were suspended for a time when they broke down, completely stopping the water supply from Seymour to the city. Efforts to repair the damage were hampered by the flats at the mouth of the Seymour being flooded with 4 ft. (1.2 m) of water.

Near the Crown bridge, the Capilano River washed out the pipeline road covering a length of 1,000 ft. (300 m). Crown Creek, a tributary of Capilano Creek, swept away the bridge and eroded the road. The pipeline road was badly washed at numerous points and repairs would take considerable time. Further down the road was covered with “a small mountain of boulders and gravel” for some distance. The previous year, this road had been taken over by the North Vancouver municipality. Just at the canyon, a large logjam formed which caused the road to flood. The jam was later removed without much difficulty. Above the intake, some large landslides occurred. One slide on the banks of the creek about 0.5 mi. (800 m) above the intake was about 0.25 mi. (400 m) long. The landslides above the intake were the cause of the muddy water on November 28 and 29. The flood on the Capilano did extensive damage to the shingle-bolt flume along the creek constructed at heavy cost several years ago. Where the flume passes through the canyon on a high trestle, many of the supports were torn away and the shattered timbers were carried to the inlet. Above the canyon, water pouring down every skidroad or path leading to the creek wrecked the structure at numerous points.

On November 28, mail service in and out of Vancouver was halted. As it appeared this would last for at least four days, outbound mail was piling up in the Vancouver post office. Telegraph lines south and east were also out of commission. Later on November 30, the CPR Telegraph company managed to get a line open to Winnipeg. Both in Vancouver and at outside points, the telegraph offices were blocked with messages.

The heavy rain caused many landslides and washouts. Rail traffic on the CPR line was blocked between Vancouver-Lytton and between Lytton-Barnet. Some of the largest slides took place at Barnet, China Bar, Spuzzum, Keefer’s and Lytton. Over 1,000 men were at work on the line between Vancouver-Lytton. All westbound passenger, mail and express traffic was held at Lytton. The eastbound Express No. 2 stopped at Barnet, where it encountered a mudslide. While pulled up close to the obstruction, another slide came down on the west side, trapping the train. The western slide was removed on November 28, enabling the train to return to

Vancouver. In the afternoon of November 30, a mudslide covered the railroad tracks near Hammond for a distance of 80 ft. (24 m). Next day at noon, the tracks were cleared. An hour later, the break in the line near Lytton was repaired. On December 1, the rail line between Vancouver-Kamloops was clear except at three points where such damage had been done that considerable pile driving and trestle building was required before the line could be reopened. In addition, some small slides occurred east and west of Revelstoke. Between Vancouver-North Bend, there were still two breaks in the line; one just west of North Bend and the other near Yale. There was also a break at Kanaka, just east of North Bend and minor problems approximately 2 mi. (3.2 km) east of Lytton.

On November 29, a mass movement occurred near New Westminster. Debris and boulders caused the blockage of the Kilby Creek culvert about 1 mi. (1.6 km) west of the New Westminster city limits. *2) The impounded runoff from a gulley saturated the fill of the rail embankment, causing it to fail. The slump left a section of the tracks unsupported. A train crossing this section derailed, killing 22 Japanese labourers travelling in a boxcar (Eisbacher 1983). Repairs to the Kilby Creek culvert were only completed late on November 30.

On November 30, the bridge at Vedder Crossing and much of the cribbing which had been constructed to protect the Vedder River Hotel were washed away (Bowman 1992). *3) The Township of Chilliwack (Chilliwack) immediately went to work on a new bridge (*Chilliwack Progress*). *4)

In Victoria, basements flooded all over the city, mainly due to water backing up through the drains. Electric car service was also effected for some time when the rails were covered with mud and sand. Thousands of dollars worth of damage was done to streets in all parts of Victoria. The heavy rain started at noon on November 27 and continued for 24 hours.

Heavy damage was reported from the Nanaimo district. In all directions, bridges had been damaged or carried away by the floods. In Nanaimo, the new South Fork pipeline, built during the previous summer, suffered considerable damage. Besides other damage to the system, some 200 ft. (60 m) of the pipe was carried away. Due to washouts on the short line to Extension, it was impossible to ship coal from the mines to Ladysmith, leaving the mines at Extension temporarily idle. The railway of Pacific Coast Coal Company between South Wellington-Boat Harbour was damaged with 250 ft. (75 m) of railway washed out. Much damage was done to wagon roads into Nanaimo and many bridges were washed away. In the Haslam Creek district, a creek changed its course and forced a family out of their home. The creek ran 4 ft. (1.2 m) deep through the bush. All the men employed on the borehole in the district were swamped and driven out of their cabins. They were forced to wade through water "breast high" to higher ground.

In the Selkirks and the Rockies, a considerable amount of snow fell. East and west of Revelstoke, a number of small slides occurred. In addition to the Great Northern Railway (GN) wreck near Sapperton, both the Cloverdale and the new Blaine cut-off lines were blocked by slides. The Cloverdale line was cleared on November 30, enabling trains to come in from Seattle over the old line. On December 1, the GN was still out and not expected to reopen for another two or three days. The bridge at Ferndale, Wash., which was 18 in. (45 cm) out of alignment, had to be practically rebuilt before it could be used again. The big slide at White Rock was expected to be cleared away allowing the line between Vancouver-Blaine to reopen. The country through which the GN ran between Seattle-Vancouver suffered heavier flood damage than the Lower Mainland and Vancouver Island.

*1) The nearest approach to the weekend's rainfall went back as far as 1883, when 4.5 in. (114.3 mm) fell in 24 hours (*The Daily Colonist*, December 1, 1909).

*2) Kilby Creek empties into the Brunette River 0.25 mi. (400 m) below.

*3) After this permanent bridge was constructed in 1903, a small community had developed here. The Vedder River Hotel became a popular fishing resort on the south bank, and Mrs. Grand operated a store on the north bank (Bowman 1992).

*4) The spelling of "Chilliwack" is correct. Between 1908-1980 there were two different municipalities: the Township of Chilliwack and the City of Chilliwack. In 1980 they amalgamated to form the District of Chilliwack (Bowman 1992).

Winter 1909

(Storm surge/tidal flooding?).

Source: Old Cemeteries Society of Victoria. Ross Bay Cemetery brochure; Adams 1998 (p. 5).

Details: During the winter, some particular violent storms in Victoria, washed away much of the existing shoreline south of the Ross Bay Cemetery. Many graves located south of Dallas Road, mostly those of Chinese and Japanese were exposed and some disappeared completely. Until this time, the cemetery extended all the way to the beach and some graves were located only a few feet from the shoreline. *1)

*1) To prevent such events in the future, in 1911 the city decided to build a concrete seawall along the length of Ross Bay. This also provided the opportunity to extend Dallas Road (Adams 1998).

March 4-5, 1910

Source: *The Vancouver Daily Province*, March 5, 7 and 9, 1910; Environment Canada 1986; Evans and Gardner 1989; Woods and Marsh 1983; Whelan 2000 (pp. 15-16).

Details: On March 4-5, two separate snow avalanches in the Rogers Pass took the lives of 64 railway workers. The disaster was the “worst experienced in the mountains since the completion of the line.” In the days leading up to the incidents, over 2 m of snow had fallen in the area. On March 3, heavy rain and warm weather weakened the snowpack. When the weather cooled, the rain turned to snow.

On March 4 at 5:40 p.m., an avalanche came down near Bear Creek on the Rogers Pass in a narrow valley flanked on either side by steep mountains. The slide did not come from a very high elevation and was composed mostly of snow. It had a length of 500 ft. (150 m) and a depth of 80 ft. (24 m). Work crews were sent out in the dark to clear the tracks. Utilising shovels and a rotary plow, the men succeeded in uncovering a long section of track through the snow and ice. Ironically, they were digging their own graves (Whelan 2000).

Just before midnight after the storm had increased to a blizzard, a second snow avalanche occurred near the summit of Cheops Mountain, west of Rogers Pass. Falling about 3,500 ft. (1,050 m), it buried the CPR rail lines beside Snow Shed No. 17. *1) Half an hour before midnight, some of the men outside the cut heard a deep rumbling, then timbers cracking. The unexpected avalanche swept down Avalanche Mountain on the side of the pass opposite the first slide. It killed 62 men of a crew at the summit clearing a big slide that had come down Cheops Mountain on the west side of the pass and had blocked the tracks. A rotary plow had cut a path across the piled snow on the line and the men were working in the cut shoveling snow and clearing away trees swept down by the avalanche. Trapped within their snow-walled tomb, most of the men never heard the slide approach (Environment Canada 1986; Evans and Gardner 1989). *2)

The slide apparently happened so fast, many of the workers were buried standing up. One of them was obviously in the middle of rolling a cigarette when being hit by the ice and snow (Whelan 2000). In a few seconds, “with a noise like a thousand thunderbolts, crashing in unison it leaped from shelf to shelf, uprooting and carrying with it a tangled mass of trees, ice and huge boulders.” It buried the tracks for a distance of 0.25 mi. (400 m) to a depth of 50 ft. (15 m). “Hundreds of thousands of tons” of other debris bounced off the heap and half filled the valley of Bear Creek hundreds of feet below. The bodies of many of the victims were swept into the canyon as well and might not be recovered until the snow would melt (*The Vancouver Daily Province*, March 5, 1910).

According to *The Vancouver Daily Province*, the second slide happened at precisely 12:30 a.m., when half of the first slide had been removed. Rain and sleet were falling when a rotary engine and a “small army of white and Japanese section men were clearing the tracks. Although there were premonitions of danger indicated by the crash and boom of avalanches on adjacent peaks, crews continued working. Eight hundred men were engaged in clearing the track. In many places, the track was buried to a depth of 80 ft. (24 m) under a mass of trees, stumps ice and snow.

On March 5 at 7 a.m., another big rock and snowslide occurred east of the second slide. It destroyed a portion of a snowshed and buried the track for 400 yd. (360 m) to a depth of 60 ft. (18 m). This slide would further delay the opening of the line to traffic. All trains were rerouted via the Arrow lakes, Nelson and the Crow’s Nest Pass railway.

The causes and effects of this accident were well recorded. Renowned photographer Byron Harmon was on the scene the next day recording the devastation and clean-up efforts. Also, two coroner’s inquests were held to investigate the disaster. The first coroner’s jury had not been able to reach a verdict. The jurors were unable to resolve two questions: were the workmen compelled to work at night and could the posting of a watchman have enabled them to receive a warning of the approaching danger? The second jury returned an “Accidental Death” verdict holding nobody liable for the accident. The jury determined that the men were out by their own choice as “It is not compulsory for men to work at night” and that lookouts would not have much difference in the outcome because they are “not much use at night.” The jury, however, did recommend that... “the CPR withdraw their workmen from all slides in future during stormy nights.”

Early on March 9, another slide came down 1.5 mi. (2.4 km) west of Glacier, a station less than 3 mi. (4.8 km) from the fatal avalanche site. This slide was one of the largest since the spring thaw had set in. It buried the track with "snow, ice, rocks and timber" to a depth between 20-30 ft. (6-9 m) to distance of "seven telegraph poles" or nearly 1,000 ft. (300 m). The force of the slide carried away 12 bents of snowshed No. 22. All the telegraph wires were buried underneath the wreckage. As the tracks would not be cleared for several days, all train traffic was rerouted via the Crow's Nest line.

On the afternoon of March 4, a huge snow slide came down at Glenogle on the Kicking Horse River near Golden. Five days later, this 900-ft. (300 m) long and 25-ft. (7.5 m) deep slide near Palliser had still not yet been completely removed. The river was dammed up and threatened to wash away the roadbed. The railway officials, who had three hundred men were working to clear the line, hoped to have the work completed late on March 9.

In the early afternoon of March 5, passengers and crew of westbound No. 97 express train miraculously escaped an avalanche coming down onto the tracks just east of Field. The train's last car had just passed a steep point when the slide struck the rails only a short distance behind. The thunder of the avalanche coming down could be plainly heard. An enormous mass of packed snow, ice and trees buried the line to a depth of 20 ft. (6 m). Awaiting clearing of the line, the train was held at Field before proceeding on to the coast. The line was expected to reopen on the later afternoon of March 7.

On the afternoon of March 5, brakeman John Mahon and fireman T. Griffith, were killed near Three Valley, just west of Revelstoke when their train ran into a snow avalanche. The small slide was 300 ft. (90 m) long and 10 ft. (3 m) deep.

*1) Ten years earlier, a section house and eight or nine men were buried in a slide that tore down the mountain in the same vicinity (*The Vancouver Daily Province*, March 5, 1910). Because no snowslides had been observed in the vicinity of Snowshed # 17, during the 23-year period CPR had been operating in Rogers Pass, it had been decided to abandon this approximately 2,000 ft. (600 m) long shed and to run the main line track parallel to it (Whelan 2000).

*2) This disaster and the long periods of closure led the CPR to construct the Connaught Tunnel (Evans and Gardner 1989) to eliminate the problems at Rogers Pass. Between 1885-1916, when the tunnel was opened, over 200 men perished in snow avalanches (Woods and Marsh 1983). The CPR budgeted some \$8 million or approximately 6% of the company's 1913 revenue to build the tunnel. It allowed CPR to abandon 14 mi. (22.4 km) of avalanche prone track and the 31 snowsheds while significantly increasing capacity on this line by doubling the track (Whelan 2000).

Ca. June 12-19, 1911

(Spring runoff/flooding).

Source: *The British Columbian*, June 19, 1911; *The Vancouver World*, July 11, 1916.

Details: Around June 12, in a sudden unexpected rise the Fraser River came up 5 ft. (1.5 m) in seven days. About a week earlier, the river was about 1 ft. (30 cm) below the previous year's level. On June the river reached 19 ft., only 1 ft. (30 cm) lower than the extreme high water mark set in 1908, which was the highest in recent years. On June 19, the Fraser River peaked at the Mission gauge at 19 ft. 1 in. (5.73 m). As a result of the freshet several points flooded. In Sumas Prairie, a large area was under water for some days. Some flooding occurred opposite New Westminster at Brownsville and Port Mann when the tide was in.

Ca. January 17, 1911

Source: *The Kootenaiian*, January 19, 1911.

Details: Due to a slide on the Gerrard branch (line), the *Kokanee* did not return from Lardo until 4:30 on January 19.

Ca. August 24, 1911

Source: *The Globe and Mail*, May 30, 2002.

Details: Ca. August 24, a major landslide near Field killed 60 railway workers. Harry Fraser Price's mother was appalled to see the treatment of the bodies at the landslide site as they were pulled from a mixed rubble of ice, snow, rock and mud. "A Caucasian body would be lifted out and carefully placed in a shed. A Hindu or Chinese body would be pulled, sometimes by the hair, and dumped unceremoniously in a separate holding area."

November 18-20, 1911

(Rain-on-snow).

Source: *The Vancouver Daily Province*, November 18 and 20, 1911.

Details: Two days of heavy warm rains caused flooding and several washouts on the CPR line.

Rail traffic on the GNR line between Seattle-Vancouver and Seattle-Leavenworth, the eastern point of the Cascade division, were cut. A washout at Burnaby Lake delayed GN's *Owl*. The GN Seattle-Vancouver line, cut on November 18, was out for at least two days. Two southbound trains were held at Vancouver.

1912

(Ice storm).

Source: Wilson and Wilson 1998 (p. 51).

Details: In 1912, the Lower Mainland was hit by a 'Silver Thaw' (Wilson and Wilson 1998). *1)

*1) A "silver thaw" occurs when warm rain drenches a cold surface

1912

Source: *The Province*, March 2, 1964.

Details: In 1912, a snowslide killed six men at the Elk River Colliery near Coal Creek and demolished the carpenter and electrical shops.

February 10, 1912

(Dam burst/flooding).

Source: *The Daily Colonist*, February 11 and 13, 1912.

Details: On February 10 at 5:30 p.m., heavy rains caused a dam to burst at a small lake near Union Bay. The unnamed lake, 1 mi. (1.6 km) long and 0.5 mi. (800 m) wide, was used by Canadian Collieries Ltd. in generating power for their Union Bay plant. The lake was 4 mi. (6.4 km) from Union Bay and 2.5 mi. (4 km) from the settlement. It caused an immense flood down the valley destroying 45 dwellings "mostly of the shack variety." As residents of the district known as Chinatown had five minutes warning of the impending disaster, only one person was killed. The flood wave was estimated at 15 ft. (4.5 m) when it reached the settlement. It completely destroyed the Chinese and Japanese section of town "like matchwood" and carried the debris along on the crest of the wave. It also destroyed were the Co-operative store, the government telegraph station and the company's medical dispensary. Telegraph and telephone communications were cut and the track sustained some damage. The value of the dam was estimated at \$100,000. The Canadian Collieries washer and building on the wharf also suffered considerable damage.

Late 1912

Source: Saywell 1967 (p. 51).

Details: Late in 1912, heavy rains "softened up" the new CPR road-bed near Cowichan Lake, causing to give way. *1) One of the train engines rolled over sideways into the lake. The engineer, who jumped, escaped without injuries. While rying to pull the engine out, a second engine in the process of tugging with block and tackle and lines, flipped over the other way. Two weeks later, a third one with adequate equipment managed to extricate the other two.

*1) As part of CPR's Alberni extension, the rail line had just been completed as far as Cowichan Lake (Saywell 1967).

January 17, 1913

(Fatal snow avalanche).

Source: *The British Columbian*, January 31, 1913.

Details: On January 17, Joe Culshaw was killed in a second fatal snowslide in the (Slocan?) valley of Coal Creek this winter. The victim was in a small "shelter shack" when the descending snow "dashed it to pieces,"

January 25, 1913

(Snow avalanches).

Source: *The Sun*, January 29, 1913; *The Daily News*, January 29, 1913.

Details: On January 25, several large snow slides occurred on the CPR main line near Three Valley. The most serious one was near the east end of Richter Lake. *1) The largest slide, which was over 300 ft. (90 m) long and 20 ft. (6 m) deep, caused trains to be delayed up to nine hours. A small slide occurred on the mountain section 0.5 mi. (800 m) east of Illecillewaet.

Around January 25, John Waters of the Meteor Mine had a narrow escape from being killed in a snowslide. After others had gone down the trail for mail, he was alone at their cabin. He went outside when he heard a snowslide coming down. He hastily made for a big tree, intending to climb it. The snow, however, overtook him before he was far enough up the tree. With the exception of his head and one arm, the slide completely buried Waters in a mass of hard snow.

About 15 minutes after leaving the Meteor, two men on their way down to the Lily B Mine, two men heard Waters shouting. Upon their arrival back at the cabin, they dug out the then unconscious victim. Being only lightly clad and with no coat on and having been tightly embedded in the snow for nearly one hour, the victim suffered considerably but later recovered.

*1) Three years earlier, an engineer and a fireman met their death at this same location when their train ran into a slide.

June 7-16, 1913

(Spring runoff/flooding).

Source: *The Sun*, June 10, 11 and 12, 1913; *The Vancouver World*, July 16, 1911.

Details: On June 7-9, warm weather and rain caused the Bull River to rise to record levels. CPR railway mills closed down and considerable damage was done to the dam. Floodwaters washed out 300 ft. (90 m) of flume from the dam to the mill. The Waldo bridge over the Kootenay River washed out while the bridge at St. Eugene Mission was expected to go out. Overnight June 9-10, a small washout occurred on the Kootenay Central railroad between Fort Steele-Wasa. The Elk River was rising rapidly and residents of West Fernie were standing by to evacuate. The lumberyard of the Elk River Lumber Co. was partially submerged.

On June 10, Kootenay Lake was rising at an alarming rate endangering farmers on the flats. Three families were flooded out by the rapid rise of Goat River. Water levels were approaching the 14-ft. High water mark.

On June 16, the Fraser River peaked at the Mission gauge at 18 ft. 10 in. (5.65 m) (*The Vancouver World*).

June 19-22, 1913

(Spring runoff/flooding?).

Source: *The Sun*, June 24, 1913.

Details: On June 19, the Columbia River went on the rampage. Judging by the size of the tree that floated down, the water must have washed out banks much higher than usual. The Edgewood Lumber Co. was forced to shut down when the engine room flooded, first time since 1896. The sawmill of Doukhobors at Trail was also flooded. Between Robson-Shields, the river eroded much land and a number of tree fruit growers sustained considerable damage.

On June 22 with cooler weather, the Columbia River dropped 6 in. (15 cm).

October 10-12, 1913

(Rain-on-snow).

Source: *The Vancouver Daily Province*, October 13, 1913.

Details: A fall of snow early October and warm weather with rain melting the snow turned the Capilano River into a raging torrent. The river washed out government crib work near the mouth of the creek. It was the second time the crib work was carried away since it was constructed intended to divert the stream into the west channel to avoid silting up the Narrows. The creek also damaged the water intake 7 mi. (11.2 km) from the Narrows and flooded the road along the stream in many places. Logs driven against the screens at the intake caused considerable damage. Above the second canyon, the creek was 8 ft. (2.4 m) above normal. Huge logs, up to 150 ft. (45 m) long, started a landslide. A large tract of land was flooded.

November 25-31, 1913

(Storm surge/tidal flooding).

Discharge (m³)/s: Max. daily: November 25: Nan.: 323; November 27: L. Qual.: 41.9; Sproat: 169; November

29: CR/CL: 263; max. instant.: N/A.

Source: *The Daily Colonist*, November 27, 29 and 30, 1913; *The Daily Province*, November 29, 1913; *The Sun*, December 1, 1913; Environment Canada 1991.

Details: On November 28 in Victoria, a gale blew at 40 mph (64.4 km/h) most of the day. The strongest gale for the year 1913 gusted up to 50 mph (80.5 km/h). In most parts of the southern portion of Vancouver Island telephone and telegraph wires came down. Nanaimo experienced “one of the worst storms in the history of the city.” Early on November 28, winds accompanied by rain gradually increased attaining almost hurricane force between 2-5 p.m. The brick wall of a new block under construction collapsed. Both the CPR line to Vancouver and BC Telephone’s line to Victoria were cut as a result of the storm.

Overnight November 30-December 1, a combination of wind and high tide caused the North Arm of the Fraser River to overflow its banks. The floods, which peaked on November 29 at 8:30 p.m., were a little worse than those of a year previous. However, as the water rose slower, it caused less inconvenience. The highest tide in 10 years caused the flooding of Lulu and Sea islands. The dikes gave way in countless places flooding hundreds of acres of farmland. Lands were scoured and fences damaged. The Sea Island dike broke through the Cooney property at 13th (?) Road, flooding 500 ac. (200 ha). In the Bridgeport township and on the west side of Sea Island, water covered roads and fields up to 2 ft. (60 cm). Around the Bridgeport school, water was about 3 ft. (90 cm) deep. Though damage on the northeast corner of Sea Island was relatively light, a grocery store and a meat market sustained heavy flood damage.

Dikes along the Eburne side of the North Arm, weakened by muskrats, proved ineffective. Flat lands along the river were covered with water to a depth of several feet. At Eburne on both sides of the North Arm Bridge No. 1, severe flooding covered hundreds of acres of pastureland. Water flowed right up to the BCER right-of-way almost covering the tops of fence posts. On Lulu Island, the worst flooding was at the North Arm Bridge No. 3 Road leading from the bridge to the Richmond school. Waters were 3 ft. (90 cm) deep and all sidewalks afloat. Along River Road, as far back as the BCER bridge, farm land was all flooded, extending back as far as 0.75 mi. (1,200 m) in places.

1913

Source: McGill 1979 (p. 31); Pethic 1982 (p. 167); Evans, unpublished data.

Details: In 1913 and 1914, construction of the Canadian Northern Railway through the Fraser Canyon caused rock slides into the Fraser River at Hell’s Gate. The slides, which obstructed the flow of the river and prevented a major portion of each year’s salmon run from reaching the Upper Fraser spawning streams, were perhaps the most expensive landslides ever to occur in British Columbia. A conservative estimate places the loss to the commercial fisheries, due to the consequent depletion of the salmon stocks between 1917-1947 at nearly \$300 million (McGill 1979).

In 1913, the Fraser River salmon run suffered a major disaster when rock waste dumped during the railway construction partially constrained the river channel at Hell’s Gate. An important back eddy used by the salmon as a passage through the narrow gorge was filled in. As a result of the obstruction, and others upstream, the sockeye and pink salmon could not pass to return to their spawning grounds upstream. Pethic (1982) notes that from Hope to Ruby Creek “the air was foul with the stench arising from the dead fish that covered the exposed parts of the River” as millions of sockeye died without spawning. The majority of the Fraser River sockeye population and the largest individual stocks spawn above Hell’s Gate, the blockage thus had the effect of decimating the upper Fraser River stocks (Evans, unpublished data).

January 3-6, 1914

(Rain-on-snow).

Discharge (m³)/s): Max. daily: January 4: Nan.: 716; January 6: Capil.: 252; January 7: Cowich.: 207; max. instant: N/A.

Source: *The Daily Province*, January 5, 1914; *The Sun*, January 5, 6, 7 and 8, 1914; *The Vancouver World*, January 5, 1914; *The Daily Colonist*, January 4, 6 and 7, 1914; *The British Columbian*, January 5, 1914; Environment Canada 1991.

Details: Overnight January 3-4, southeast gales swept the Pacific coast from the Queen Charlotte Island to Tatoosh, Wash., caused great inconvenience to shipping. Heavy rain overnight and during January 4 caused many streams to the verge of overflowing and threatening to damage railway tracks. Vancouver rainfall between the afternoon of January 3 and noon on January 4 amounted to a record-breaking 3.08 in. (78.2 mm).

Water levels in the Capilano River and Seymour and Lynn creeks rose rapidly to “heights unknown since 1906.” Land and roads along the pipelines on Seymour Creek and Capilano River eroded. The city’s

flood damage bill amounted to \$10,000. On January 4, rain melting snow in the mountains caused the Capilano River to overflow its banks. The river rose 10 ft. (3 m) in 10 hours, registering the highest mark since 1906, washing away 10 ac. (4 ha) of land opposite the Capilano Hotel.

Floodwaters also undermined the city's pipeline and damaged the new Pacific Great Eastern (PGE) line to West Vancouver. A trestle on the PGE was undermined, cutting service on the new line between North-West Vancouver. On January 4, a large stretch of trestlework on the PGE line shifted due to a large logjam that piled against the tracks. *1) The trestle was later taken out by a large stump leaving the rails temporarily suspended. The pile driver used on the construction capsized and was carried downstream right into First Narrows. The force of the water in Capilano Creek undermined the banks. At one point, a few hundred yards from the PGE railway crossing, 10 large trees toppled into the stream. Late on January 4, the snapping of trees was described as resembling thunder.

The roadway to the Capilano Hotel sustained the heaviest damage and the washed out crib work made the road impassable. The course of the stream changed entirely at this point and the road had to be reconstructed. Considerable damage was done towards the mouth of Capilano River near the break that had occurred a few months earlier. When the rain stopped early on January 5, the Capilano River dropped 7 ft. (2.1 m).

Seymour Creek eroded land near the city's log house at Scott's Ranch. At the intake station, the water rose above the kitchen floor. In North Vancouver at the intake pipe of Lynn Creek, water rose to the highest mark in three years. Water levels in Lake Coquitlam rose considerably. *2) On January 5, BCER reported 3.5 ft. (1.05 m) of water pouring over the 250-ft. (75 m) wide spillway with a drop of about 80 ft. (24 m) on Lake Coquitlam dam. Between January 5-7, the lake level rose 1 ft. (30 cm). On January 7, water levels dropped by 2 ft. (60 cm).

On January 4, mudslides interrupted traffic on the BCER Fraser Valley line. A debris slide down the side of Vedder Mountain blocked the tracks for some time.

On January 7, Coquitlam River flooded again. The river came higher than on January 4, when residents were threatened to have their houses cut off. The Myrtle Hotel ground storey flooded and many families were evacuated. All low-lying land between Coquitlam-North Westminster flooded. With floodwaters still rising, Pitt River Road was entirely flooded. Washed out at both ends of the bridge, the road was made impassable.

On January 7, Lulu Island experienced the worst flood conditions in years. The heavy rainfall of the previous days combined with the highest tides of the season rendered the drainage system of the municipality practically useless. Conditions were worst in the Cambie and Alexander township districts. Along No. 20 Road between Cambie Station-No. 5 Road, severe flooding occurred. At Alexandra, the basement of one house was flooded with 18 in. (45 cm) of water. Later at a meeting of ratepayers, the keynote speaker John Tilton stated that "... well diked and well drained, this island would be a beauty spot of Canada. As it is, it is no better than a duck pond."

Washouts on the CPR line delayed the passenger train inbound to Vancouver for several days.

*1) Only one day earlier, the PGE had formally taken over the bridge from the contractor (*The Vancouver World*).

*2) Following the floods, water gauges were placed at the city's waterworks system (*The Vancouver World*).

January 26, 1914

(Storm surge/tidal flooding).

Source: *The Vancouver World*, January 27, 1914; *The Daily Colonist*, January 31, 1914; *The Daily Province*, January 26 and 31, 1914.

Details: Early on January 26, high winds and an unusual high tide caused floods in the Fraser River delta. Floods in the Richmond district were described as "exceeding in extent any occurring in the memory of the oldest inhabitant." *1) In many places the dikes that had been in need of repair caved in. Sea Island had a break 30 ft. (9 m) deep for a distance of 150 ft. (45 m). The break occurred in a slough, which accounted for the great depth and the serious nature of the repair. All of Sea Island and the lower parts of Lulu Island flooded with 1-2 ft. (30-60 cm) of water. On January 26, the Bridgeport school was closed all day. Small islands in the North Arm were almost completely flooded.

More damage occurred higher up river. The whole of Mitchell Island and the east-end of Fraser Avenue flooded and dykes sustained damage. Near No. 5 Bridge, dyked land under cultivation was flooded.

Service on the Westminster-Eburne tramline was halted due to flooding at the foot of F Avenue. The BCER was flooded on both sides of the street. All land between the tramway and the river was inundated. There was water between the rails nearly all the way down from F Bridge to Oak Street.

*1) During the winter 1913-14, floods in Richmond were the worst in years. Earlier the area was hit by flooding in November and again early January due to a combination of high tides and heavy rains.

February 23, 1914

Source: Forester and Forester 1975 (pp. 91-92); Evans, unpublished data; International Pacific Salmon Fisheries Commission 1980; B.C. Ministry of Energy, Mines and Petroleum Resources 1993.

Details: On February 23, the already constricted river channel in the Fraser Canyon at Hell's Gate was further obstructed by a rockfall, which impacted the Fraser River and threatened the salmon run. It caused millions of dollars in lost fish stocks and in repair of the fish migration corridor. (B.C. Ministry of Energy, Mines and Petroleum Resources 1993; Evans, unpublished data). Remedial work undertaken in 1914-1915 during which some 60,000 tons (?) of rock were removed, eased the blockage (Evans, unpublished data).

On February 23 around 10 p.m., a rockslide occurred at Hell's Gate. During the day, residents of Camp 16 observed a continual rain of small rocks from the shattered cliffs immediately above the Canadian Northern Railway (later CNR) track under construction on the opposite side of the river. The day had been very mild and a light rain was falling. It was assumed that possibly a few groups of disintegrated rock had detached themselves from the main cliff after being frozen there during the winter.

Later that evening, the fall of rock increased and at about 10 p.m. a "tremendous rumbling roar" was heard as a huge portion of the cliffs opposite detached itself and fell towards the river. The slide blocked the Fraser River and completely blocked the Canadian Northern tunnel, which had probably 50 ft. (15 m) of it carried away.

The mammoth task of unblocking the river got underway, aided in some measure by the work of the Canadian Northern Railway Company clearing its right-of-way. By the time the first Sockeye salmon arrived in the canyon in July, a rough passage had been provided. Only some of the hardiest fish made their ascent. To aid the thousands of fish remaining below the falls, a special platform was constructed. Native Indians were hired to move salmon by dipnet from the pool below into a wooden flume whence they continued their voyage upstream.

The turbulent waters of the Fraser River soon changed the riverbed and no further work was done for decades to come. *1) In 1913, the sockeye catch had been 31 million fish but after the Hell's Gate disaster the cycle changed. The average annual catch over a four-year period dropped to 5 million fish. Escapement to the spawning grounds fell below a million. The effects of the slide continued to reduce the numbers of spawning salmon year by year. Based on the established four-year cycle, a big run should be expected in 1917. It did not appear and succeeding years showed yet further declines (Forester and Forester 1975).

* By 1944, investigations had shown that the obstruction at Hell's Gate was the major reason for the continued poor Fraser sockeye runs. In an attempt to restore the sockeye and pink salmon runs to their historical abundance, between 1944-1966 fishways were constructed at a cost of \$1.36 million to provide passage for the salmon past the obstruction. In 1978 dollars and landed values, the loss to the sockeye fisheries alone, resulting from a diminished return in 1914, amounted to an estimated \$1.7 billion between 1951-1978 (International Pacific Salmon Fisheries Commission 1980).

October 15-19, 1914

Discharge (m³/s): October 15: Stamp A.: 428; October 18: CR/CL: 513; L. Qual.: 57.5; October 19: Sproat: 229; max. instant.: N/A.

Source: *The British Columbian*, October 20, 1914; *The Daily Colonist*, October 16, 1914; Environment Canada 1991.

Details: Due to recent heavy rains and anticipating high tides, repairs were required to the dike on Lulu Island between Numbers Two-Five roads. Pending future repairs, the necessary repairs were scheduled to be made within a week (*The British Columbian*).

March 22, 1915

Source: *Victoria Daily Times*, October 30, 1921; *The British Columbian*, March 22, 23, 24 and 25, 1915; Ramsey 1967 (pp. 39-46); Eisbacher 1983; Evans and Gardner 1989; B.C. Ministry of Energy, Mines and Petroleum Resources 1993; Evans, unpublished data; Egginton, pers. comm.

Details: On March 22 at 12:05 a.m., a “snow and landslide” came down striking several bunkhouses at the Jane Mining Camp, part of the Britannia Mine complex more than 2 mi. (3.2 km) distant from the beach. *1) Without warning hundreds of thousand of tons of earth and water-saturated snow, rocks and trees slid from the upper mine high up near the top of the mountain. The volume of the debris was estimated at more than 100,000 m³. The B.C. Ministry of Energy, Mines and Petroleum Resources (1993) estimated the amount of rock displaced by the Jane Camp rock avalanche at 200,000 m³.

The slide cut a swath through the camp carrying buildings and trees with it and burying them in a mass of debris. The huge solid mass completely destroyed the bunkhouse, cookhouse, rockhouse, mine office, store, tool houses, candle house at the tunnel mouth, tramway terminal and other dwellings. All electric light wires and tramway terminals were demolished. Part of the aerial tramway from the mine to the beach was also carried away.

A total of 54 people were killed, including four women and six children (*The British Columbian*, March 25, 1915). Several families were entirely wiped out. Although Ramsey (1967) and all other sources put the number of fatalities at 56, the death toll was later reduced by two. One man was not in the camp during the disaster and later showed up while another had a miraculous escape (*The British Columbian*, March 25, 1915). Nine people were severely injured and 12 others slightly injured. The principal loss of life occurred in the bunkhouse, which was entirely buried under the debris. Iron beds in the bunkhouses were attributed to saving some lives. Having been asleep in the lower bunk of an iron bed when the slide struck, one man was taken out alive from beneath 15 ft. (4.5 m) of earth.

According to survivors, the slide made an “almost indescribable sound, chiefly resembling the noise made by a colossal explosion.” Another witness said the slide “smashed the (rock) crusher like it crushed ore from the mine.” She thought it was a hurricane. “You’ve heard a big wind when it tears down trees and it thunders and lightning crashes.” It was estimated it would take at least three months to remove debris and restore the destroyed equipment (Ramsey 1967).

B.C. Police Const. M.T. Spence said, “I found the mine office, store, rock crusher, tram terminus, a big bunkhouse and a half dozen homes had been blotted out by the millions of tons of rock, which in some places was piled 50 feet deep over what had been the level of the camp.” The slide also destroyed Chas. Dainton’s schoolhouse near the mouth of the mine. Dainton himself was amongst the missing (Ramsey 1967; *The British Columbian*, March 25, 1915).

Despite the great loss of life, the inquest by the coroner’s jury occupied less than two hours. Only four witnesses, all employees of the mining company, were examined. It was agreed that blasting operations were at too great a distance from the spot where the slide started to have been responsible for the disaster (*The British Columbian*, March 25, 1915). *2)

The slide was possibly caused by rapidly melting snow during the warm weather of the preceding 48 hours. Temperatures appear to have been above normal. The average daily temperature on March 22, 1915 was almost double the 1913-2000 March normal of 5.8° C. Maximum daily temperatures had reached 18.3° C on both the two days prior to the landslide. (Egginton, pers. comm.).

*1) The camp was situated along the south side of Britannia Creek, 37 km north of Vancouver. A new Tunnel Camp was established as “headquarters” to replace the original Jane Camp by the Boscowitz’ at the 1,050 foot level (Camp 1050). The Britannia Mine operated from 1905 till 1974. It is presently the site of the B.C. Mining Museum (Ramsey 1967; Eisbacher 1983).

*2) Tunneling in fractured Mesozoic volcanoclastic rocks above Jane Camp in 1914 may have contributed to a progressive deterioration of an unstable bedrock ridge approximately 300 m above the camp. A near-vertical crack on the ridge crest above Jane Camp was observed and photographed before the disaster struck (Eisbacher 1983; Evans and Gardner 1989).

August 11, 1915

(Earth quake?).

Source: *The Chilliwack Progress*, August 12, 1915.

Details: On August 11 just after 6 a.m., a quake lasting several seconds was felt in the Chilliwack area. This most pronounced quake since 1871 shook houses and rattled windows. *1) It was not known whether this quake was caused by a real earthquake or by “the fall of a massive glacier in the mountains” caused by a long season of dry weather. The latter view was accepted by many from the fact that the disturbance appeared to have been confined to the (Chilliwack) valley.

*1) In 1871, a “big slice” of Mount Cheam dropped about 1,000 ft. (300 m), causing a quake in the Chilliwack area. (*The Chilliwack Progress*, August 12, 1915).

October 28, 1915

(Tsunami ?).

Discharge (m³/s): Max. daily: October 28: L. Qual.: 43.3; Stamp A.: 538; October 29: CR/CL: 544; October 31: Sproat: 156; max. instant.: N/A.

Source: *The Daily Colonist*, October 29, November 2, 1915; Environment Canada 1991.

Details: On October 28, a giant sea wave came inland beyond any known previous mark. It tore out large sections of the summer boardwalk and littered the lawns in front of several cottages with boulders and sand. A part of the stone retaining wall was destroyed. No storm accompanied the comber.

November 1915

Source: Ramsey 1962 (p. 84).

Details: In November, floodwaters swept away the newly constructed Pacific Great Eastern (PGE) railway bridge over the Capilano River.

December 7-9, 1915

(Tidal flooding).

Discharge (m³/s): Max. daily: December 7: Kok.: 157; December 8: Chem.: 174; December 9: Cowich.: 141; max. instant.: N/A.

Source: *The Vancouver World*, December 9, 1915; *The Daily Colonist*, December 8, 1915; Environment Canada 1991.

Details: In Vancouver, hundreds of acres of land were flooded from the bridge over North Arm to Woodward's Landing. On December 8, many houses were entirely surrounded by water. On December 8, there was a 12 ft., 8-in. (3.8 m) tide, while 15-ft. (4.5 m) tides were expected for December 9 and 10.

1916

(Damburst/flooding).

Source: Leighton 1979 (p. 87).

Details: In 1916, a dam above Kimberley gave way and swept the mining company powerhouse off its foundation. Many houses, the lower tram terminal and a section of railway track along Mark Creek were damaged. Photographs in Leighton's “Mountain Treasures – The History of Kimberley, B.C.” show the devastation caused by the flood.

January 22-23, 1916

(Storm surge/tidal flooding).

Source: *The Sun*, January 24, 1916; Ramsey 1962 (p. 86).

Details: On the morning of January 23, a violent northwesterly gale and a 13-ft. (3.9 m) tide running out caused heavy damage on the North Shore. Old timers said that the storm was “the worst in their experience of this shore.” The PGE track suffered the worst damage. Waves washed out about 0.5 mi. (800 m) of track between Navy Jack's Point-Dundarave. The big seas carried away a lot of bulkhead. The seas were breaking over the 14th Street wharf and the “new” wharf at Dundarave. On the old dock, part of the waiting room was wrecked and the lamps on the new dock were smashed. Waves sweeping in heavy logs did much damage to the beach. Logs and rocks rolled in by the waves also damaged and destroyed a number of the beach camps. Some of the camps were filled with rocks washed up onto the beach.

Overnight January 22-23, heavy snowfall brought the construction of the PGE line to a standstill until April 22 when the line opened up to the “end of steel” at Clinton. (Ramsey 1962).

General superintendent F.W. Peters noted that, “never in the history of the Canadian Pacific Railway have the storms been so severe through the Fraser and Thompson canyons,” as on the night of January 22. (*The Sun*, January 24, 1916). The storm was general throughout the Coast and Southwest ranges halting all train traffic. At Sailor Bar, snowfall was 5 ft. (1.5 m) “on the level” and drifts buried the tracks. In the Selkirks, the storm was very severe. CPR was hoping to have their line cleared early on January 24.

Snow and a slide at Boston Bar blocked the Canadian Northern train. On January 21, small mudslides on the Great Northern between Vancouver-Seattle caused delay up to three hours near Crescent, where a mudslide covered the track for a short distance.

Among those mentioned as victims of an avalanche was a 27-year old Vancouver man. Mystery surrounded a report of a man burning to death in a dining car of a train that was reported hit by an avalanche. Details of location and circumstances are unknown. (*The Sun*, January 24, 1916).

February 1-16, 1916

(Rain-on-snow).

Discharge (m³/s): Max. daily: February 15: Capil.: 254; Chem.: 172; Nan.: 371; February 16: Sooke: 31.7; February 17: L. Qual.: 31.7; max. instant.: N/A.

Source: *The Nanaimo Free Press*, February 1, 2, 3, 4, 5, and 7, 1916; *The Daily Province*, February 16, 1916; *The Daily Colonist*, February 13 and 16, 1916; *The British Columbian*, February 2, 3, 4, 13, 14 and 16, 1916; *The Week*, February 5, 1916; *The Vancouver Sun*, May 27, 2000; *The Cowichan Valley Citizen*: Millennium Chronicles p. 39; Won 1971; Environment Canada 1991; Provincial Emergency Program 1997.

Details: During the first five weeks of 1916, Victoria recorded the most severe weather conditions ever experienced on this coast, at least during the previous 60-70 years. Storms forming out of the Pacific persisted over southern Vancouver Island. The difference in barometric pressure between these storm areas passing in over the land to the south and the excessively cold interior was very marked, and the cold severe. Coming in contact with the moist air from the Pacific, caused heavy snowfalls. This cold influence was very extensive. Due to the extraordinary conditions, the low pressure or storm areas were making their paths to the south of Vancouver Island. Consequently, there was a rush of air south from the colder regions of the north (*The Daily Colonist*).

Victoria reported the worst winter conditions since 1893, even then the snowfall was not accompanied by a storm *1) During January and the first days of February, the city experienced very abnormal low temperatures and snowfall. In January, there were 10 days on which snow fell in Victoria, totaling 30.2 in. (75.5 cm). In the first 29 days of January, Victoria reported 23 in. (57.5 cm) of snow. During the first nine days in February, snow was recorded on six of these for a total of 46.4 in. (116 cm). On February 1 and 2, Victoria recorded 10 in. (25 cm) and 21 in. (52.5 cm), respectively. Since January 1, Victoria received an unprecedented total of 76.6 in. (191.5 cm).

A record snowfall overnight on February 1-2, brought traffic in Victoria to a standstill. Streetcar service was halted and cars were abandoned in the streets. Schools and theatres in the Greater Victoria area were closed due to poor road conditions and problems in heating the classrooms. As only one snowplow was available, only one lane of the main thoroughfares was cleared. This mounded snow on both sides of the streets to heights over 7 ft. (2.1 m). A heavy southeast wind added to the difficulties clearing the snow. Businesses remained closed and no supplies could be delivered. On February 4, Victoria was running short of coal due to the difficulty of loading at the point of dispatch. *2) Train service resumed on February 4 for all points south of Wellington while north of there the blockage continued.

Snow loads on roofs were recorded at 50 lbs./ft.². At Willows Camp, the roof of the mess hall collapsed under the weight of the snow. No injuries were incurred in the camp, which housed about 3,000 men. Around February 6, the heavy snow load caused roof to collapse in Nanaimo. At Nanaimo River, Walter Raines' barn collapsed, killing five cows. Chester Young's private garage and two houses on Five Acres also collapsed.

On February 6, rain together with warm wind and rising temperatures started thawing the unprecedented amount of snow that had fallen in Victoria since the beginning of January. On February 6, 0.42 in. (10.7 mm) of rain fell, followed by 0.20 in. (5.1 mm) and 0.56 in. (14.2 mm) on February 9 and 10, respectively. By February 13, Victoria had recorded a total of 1.21 in. (30.73 mm) of rain and 46.4 in. (117.9 cm) of snow calculated on a water precipitation basis for a total of 5.85 in. (148.6 mm). To date the precipitation had been nearly double the average. *3)

On February 13, Victoria was paralysed by a single-day snowfall of 55 cm. *4) The single snowplow in the city's inventory of equipment was unable to cope. The city's fire department had to resort to older horse-

drawn equipment to get around. The military was called out to shovel the snow from the streets, mainly to allow streetcars to operate. In about eight days nature allowed things to return to normal (Provincial Emergency Program 1997).

During January, the Nanaimo district recorded 42 in. (105 cm) of snow. An additional 1.58 in. (40.1 mm) of heavy rain in the middle of January brought the total precipitation in Nanaimo for January to 6.08 in. (154.4 mm). On February 1, though temperatures were rising, snow continued to fall in Nanaimo all day without interruption. Snow removal of Commercial Street, using wagons to remove the snow, made slow progress. The general belief was that it would be better to clear a roadway on each side, heaping the snow in the middle. In the 12 hours ending 8 a.m. on February 2, an additional 12 in. (30 cm) of snow brought the year's total to 59 in. (147.5 cm) of snow, which by far exceeded any season's record since weather records started on the coast.

Traffic on the E&N Railway line was blocked. The E&N rail service was cancelled due to snowdrifts of over 70 in. (177.8 cm) in places. On February 3, the rail line remained blocked. The southbound train left in the morning but was stalled at 17-Mile post. Neither the morning nor afternoon train left Victoria on February 3. For nearly two days rail communications between Nanaimo-Victoria was halted, probably for the first time since the railroad commenced operations in 1886 "or thereabouts" that such a standstill had occurred (*The Nanaimo Free Press*, February 4, 1916).

In Nanaimo, the deep snow covered up the fire hydrants, adding to the danger of fire. A large force of men was out clearing roadways round Bastion Street. The city snowplow so far had been limited to clearing sidewalks in front of public property. Schools remained closed until the roads would be cleared.

Various parts of south Vancouver flooded. On Marine Drive near the Burnaby boundary road, a 15-ft. (4.5 m) deep washout occurred. On Ontario and Manitoba streets and Marine Drive washouts did considerable damage to roadways. North of Kingsway, the low-lying area between Collingwood-Cedar Cottage flooded.

In New Westminster, the latest in a series of snowstorms since early January added about 16 in. (40 cm) bringing the total to 45 in. (112.5 cm) since January 1. It was the heaviest snowfall since January 1913 when 65 in. (162.5 cm) were recorded.

The incoming CPR train stalled on Front Street due to snow packing into the flange of the rails. Great Northern's traffic in the industrial park on Front Street was tied up. It was hoped to have Columbia Street cleared late on February 4. Service on the PGE was discontinued for several days due to snow slides.

On the morning of February 14, the *Samson* and Dredge 303 made an attempt to break up the iceflows in the North Arm of the Fraser River and to reopen it to navigation. Dredge 303 tried to break up the ice collected around the CPR and the passenger bridges.

Slides at Ocean Park and Samish, Wash. blocked the coastline of GN suspending train service on the night of February 14, leaving White Rock isolated.

*1) During January, Vancouver recorded an average temperature of 26° F (-3.3° C) (*The Vancouver Sun*). The Victoria weekly *The Week* commented: "That perhaps is why some Prairie people who have settled here invariably winter in Winnipeg."

*2) Victoria's normal winter consumption of coals was between 500-600 tons a day. Being down to 1,000 tons meant only two days of supply were on hand (*The Nanaimo Free Press*, February 5, 1916).

*3) The average precipitation for Victoria for the whole month of February was 3.07 in. (77.98 mm) (*The Daily Colonist*). A total of 46.4 in. (117.86 cm) of snow fell on Victoria in February, making the total for the 1915-16 winter 77 in. (195.6 cm). In Vancouver a total of 62 in. (157.5 cm) of snow fell between January 1-February 16. The snow fall set records at both Victoria and Vancouver and the yearly record of Victoria still stands today as do the February records for both localities (Won 1971). Glenora (Duncan) recorded an all-time record of 9.5 ft. (2.85 m) of snow (*The Cowichan Valley Citizen*).

*4) This set a long-standing record for a single day's snowfall for a western Canadian city. Though it was a highly "qualified" record, it was significant considering the normally balmy weather Victoria enjoys (Provincial Emergency Program 1997).

March 7-14, 1916

Discharge (m³/s): Max. daily: March 8: Kok.: 56.1; March 10: Shawn.: 14.7; March 11: Stamp A.: 294; March 12: Sproat: 136; March 13: CR/CL: 419; Cowich.: 114; max. instant.: N/A.

Source: *The British Columbian*, March 8, 9 and 10, 1916; *The Sun*, March 10, 1916; *Victoria Daily Times*, March 8, 1916; *The Daily Province*, March 9, 1916; *The Daily Colonist*, March 8 and 14, 1916; Environment Canada 1991.

Details: Heavy continuous rain caused the worst flooding conditions encountered since 1911. All sections of Victoria reported drains and sewers unable to carry off the water. In downtown Victoria, flooding occurred at the Yates, View, Wharf and Store streets by backing up of sewers. The Empress Hotel basement flooded. At the low-lying section near Alpha Street the whole block flooded "until only the tops of the picket (fence) could be seen." The water level in the Humpback Reservoir rose 9 in. (22.5 cm) an hour. At Elk Lake, water rose 6 in. (15 cm) below the high water mark, being the highest since 1911 when it was 14 in. (35 cm) below the mark. On March 7, a heavy snowfall occurred in the vicinity of Duncan and southerly to within few miles of Victoria.

Heavy rain caused slides and washouts in the Lower Mainland and Fraser Valley. During 60 hours ending March 9 at 1:45 p.m., Vancouver recorded 8.50 in. (215.9 mm) of rain. The heavy rains caused serious flooding in a section of south Vancouver. Worst damage occurred at Manitoba Street, 31st and Knight, Commerce Street, Joyce/Euclid Avenues, 59th/Victoria Road, 43rd/Victoria, Wilson/Bruce Street, 41st/Martin Street, Lakewood Street and Lakewood Drive. Damage on Manitoba Street between 63rd-River avenues alone amounted to \$5,000. The basement of Henry Hudson School on Cyprus and Cornwall flooded, sending 406 children home. The toilet rooms and boiler room were under 6 ft. (1.8 m) under water, 6 in. (15 cm) of that above the top of the boiler box. Kitsilano School on Fourth and the Model School on 12th and Ash also flooded but did not close.

BCER interurban cars were running through water on the Eburne line at Ardleigh on the Burnaby Lake line. At Argyle on Lulu Island, a washout between Eburne-Westminster left the tracks suspended in the air. The Brunette River rose to the stringers on the BCER bridge. The Brunette River had risen several feet causing serious flooding near the VPR packinghouse on the Pitt River Road at Sapperton. The basement of this building was flooded with 4 ft. (1.2 m) of water, covering some \$20,000 worth of skins stored there. The sheep house and the pig house were also partly flooded. Traffic on the Pitt River Road was blocked at the bridge crossing. The road and the CPR tracks and several side-tracks near the packinghouse were flooded. The city water main connected to this bridge was under water. On the bridge a gang of men tried to keep the driftwood away.

In New Westminster, the continuous near-record rain dumped more than 7 in. (175 mm) in the 48-hour period ending 9 a.m. on March 9. According to Dominion meteorologist H.A. Wilson, between the night of March 6 and the morning of March 10, a total of 7.68 in. (195.1 mm) came down. The storm was one of the most costly experienced in the city for years. Flooded basements and washouts were reported from all parts of the city.

On the CPR line near New Westminster, Glen Brook washed out and undermined the tracks at the foot of Asylum Hill. Early on March 9, there was water flowing over Columbia Street. It soon made an outlet for itself by tearing a huge hole in the fill under the street, under the CPR and the GNR tracks down to the river. Both the CNR and GNR rail lines were tied up and Columbia Street was closed to vehicular traffic. The direct cause of the flood at Glen Brook was a slide some distance up the ravine. For some months, the creek water was carried off through the lower part of the great sewer under construction. A dam had been constructed and a flume took the water there from a hole cut in the top of the sewer at a point below where the construction had been carried out. By midnight, the flume was running at capacity. Early on March 9, a slide came down which knocked the flume galley west. The same or another slide carried away one of the piers supporting the 14-in. (35 cm) water main that feeds Sapperton from Queen's Park Reservoir. The mainline broke and discharged approximately 1 million Gal. (4.5 million L) before it could be shut off. This added to the storm water that was pouring down the creek. It created a roaring torrent that swept everything before it.

The big sewer was undermined in several places and at one point a 50-ft. (15 m) section collapsed. Ingress to the sewer being blocked, the water rose quickly completely surrounding a house. Before falling again, the water had risen to a height 2 ft. (60 cm) above the level of the ground floor. Damage to items in the house was estimated at \$1,500-2,000. During the forenoon, one of the bents of Glen Brook bridge had to be closed to traffic, thus isolating Sapperton. Mr. J.W. Harvey, the owner of the damaged house and whose lawn was under 3-4 ft. (90-120 cm) of mud and sand, put in a damage claim. Harvey claimed that if

the city had not built the sewer and the retaining wall on Columbia Street, this flood would not have occurred. The city refused flood damage liability claiming that such unprecedented conditions would have caused a flood in any event. The rainfall was not only greater than any before recorded, but also the ground was in such unusual conditions as a result of heavy frosts and snows in January and February that slides occurred in the ravine, which were unprecedented. As a result, debris was carried down the creek which would in any case, it was contended, have blocked the opening through which the stream formerly found its way. During the worst of the flood, huge sections of fence and other debris came down. It was pointed out that the sewer was not the only outlet for water from the creek, as there was a big wooden box drain under the street, which was quickly blocked up and rendered useless. On Sixth Avenue, water coming down the hill undermined the foundations of several homes. Flood conditions were reported from every low-lying part in the district.

In the Fraser Valley, banks washed out in several places, flooding a number of areas. GNR suspended rail service between Vancouver-Blaine, Wash. due to a washout in Grandview Cut and slides at New Westminster and along the shore section near White Rock. The slide in New Westminster occurred near the GNR depot at the bridge. The washout at Sapperton also affected the BCER. Canadian Northern experienced similar problems at points east of Port Mann. On the CNR section, a slide occurred between Port Kell-Port Mann. On the Northern Pacific Seattle-Mission line, trouble was experienced south of Huntingdon. GNR also reported slides at their depot and others at White Rock and Townsend.

On March 10, a temporary roadway was built across the Columbia Street washout. BCER was still unable to cross and passengers were transferred. The BCER interurban line between Eburne-Burnaby Lake was still under water. A washout on the Fraser Valley line between McLellan-Sullivan held up the market special and a milk train. The GNR line was still closed indefinitely with crews working on the slides at White Rock and Samish. Scott Road was still under water and miles of flats along the Nicomekl and Serpentine rivers and delta land were flooded.

March 26, 1916

Source: *The Cranbrook Herald*, March 30, 1916.

Details: On March 26, steady rain caused a "bad" mudslide 8 mi. (12.8 km) east of Creston. The slide, "one of the worst in years," carried a portion of track away delaying rail traffic between Creston-Nelson for 24 hours.

June 2-10, 1916

Source: *The Vancouver Daily Province*, June 12, 1916; *The Vancouver World*, June 5 and 12, 1916.

Details: During the second week of June, Vancouver reported 48 hours of rain. Near Hedley, rockslides smashed the 20-mi. (32 km) flume of the Daly Reduction Co. in three places. One rock on the flume weighed at least 50 tons. Large areas in Sumas Prairie and Langley flooded, causing extensive damage to crops. Damage at Sumas Prairie was similar to the previous year when thousands of acres flooded but the flooding was several weeks earlier. On Whatcom/Evan Thomas roads, the water was several feet deep. On June 2, the Vedder River flooded its banks and the Fraser River was still rising reaching 15 ft. 10 in. The BCER line was flooded in many places. Nicomekl River overflowed its banks. The Serpentine River was also running very high and just east of Cloverdale, pastureland flooded. On June 10, the Fraser River at Mission reached 18 ft. 3 in.

June 15-24, 1916

(Spring runoff/flooding).

Source: *The Victoria Daily Times*, June 16, 1916; *The Sun*, June 17 and 22, 1916; *The Vancouver World*, June 15, 20, 21, 23 and 26; July 11, 1916; *The Vancouver Daily Province*, June 20, 21, 23 and 24, 1916; *The Cranbrook Herald*, June 22, 1916.

Details: Flooding throughout the Chilliwack district made the road through Sumas Prairie impassable. The road skirting Sumas Lake was covered with 4 ft. (1.2 m) of water. On June 21 at 4 a.m., the No. 1 sluice box in the Nicomen Island dike was carried away, flooding some 500 ac. (200 ha) of land. The breach occurred at the mouth of the canal that traverses the island. On Nicomen Island, the Stave River Power Co. plant sustained heavy damage. One farmer alone lost 15 ac. (6 ha) of winter wheat valued at \$500. At its peak, the Fraser River at the Mission gauge hovered around 20 ft. (6 m).

Two spans of the big bridge at Mission over the St. Mary's River were carried away. At Cherry Creek, about 4 mi. (6.4 km) from Mission, a rancher and a team of horses had a narrow escape from

drowning when a culvert across St. Mary's River gave way. High water had filled up an old channel beside the St. Mary's River, which normally was dry. The stream, described as a "regular torrent" carried away the man, his horses and the wagon. The rancher managed to survive but lost his team, harness and wagon.

Hot weather, which melted snow caused washouts and interrupted CPR rail service for several days. On June 23, the first westbound arrived at Vancouver over the CPR line since service was disrupted. Between midnight on June 16-noon on June 17, the Elk and Kootenay rivers rose more than 1 ft. (30 cm) and 18 in. (45 cm), respectively. Worst trouble occurred in the Kicking Horse Canyon. The Kicking Horse River carried out the southern span of the railway- and road bridge. The Golden bridge was damaged and a number of residents were flooded out. Late on June 19, the large steel bridge east of Palliser was damaged halting train traffic. The river carried out the cribbing fills in the Kicking Horse Canyon.

During the spring runoff, heavy floods occurred on the Columbia River and its tributary streams. At Bear Creek, houses were swept of their foundations. Bridges had to be burned and dynamited. On the Kootenay Central line, the Bull River railway bridge moved out of line. The Kootenay Central rail line and the Banff-Windermere highway were tied up for several weeks. Late on June 19, floodwaters tore out the fill of the north approach to the steel Kootenay Central bridge at Golden. Late on June 19 with cooler weather and the cessation of rain, the flood situation improved somewhat.

A large area was flooded on the south side and the steel bridge of the Kootenay Central was threatened to be taken out. The approach to the steel CPR bridge at Lemon Creek on the Nelson-Slocan Lake line washed out. It was expected the line would be tied up for several days. The Slocan-Kaslo line was cut by numerous washouts delaying a CNR train 32 mi. (51.2 km) west of Blue River. Trains through the Crows Nest Pass were held up by a large mudslide just east of Cranbrook. Canadian Northern experienced trouble and it would take three to four days to get through trains operating again. On June 18, part of the piles of the temporary railway bridge across the Thompson River washed away.

On June 18, floodwaters inundated Fernie. For two or three days, the city was almost completely isolated. Most of the roads into Fernie were impassable and the railway was tied up. Between June 19-21, no trains were able to get through on the Crow line after water backing up from Moyie Lake covered the track. High water threatened to carry away the city water supply and closed down the school. High water crested on June 19 after cold weather set in the previous day. A washout at Bonner's Ferry cut rail traffic on the Spokane International.

At Wardrop, between Fernie-Michel, the Elk River washed out about 450 ft. (135 m) of grade. The Kimberley branch of the rail line was out of commission for about a week. It was feared that the Wycliffe bridge would go out. Thanks to strengthening operations the structure was saved with only one end sinking about 5 ft. (1.5 m). After the compressor washed out, the Sullivan mine was temporarily put out of commission. For nearly a week, no trains were running on the Kootenay Central. It was reported there were 20 washouts on the line between Golden-Corvalli.

On June 19, the river at Fort Steele reached "the highest level yet recorded" endangering the bridge over the Kootenay River. On June 20, the water went down 1 ft. (30 cm). A "small country bridge" went out and 200 ft. (60 m) of track were under water. On June 22, water rose 10 in. (25 cm) at Kootenay Landing with the water 20 ft. 10 in. (6.25 m) above low water mark. The Nelson River rose 15 in. (37.5 cm) in 24 hours, reaching 16 ft. (4.8 m) above the low water mark. Near Sandon, a large number of washouts occurred.

Overnight June 20-21 in the Fernie area, fast rising water and flooding forced some 100 people from their homes. The riverbank along Morrice Avenue washed away to a depth of 20 ft. (6 m) over a distance of several blocks. The area was flooded from the northern limits of the F annex extension to the natural course of the Elk River in the F annex where the river takes a turn. Over a distance of 1.5 mi. (2.4 km) a width of four to six city blocks between the Morrice-Nicholls avenues were virtual rivers. The majority of the intersecting streets were impassable. In many places the water was level with the lower windows of the houses. All approaches to the Fairey Creek bridge, which carried the main city water supply, were blocked. At Nelson, the water rose 22.5 in (56 cm) in 24 hours. The flooding streams continued to take out bridges and other structures, such as the crib work at Kaslo Creek (River?) and flooding nearby buildings. On the GN rail line, the Olson bridge went out and the bridge at Hosmer was cut off when the river changed channel above the town of Fernie. A large volume of water flowed past the Fernie Lumber Co.'s mill endangering the mill and nearby houses. The change of current also pumped more water into the F annex. On Arrow Lake, 1.5 million ft.³ (28,300 m³) of logs owned by the Edgewood Lumber Co. broke lose and were thrown onto the shores. The Lardeau railway line was closed indefinitely. Much damage was sustained in Natal near Michel.

Overnight June 21-22, the Elk River dropped about 2 ft. (60 cm). At the Fairey Creek bridge, the logjam increased in size, diverting the river current in the direction of Island Road. Late on June 21, one of the two pile drivers working on the 200-ft. (60 m) breach at Sparwood flipped over the end of the new trestle, causing a further 24-hour delay. West of Fernie, a large slide came down onto the tracks of the GNR branch line. Repairs to the Hosmer bridge and at Olsen were extensive and would take several days. The GNR main line near Belton at the western gate of Glacier National Park was reported washed out over a distance of 3 mi. (4.8 km). Large damage was sustained through the valley with Ross Saskatoon Lumber Co.'s damage in lumber and logs alone estimated at \$30,000.

Due to the unprecedented rise of the Kootenai River, Bonner's Ferry, Idaho was under 3-4 ft. (90-120 cm) of water. The lower part of the city was covered with as much as 15 ft. (4.5 m)

October 31-November 8, 1916

Source: Sanford 1978 (p. 201).

Details: On the night of October 31, 2 ft. (60 cm) of snow fell on the Coquihalla section of the Kettle Valley Railway (KVR) *1) On November 1, a rockslide just west of Coquihalla smashed into a plow train, killing a crewmember. On November 2, more rocks came down followed by still more snow. On November 8, three slides blocked the line at Iago and 100 ft. (30 m) of track washed out near Jessica, forcing trains to detour over the longer line via Spences Bridge. No sooner was the track repaired than more snow fell, once more closing the line. On January 13, 1917, the line reopened. (Sanford 1978).

*1) The KVR section through the Coquihalla Pass had only been opened in the summer of 1916.

January-February 1917

Source: Sanford 1978 (pp. 201-202).

Details: A week after the KVR line reopened on January 13, it closed again a week later. On February 18, after great effort, the line was reopened again. Soon another 6 ft. (1.8 m) of snow fell on the Coquihalla Pass, trapping a passenger train at Iago. The snow was so deep that plow trains trying to rescue the stranded passengers became entombed themselves. Only after two days plow trains were able to reach the trapped train and it took an entire month to reopen the line. Seven hours after reopening, winter conditions closed the line once more. It was not until late May that there was anything approaching uninterrupted service (Sanford 1978).

December 13, 1917

(Ice storm).

Source: *The Chilliwack Progress*, December 20, 1917; January 3, 1918.

Details: On December 13, an ice storm caused considerable damage throughout the Chilliwack district. Heavy rain, which fell all day, froze as it came down. The surface of a few inches of snow on the ground turned into a sheet of ice. Ice on trees and utility poles grew in thickness as the day advanced. Late in the afternoon, damage started to occur. Telephone, telegraph and power lines sustained heavy damage. Part of the Chilliwack Telephone Co. system was knocked out. Telephone lines, carrying between 30-50 wires leading into the city were the first to go, downing long stretches of poles. In places they took the power lines down with them. By 6 p.m., the telephone and power services to residences were knocked out. The CPR and GNW telegraph and long-distance telephone lines also went down. Ornamental trees, particularly the older orchards, also suffered. In some cases a third of the trees were destroyed. Around midnight on December 13, the wind switched from east to west and the ice began to come down.

Before the morning of December 14, nearly all the ice and snow had disappeared. The GNW telegraph was back in service in the afternoon of December 14. Temporary telephone service was back in operation on the afternoon of December 18. At that time, CPR service was still out of commission.

September-December 1917

Source: Sanford 1978 (pp. 204-205 and p. 221).

Details: On September 12, a rockslide 2 mi. (3.2 km) west of Coquihalla sealed off a tunnel mouth, blocking traffic on the Coquihalla line for a full week. On October 3, another slide knocked out a 360-ft. (108 m) trestle at Jessica. On December 3, after a fierce snowstorm hit the Coquihalla Pass, a snow and rockslide struck the rear of a plow train that was trying to clear the tracks at Iago. The caboose was knocked 700 ft. (210 m) down into a canyon, killing one crewman and seriously injuring two others. *1) On December 21, long before the first

snowfall had been totally cleared away, more snow fell and blocked the rail line. The snow was so deep that it took an entire week just to clear the 18-mi. (28.8 km) stretch between Brookmere-Coquihalla. (Sanford 1978).

*1) From the day that regular passenger service began on the KVR in 1915 until its termination 49 years later, not a single passenger was ever killed and injuries to passengers were but a handful. (Sanford 1978).

December 26, 1917-January 1, 1918

(Ice storm and rain-on-snow).

Discharge (m³/s): Max daily; December 29: Sooke: 66.8; December 30: L. Qual.: 41.6; December 31: CR/CL: 413; Cowich.: 182; Sproat: 151; Stamp A.: 496; January 1: Capil.: 233; January 3: CR/CL: 799; Stamp A.: 779 (extreme record); January 4: Cowich.: 224. max. instant.: N/A.

Source: *The Chilliwack Progress*, January 3 and 10, 1918; *The British Columbian*, December 27, 28, 29 and 31, 1917; January 2, 3, 4, 5, 8, 7 and 10, 1918; *The Daily News*, January 2, 1918; Sanford 1978 (p. 205); Ramsey 1962 (pp. 125-126); Eisbacher and Clague 1981; Ewert 1986 (pp. 138-139); Bowman 1992; Wilson and Wilson 1998 (p. 20); Environment Canada 1991; US Army Corps of Engineers 1991 (p. 1)

Details: On December 26, a second ice storm within two weeks struck the upper end of the Fraser Valley. Three days of heavy rain and below freezing temperatures caused heavy damage in the Chilliwack area. During the storm, the coating of ice increased to 4-6 in. (10-15 cm). The storm was described as "the worst on record for the valley." The Fraser Valley north of the river appears to have escaped the worst of the sleet storm, which caused havoc in the vicinity of Huntingdon and Abbotsford. Maple Ridge was reported to be only slightly affected. Never before, had such weather and such rapid change been experienced in the Fraser district. It appeared to have traveled in a southwesterly direction. Its western limit was at Ruskin, while extending right into Washington State. The storm lasted practically without intermission till early on December 29 when the temperature rose suddenly.

The sleet and rainstorm with a maximum daily precipitation of 70 mm, or 206 mm for the duration of the storm in the downtown Vancouver area caused landslides in the Vancouver region (Eisbacher and Clague 1981). New Westminster recorded 2.5 in. (62.5 mm) of rain in the 24-hour period ending the morning of December 29. About 1.75 in. (43.8 mm) of this fell after 8 p.m. on December 28. This brought the total precipitation for the previous four days to between 5-6 in. (125-150 mm). According to Dominion meteorologist H.A. Wilson, it was very unusual to receive such a large quantity with temperatures hovering only a few degrees above freezing. Total rainfall for the week ending January 1 was 9.27 in. (235.5 mm). *1)

All communications between New Westminster-Chilliwack were cut. The storm caused worse damage than during the previous one. This time, it did not only affect the BCER light and power lines but also put the BCER railway system out. Damage done to light, power and trolley lines of the BC Electric ran into several hundred thousands of dollars. Damage estimates of losses along the BC Electric system alone ran over \$100,000. It would take months before conditions were back to normal.

The three-day ice storm beginning December 27 piled ice to a depth of 3-4 in. (7.5-10 cm) on wires. Damage to wires and 550 poles that crashed to the ground, and from track washouts swollen with the "Silver Thaw" on New Year's Day totaled \$150,000. In addition, a completely new watercourse had been created just east of Huntingdon, which now required bridging. The Vedder River had overflowed its banks, washing out track to a depth of 4 ft. (1.2 m) in places for 0.75 mi. (1.2 km).

Electric light and power, telephone, telegraph, train and mail service, domestic water and fire protection service, vehicular and even pedestrian traffic were completely tied up. Due to the lack of power the BC Electric stopped running. Chilliwack was isolated due to this destructive ice storm. Eight BCER high-tension poles came down at Vye, 1 mi. (1.6 km) north of Huntingdon. In addition to the light and power lines, these poles also carried the 40,000-V transmission feeders for the trolley wires. The ice on some of the wires was several inches in diameter. The rails and trolley wires were also covered in ice. The sleet cutters on the trolley wheels were of no avail against the latter.

In Chilliwack, a ll light and power lines and many of the heavy poles were down. The Chilliwack Telephone Co. system sustained heavy damage. The company was forced to practically rebuild the entire system. Among the larger users of electric power to be seriously handicapped was the B.C. Milk Condensing Co. at South Sumas. Chilliwack was without light and power for several weeks, many of its own lighting and telephone poles strewn about the streets. Railway operations and restorations east of Huntingdon were run well into February by three steam locomotives the company had borrowed from the CPR, Timberland Lumber Co. and Shearwater Lumber Co. It was not until a week or two after the

beginning of the storm that the section from Huntingdon west to Coghlan could be operated by electricity (Ewert 1986).

On December 26, telegraph wires and telephone wires of the Chilliwack Telephone Co. began coming down under the weight of the ice. All telephone and telegraph to Chilliwack and many long-distance came down again. The BC Telephone long-distance lines above Hammond, and telegraph wires were down. The damage near Huntingdon, Abbotsford and Clayburn was reported to be equally bad. BCER Superintendent W.H. Elson summed up his impressions of the situation as “indescribable,” while others described it as “simply appalling.” It was expected it might take six weeks before a full light and power service would be restored as it practically meant rebuilding the whole system. To restore the telephone system being in the same situation, might even take longer. The transmission line to Western Canada Power Co.’s (formerly Stave Lake Power Co.) went down where it crosses Matsqui Prairie and the wires were also down across the Mission bridge. *2)

The lines carrying the trolley, high tension and telephone lines for a distance of 45 mi. (72 km) were a tangled mess of broken poles and wire. The BC Electric had a steam wrecking train working from the other end of the line clearing away the debris. The roadbed suffered from washouts in the vicinity of the Vedder River. At Woodroffe, near the east end of the Vedder River bridge, 0.5 mi. (800 m) of track washed out. The bridge, which had been reported washed out, remained intact.

The Vedder River, being “higher than ever in the previous 20 years,” changed its course at Vedder Crossing to the one existing a quarter of a century earlier. It was now sending a considerable quantity of water down on old course to Sardis and then to the Fraser River, instead of Sumas Lake. *3) On December 28, the Vedder River began to rise rapidly. On December 29, it reached a height and force “never before known.” That morning the extensive protection work constructed by the provincial government at Vedder Crossing during the previous summer went out. The river tore a 70-ft. (21 m) wide gap in the Yale Road, took out the two very substantial abutments of the bridge put in only a year prior. In the evening of December 30, floodwaters were up over the foundations of the Vedder Hotel, forcing people to evacuate. BCER hoped to save its own bridge over the Vedder after the main stream had been relieved by the course change. It was feared that the main river would revert to its old course. This would take it right through the city of Chilliwack. With the city 90 ft. (27 m) below the level of the Vedder River, the results could hardly be guessed at.

The rainstorm accompanying the ice storm washed away one of the spans of the bridge and Mrs. Grand’s store on the north bank. Before night, the entire space and roadway to within a few feet of the store were swept away. The eastern abutment of the bridge was in midstream, the bridge having the appearance of having one span washed away. The Vedder Crossing Hall, a new building erected a few years previous, was undermined and collapsed. The river carried parts of it away. On the other side of the stream, the grounds of the hotel were torn away.

Elk Creek, from which Chilliwack, Sardis, Rosedale and other settlements drew their water supply, changed its course above the intake dam. As the water now did not reach the intake, since December 28 water supply to these places was cut. This left Chilliwack without power, water, transportation and telephone and telegraph service. As a result, many residents were without any water service and the city fire protection and the sewage system ceased to operate. Farmers had difficulty getting water for their dairy and stock herds. Being flat, Chilliwack depended on a system of electric pumps to clear its sewers. Having lost power on the night of December 26, left the sewers choked. Following the thaw, many basements flooded, including the hospital where the water rose above the level of the furnace. Due to the ice, it was unsafe to drive stock to creeks or streams. Fruit orchards also sustained heavy damage. The weight of the ice damaged fruit trees, shade trees and shrubbery. In some apple orchards, not a tree remained standing and all raspberry patches were flattened. Even the tops of big fir trees were broken off. During the storm, the frost resounded with pops and cracks like rifle shots while the fir trees roared like cannons.

In Port Coquitlam, the main section of the city flooded. A logjam had formed on the upper side of the CPR bridge. After an attempt to dynamite the jam on December 31 failed, a large gang of men continued to clear out with the aid of a locomotive and cables. It was feared that the structure would be carried away (*The Daily News*).

Besides losing rail traffic, Chilliwack, Langley and Matsqui also lost vehicular traffic in many places due to fallen trees and poles across the roads. Mission City suffered similar damage due to the sleet storm. Washington Street was impassable for vehicular traffic. The telephone service suffered the worst with almost all the lines down. In Washington Street between J. Plumridge’s Store and Stave Lake Road, a distance of almost 1 mi. (1.6 km), not one telephone pole was left standing. Looking east from Grand Avenue, the street appeared like one long ladder, the fallen poles forming the runs. The ice formed on the wires was 2 in. (5 cm)

thick. A foot-long section of wire covered with ice 5 in. (12.5 cm) in diameter weighed 10 lbs. (4.5 kg). One of the high steel towers, which carried the high-power lines across the CPR line, was brought down under the terrific weight of the ice. Nearly all the streetlights were torn down. It was estimated that it would take 2-3 weeks before the electric light service could be restored.

Though not by ice, the CNR line was also tied up. East of Ruskin, all telegraph wires on the CPR were down to Ruby Creek. South of Huntingdon near the border, CPR lost 25 poles. There was also a break in the telegraph service south of Blaine, Wash. where it was reported that 12 mi. (19.2 km) of pole line were down. Rail traffic was tied up due to a slide at Albion, 3 mi. (4.8 km) east of Port Haney. Early on December 27, another slide off Mount Lehman, a "prolific source of slides," held up a train and brought down the wires. Rail traffic on the Canadian Northern was also tied up. Their local from Hope derailed at St. Elmo and the passenger train due in Vancouver on December 26 was stalled at Floods, near Yale. While held up by a slide, another slide came down behind it, leaving the train only 0.75 mi. (1,200 m) to move on. Eastbound trains could not get past Mount Lehman due to other slides.

Several slides came down on the GNR rail line between New Westminster-White Rock and at Samish. The worst trouble was experienced with a washout at Ferndale, Wash. where the river was high and still rising. With the GN telegraph line was down, both south and east communications were out. The only telegraph communication available was via the CPR wire to Victoria, and from there to Seattle and then to the east.

On December 29, a two-engine plow train stalled on the KVR line in a snowdrift at the lower end of the Bridalveil Creek trestle near Romeo. While crews were trying to dig themselves out, another snowslide came down the canyon, sweeping out all but a few trestle bents upon which the rear of their train was standing. Unable to move either way and with snow continuing to fall, the crews drained the locomotive boilers and abandoned their train to winter. After the crews hiked out of the Coquihalla Pass, the snow continued to fall for another week. On January 8, a quick thaw brought a rapid reversal in snow conditions. Hoping to free the engines and clear the line, the crews snowshoed back in. Though the men managed to refire their engines, the thaw brought dozens of snowslides. Not until 20 days later, did the train reach clear track at Portia, 13 mi. (20.8 km) west. However, behind the train the tracks as fast filled in again and no further efforts were made to reopen the line till May. (Sanford 1978).

While the sleet storm was still at its height, a warm Chinook wind started melting snow on the upper levels of the hills. On December 29, the top of Mount Cheam was bare. With the rise in temperature early on December 29, following a rapid melting of ice in some places 5 in. (12.5 cm) thick, flooding started. On the BCER line at Meridian already two washouts occurred. Mild weather and rain on December 31 caused flooded basements and other inconvenience.

The BCER line between Mount Lehman-Chilliwack practically had to be rebuilt. The necessity of removing the wreckage made this task greater. On December 31, BCER was still operating a limited service as far as Gifford. It was also trying to break through to Huntingdon with a steam locomotive borrowed from CPR. The major washout was 60 ft. (18 m) long with 6 ft. (1.8 m) deep water going through this gap and still rising.

Early on January 31 (?), the CPR line reopened with four trains arriving at Vancouver. Later a new slide was reported on the line. On the mainline, a serious washout occurred 12 mi. (19.2 km) east of Dewdney. The Canadian Northern was still only operating as far as Rosedale. The GNR coast line was still out. GN's telegraph lines to the east were still down but the GNW wires to the south were operating. Due to the washouts on Pitt River Road opposite Booth's farm near Maillardville and near the Junction, jitney traffic plying between the Junction and New Westminster was diverted through Port Moody to Port Coquitlam.

The Nooksack River also went on the rampage. In the streets of Sumas, 4 ft. (1.2 m) of water was reported. The river also washed out a section of BCER track just east of Huntingdon. The river caused heavy damage and greatly altered its course. Now crossing the boundary, it also flowed into Sumas Lake.

*4) Sumas City was also reported to have suffered from the ice storm and subsequent flooding. On January 3, BCER service still only run as far as Abbotsford. Crews were still working on the washout on the Nooksack River east of Huntingdon. The company was hoping to get across this gap within the next three days. On January 4, BCER service was restored as far as Mount Lehman while train service was through till Huntingdon, utilising the steam locomotive beyond Gifford. As soon as the track would be cleared, BCER would restore rail service using steam from the end of live wire. By January 5, electric power was restored as far as the Clayburn substation and to Abbotsford. Crews were still working on the big washout at the crossing with Whatcom Road.

Late on January 7, a BCER work train made it through to Chilliwack. But east of Vedder, the track was not strong enough to carry the big locomotive and the passenger train. The opening of the line was delayed

by a day as the washout east of Vedder at Woodroffe, 4 ft. (1.2 m) deep and 0.5 mi. (800 m) long, took much longer to repair than originally anticipated. Work on the light and power lines was progressing. The repair of the washout caused by a burst culvert on Pitt River Road opposite Booth's farm was completed. A temporary substantial wooden bridge, 36 ft. (10.8 m) long and 16 ft. (4.8 m) wide was constructed over the gap. It was calculated to accommodate traffic well into spring when the government was expected to decide whether to construct a new and larger culvert or a permanent bridge at the site. The former culvert had proven to be too small to handle a rush of water during an abnormal high rainfall, besides showing signs of decay.

On the evening of January 9, passenger service to Chilliwack was restored. BCER telephone communications were completed as far as Abbotsford. On January 10, the gap between Delairs-Hunt was temporarily closed. For the first time since the system went down, Sumas and Hunt had power. If weather would be favourable, lights and power into Chilliwack might be restored within another two weeks.

After a hiatus of two days, Canadian Northern was operating again to Rosedale and from Hope east, with no service in between these points. On January 2, half a carload of dynamite was used to clear another debris slide at Mount Lehman. Both CPR's main and branch lines were operating and communications were restored through to North Bend. GNR was again running to Seattle but south of there the line was flooded and tied up near Mount Vernon. At the washout at Pitt River road at Booth's Ranch, the road was still impassable. "Jitneys" were still transferring their passengers at the gap. At the bad slide in the cutting of North Road bridge, where contractors were building the GN cut-off to pass under North Road, was cleared. It had practically buried a steam shovel and covered 100 yd. (90 m) of newly laid track. It also broke the Burnaby water main and caused other minor damage.

In early January, the Capilano River went on a rampage, taking out the PGE rail bridge "for about the 'teenth time." And at other points along the line, slides and washouts forced a shutdown of operations. (Ramsey 1962).

*1) Total December rainfall for Sooke was 25.6 in. (650.2 mm) while at the Humpback Reservoir 21.4 in. (543.6 mm) were recorded (*The British Columbian*).

*2) The original Stave Falls power development was started by the Western Canada Power Company, a BC Electric competitor. In 1920, after some years of competition between the Stave Falls and BCER companies, BCER took over the Stave Lake Power Company (Wilson and Wilson 1998).

*3) Up till 20 years prior, rather than flowing into Sumas Lake, the Vedder River emptied into the Fraser River (*The British Columbian*). In 1918, the British Columbia government started the Sumas Lake reclamation project, involving the diversion of the Vedder River into a straight, narrow canal formed between two dikes. The Sinclair plan was completed in 1924, protecting the vast area of Sumas Prairie for intensive agriculture (Bowman 1992).

*4) The Nooksack River basin is located in the uppermost northwest corner of Washington state. It has a drainage area of 826 mi.² (2,139 km²), including 49 mi.² (127 km²) in Canada. During high flows, floodwaters from the Nooksack River cross a low divide near Everson and flow northward into the Sumas River and then into Canada. The magnitude of these overflows has not been precisely determined, but it is believed to occur when the Nooksack River exceeds 20,000-25,000 cfs (566.3-707.9 m³ /s). Aggregation of the river channel in this vicinity appears to be causing the overflow to occur at lower flow rates year after year (U.S. Army Corps of Engineers 1991).

February 8-9, 1918

Discharge (m³/s): Max. daily: February 9: Nan.: 946; Sproat: 283; February 10: L. Qual.: 73.6; max. instant.: N/A.

Source: *The Daily Colonist*, February 10, 1918; Environment Canada 1991.

Details: On February 8-9, heavy rain north of Nanaimo caused three breaks in the E&N rail line. On the Alberni extension of the E&N line a washout occurred. Two washouts were reported on the Parksville-Courtenay branch line. On February 9, the afternoon train from up-island did not arrive at Victoria. Train service was expected to resume on February 11. At McDey Creek, Cameron Lake, the bridge foundation was carried away.

April 30, 1918

(Spring runoff ?).

Source: Sanford 1978 (p. 205).

Details: On April 30, a logjam piled up against the main pier of the KVR railway bridge just north of Rock Creek, causing the bridge to be severely damaged. Traffic on the KVR line east of Penticton was disrupted for a two-week period. (Sanford 1978).

November 13-18, 1919

(Dam burst/flooding).

Discharge (m³/s): Max. daily: November 15: Capil.: 348; November 16: L. Qual.: 45.9; Nan.: 450; max. instant.: N/A.

Source: *The British Columbian*, November 17 and 19, 1919; Eisbacher and Clague 1981; Environment Canada 1991.

Details: A rainstorm with a maximum daily precipitation of 68 mm, a two-day maximum of 101 mm or 160 mm for the storm total in the downtown Vancouver area, caused landslides in the Vancouver region (Eisbacher and Clague 1981). New Westminster recorded 6 in. (152.4 mm) during a rainstorm that lasted several days. It was the heaviest rainfall for a similar period for some years. The heavy rain caused a good deal of damage in the municipality of Maple Ridge.

During the night of November 14-15, the dam at Bain's went out and the rush of the water carried some of the old milling on the river road. Minor damage was reported from the Mission main road. At Chester Creek, water was up to the door of Mr. O. Bloomfield's house. A serious washout occurred on the main road between Red Bridge-Ruskin in the Stave River Canyon. For a distance, the whole side of a hill slid into the river, carrying a portion of the road with it. The line of Western Canada Power Co. was threatened and probably would have to be moved further back.

The Lillooet River and smaller streams rose quickly. The whole northern part of the district was described as a "vast sea." On November 19, the waters started subsiding, but not as quickly as they rose. The northern half of the Baker Road bridge was carried away. The bridge on Bossomworth was demolished and the bridge over the Lillooet partly wrecked, the south half of it gone. Numerous culverts washed away and dykes broke through, resulting in considerable inundation and drowning of many cattle. On November 18, the Mission settlement reported experiencing an exceptionally rainstorm which caused several serious washouts and other minor damages. On the Dewdney Trunk road in the Steelhead Valley, Silver Creek flooded in several places 2 ft. (60 cm) over the road and caused washouts.

December 26, 1919

Source: *The British Columbian*, December 27, 1919.

Details: On December 26, heavy rain immediately following a coldspell made parts of the Pacific Highway almost impassable. In the Mission District, Silver Creek carried away the logs and booms at Hanna and Williams' camp. The creek, reaching highest water yet for some time, threatened to flood the camp, reaching the floor of several buildings. On December 26, lake levels were almost as high as during the summer months.

July 13, 1920

(Flash flood).

Source: *The Ashcroft Journal*, July 17, 1920.

Details: On July 13 at 2 p.m., a cloudburst at Cache Creek washed away a home and completely destroyed a garden and orchard. The home belonging to Mr. T. Parke, farmer and postmaster, washed several hundred feet down a creek and was entirely buried in mud and gravel. As the flood came without warning, the residents had to vacate the house in a hurry, some of them half dressed. The family narrowly escaped having to wade through mud and water knee-deep to a place of safety. A few minutes after the house was vacated, it was swept away by the ever-increasing torrent.

The flood did not last more than 15 minutes. Several other houses in the vicinity were flooded with mud and gravel. A road camp situated in the path of the torrent a little further down the creek was swept away and was destroyed. A Chinese store was flooded and some tons of rice were destroyed. It was said to have been the most destructive cloudburst that ever visited this part of the dry belt. In the vicinity of the storm, the Cariboo Road was damaged by water or covered with gravel in many places. Some farms and a few of the dwellings on a nearby Indian Reserve suffered some damage.

July 16, 1920

(Spring runoff/flooding).

Source: *The Daily Colonist*, July 22, September 19, 1920; Environment Canada 1991.

Details: Early July, the Nicomen Island dike broke in several places. About 4,500 ac. (1,800 ha) of crops and berries were inundated. Damage to crops was estimated at more than \$200,000. Property damage reached almost the same total. *1) On July 21, a 30-ft. (9 m) break in the Matsqui dike was stopped, keeping the Fraser River out of 10,000 ac. (4,000 ha) of farm land. Communities turned out en masse to assist in fighting the flood. A gang of 300-400 men consisting mainly of Matsqui farmers under the personal supervision of Hon. E.D. Barrow, Minister of Agriculture, closed the breach using thousands of sandbags. It was estimated that in two days more than 100,000 sandbags were filled.

On July 16, the Fraser River at Hope recorded a maximum daily discharge of 10,800 m³/s. (Environment Canada 1991). On July 22, all immediate danger in the flooded low-lying country of the Fraser River was past.

*1) On September 16 at a meeting of Nicomen Island farmers, a resolution was passed asking the Provincial Dyking Commissioners to construct a dike at Nicomen Island of sufficient size and strength to protect the island against recurrence of such floods as in July. Premier Oliver, who was present at the meeting, promised to recommend the necessary expenditure. The cost of the dike might be as high as \$250,000. The residents of the island demanded compensation for their losses. A dispute between provincial and federal governments arose. The province contended that the diversion of the Fraser River above the island carried out in 1918 by the federal government, at a cost of \$80,000, was partly responsible for the previous year's flooding of the island.

October 1920

Source: *The Victoria Times*, October 7, 1920; *The Daily Colonist*, October 29 and 31, 1920.

Details: On October 6, the water in the flooded area of the Fraser River valley delta was higher than at any time during the previous few months. According to R.J. Skelding, the Assistant Agriculturist of the Soldiers' Settlement Board at Lulu Island, floods caused heavy damage to crops. Practically the whole area of Nicomen Island, some 16,000 ac. (6,400 ha). Consequently, the 300-400 settlers, including 22 war veterans and their families, suffered enormous losses. The veterans, who had settled low-lying land in the previous 12 months, lost practically everything.

The provincial government engineer estimated the cost of an entirely new dike for Nicomen Island. It included a public roadway to be strong enough to withstand any future freshets of the Fraser River. In addition to the dike to be built by the provincial government, the Dominion government would assist with dredging and building several jetties in order to obviate the river waters from cutting into the island banks. The existing dike being under control of the Land Settlement Board, the settlers claimed that the Dominion government had spent thousands of dollars at this point, but that the provincial government did nothing. One of the settlers, who had been flooded out in 1894, noted that at that time the provincial government had supplied feed for the cattle, both grain and hay for the horses and flour, meat, tobacco and rum for the farmers (*The Daily Colonist*).

Early January 1921

(Tidal flooding)

Source: *Victoria Daily Times*, January 5, 1921.

Details: During the first week of January, “extraordinary” rain and high tides caused Lulu Island and the smaller islands around it to be inundated. The Fraser River overflowed dikes at their weakest points. At Twigg Island, “owned by Chinamen” the flood box went out. Consequently, the island entirely flooded twice every 24 hours. The municipal road was being washed by the tide “like a seaside beach.” On Mitchell Island at the new Union Cedar Mills, the river surged over the dike and flooded the island for some time. When the mill had been rebuilt, the dike had not been properly reconstructed. At other places, such as at the unfinished dike close to the North Arm, and near the London property, the tide flowed over the dikes near the river. On January 4, all of the Brennan estate was under water and large parts of Garden City and the Alexandra townsite were badly flooded. A fall of 3-4 in. (75-100 mm) every week for four months had gradually saturated the central peat bog, causing it to steadily pour a dark brown stream of peaty water all over the surrounding land.

On January 7, at a public meeting at the Richmond townhall, the installation of powerful electric pumps to drain Lulu Island was considered. The citizens of Richmond had already willingly taxed themselves for dyking and drainage to an extent equal to half the general taxes of the municipality.

Early March 1921

Source: *The Penticton Herald*, March 10, 1921.

Details: In early March, a large rockslide came down from the “almost perpendicular” cliffs about 2.5 m (4 km) southwest of Princeton, just beyond the Red Bluff. A sectionman at Princeton, who discovered the slide shortly before the eastbound train was due, prevented the train from crashing into it. The engine stopped within 150 ft. (45 m) of the slide, which covered the rails to a depth of 8-12 ft. (2.4-3.6 m) for a distance of 40-50 ft. (12-15 m). The rock slide was held entirely on the track by the bank of the cut opposite the cliff and covered the rails to a depth varying from 8-12 ft. (2.4-3.6 m) and a length of 40-50 ft. (12-15 m). It was cleared by 4 p.m. the next day. Later more rocks came down from the same cliff face, delaying an eastbound train by four hours.

May 19-21, 1921

(Dam burst flooding and spring runoff flooding).

Source: *The Penticton Herald*, May 21, 1921; May 15 and 22, 1941.

Details: On May 19 at about 10 p.m., the Penticton municipality’s new dam (Ellis Creek No. 3, or Dufresne dam) broke above the town. About the middle of the night, after a hot day succeeded by a heavy rain, a “big rush” of water and what seemed the peak of the flood came down Penticton and Ellis creeks. *1) The Dufresne failure poured approximately 300 ac/ft. (370,050 m³) of water over the land. The failure was caused by floating of anchor ice, which carried back fill and tamped earth to the surface with it.

On May 20, a “torrent of yellow flood” coming down Ellis Creek overflowed the channel banks in many places. At one time in the morning, it covered south Main Street for a distance of about half a mile (800 m). The south fork, which crosses Main Street, at the corner of Huth Avenue, was a “turbulent river.” It was flooding down to the Okanagan River in half a dozen old courses. At noon, the greater volume of the floodwaters threatened the bridge on Main Street.

The Ellis Creek south fork overflowed its channels at several places in the woods south of the Nagle place, carried it through the Wyles orchard. On the afternoon of May 20, there was a regular river flowing through the Wyles property. Lower down, on the Homer McLean ranch, “a good deal of vegetable crop and a strawberry planting” were washed out. Another stream from Ellis Creek surrounded the Fort place with water running around and under the house, doing considerable damage. West of the Wyles place, the house occupied by Mrs. Roberts was also flooded.

At one time on May 20, the water on Main Street was nearly 2 ft. (60 cm) deep between the Wyles and Fort orchards. Floodwaters washed out the sides of the road. That afternoon, the water running over the road and through the Wyles orchard tore a gap through the road about 20 ft. (6 m) wide and 6 ft. (1.8 m) deep. As a result, the Dog Lake residents were virtually cut off from the town. It was hard to keep Ellis Creek confined to any particular spot as in the past it had apparently flowed down to the river in half a dozen different old courses, none of which were deep enough to hold it in flood time. Debris and rocks continually formed dams, throwing the creek into new courses and causing more damage. The creek uprooted many trees, including a pine at least 4 ft. (1.2 m) in diameter.

Penticton Creek had an even larger volume of floodwater than Ellis, but had a much better channel. The flood carried large boulders. As a precautionary measure the footbridge behind the laundry and the Penticton Bridge at Forest Brook Drive were removed as debris jams continually formed at these points. The laundry itself was saved by sandbagging the water behind the building.

On May 20, the Penticton Creek bridge on Ellis Street was threatened by floodwaters that reached the bottom of its stringers and only a foot below the bridge surface. The structure was closed and to create less obstruction to the current, planks were taken out of it. The new crib work in Penticton probably prevented a serious flood in the residential section along its banks.

A small frame house on the banks of the creek just north of the Ellis Creek bridge was completely surrounded by water. A cottage on the east side of the creek near the Fairview Avenue bridge was threatened with one corner of the house actually overhanging the creek.

On May 21, both Penticton and Ellis creeks were “higher than ever before in the history of the municipality.” Despite efforts made during the previous two weeks to “provide against high water,” the flood rush, following alternating rains and warm spells, swept across roadways, through orchards and open spaces.

South of Penticton, the low road to Fairview was impassable while even the high road had a mile of water-covered highway beyond Myers Flat. McIntyre Creek went on the rampage. A dam up these creek had to be taken out. About \$15,000 damage was done by the undermining of the big siphon across the river below Oliver and of adjacent concrete work. A branch of the McIntyre ran into the big ditch and beside it washing out the concrete and breaking the siphon. On the afternoon of May 20, rain between Fairview-Okanagan Falls was described as a “veritable cloudburst.”

The new dam wall of the reservoir was almost completely destroyed. As the local council considered the flood an “act of God,” no reparations whatever were made to the owners affected. Council of that day refused to consider the matter of damages whatsoever. “In any event, the deflection had taken place upon the Indian reserve,” they contended.

*1) The 275-ft. (82.5 m) long structure was only about one year old and had a cement core 44 ft. (13.2 m) wide and 20 ft. (6 m) deep in the centre that gradually tapered to 4-ft. (1.2 m) walls at the ends.

June 10-14, 1921

(Spring runoff/flooding).

Source: *The Daily Colonist*, June 12 and 14, 1921; *The British Columbian*, August 16, 1921; *Victoria Daily Times*, June 13 and 21; October 26, 1921; Environment Canada 1991.

Details: On June 10, the Fraser River broke through the Nicomen Island dikes and flooded a considerable portion on the island. On the evening of June 10, the CPR gauge at Mission was up 7.5 in. (18.75 cm) and at Yale the Fraser River came within 30 in. (75 cm) of its extreme height in 1920. On June 11, the Gourley (Gourlay?) dyke, a secondary dike inside the main Nicomen Island dike, broke. At 8 p.m. the flood level was

higher than it had been for the past 26 years. Flooding was reported from Langley, Fort Road, Glen Valley, the south shore of the river opposite New Westminster, the Salmon River flats, Ruskin, Mission, Sardis and from many points between Huntingdon-Chilliwack. On June 14, damage to small fruit trees and dairy farms was estimated to reach \$100,000. Some 2,500 ac. (1,000 ha) of fruit and berry crops had been ruined. On June 14, the gauge at Mission was down 4 in. (10 cm).

In the lower section of Nicomen Island, sandbags were holding floodwaters back at the highway, keeping Andy Gourlay's farm from flooding. Settlers worked together for five days around the clock to hold the dikes against flooding by the Fraser River. The new pump installed at Annacis Island was lifting 240,000 Gal. (1,080,000 L) of water back into the river from the delta. The present level of the river was the highest since 1903 and the highest water held by dikes. They held for 1 ft. (30 cm) higher than the high water level of 1920 and then broke just as the Fraser River crested. Initially coming through a narrow break, floodwaters soon widened the gap to some 30 ft. (9 m).

On June 11, the Fraser River at Hope recorded a maximum daily discharge of 11,100 m³/s or the fifth highest for the recording period 1912-1982 (Environment Canada 1991). On June 12 at 1 a.m., the river gauge at Mission reached 21 ft. 2 in., having dropped 2 in. (5 cm). *1) On June 12, the Fraser River at Quesnel had dropped 3 ft. (90 cm) since the morning of June 11. On June 14 further downstream, the Fraser River rose another 3 in. (7.5 cm), probably due to heavy rains in the areas, but later that day the river receded. Reports from the interior indicated that at the junction of the North Thompson and Fraser rivers, the high water mark had been reached. Though many acres of farmland would be under water for many more days, no increase of inundated areas was expected.

According to Hon. E.D. Barrow, Minister of Agriculture, the damage by the recent floods had been much exaggerated. By June 21, the river level was going down fast with water draining from the flooded areas. By immediately planting the flooded areas with barley, oats, root, and other late crops, there could still be a good crop expected this year.

Nicomen Island ranchers were highly incensed at the apathy shown by the provincial government, which did little or nothing until the break in the dike occurred. *2) On August 19, a delegation of farmers from Nicomen Island addressed the Board of Trade on the recurring flood situation there. The object was to demonstrate that such floods were unnecessary and that a great loss to the farmers would also mean a similar loss to New Westminster (*The British Columbian*). *3)

*1) In 1894, the Fraser River had peaked at 26 ft. 8 in. (*Victoria Daily Times*).

*2) On Nicomen Island, dikes protected two areas. Some 2,500 ac. (1,000 ha) on No. 1 section flooded as its dike was old and patched up. It found no relief from the new channel dug by the federal government through the river bar formed during the previous high water. The 1,000 ac. (400 ha) on No. 2 section did not flood (*The Daily Colonist*).

*3) The break in the dike once again revived the old controversy between the provincial and federal authorities as to the responsibility for the protection of the riverbanks from erosion. The provincial government was taking the stand that it was the duty of the federal government to undertake such work on navigable streams. The provincial government had already spent considerable money in repairing existing dikes, which had suffered annually through the early summer freshets. The federal government refused responsibility of river protection and paying compensation to the provincial government. In addition, many returning veterans had been settled on Nicomen Island under the federal re-establishment plan. The majority of the 35 settlers that were flooded out were returned soldiers. The controversy became a hackneyed question on the floor of the Legislature year after year. Premier Oliver reviewed the dyking situation on October 25. He felt that since the lands were difficult to protect, the settlers should never have been there in the first place. The provincial government had already spent \$100,000 at Nicomen Island and an additional \$500,000 would be required to protect the area properly. On behalf of the provincial government, Oliver offered to spend dollar for dollar with the federal government on dyking of the island, provided that the Dominion would first protect the Nicomen Island riverbank against erosion. An appeal had been made to the former Conservative government, which agreed to construct roads that would serve as dikes by raising the level of the road above the high water mark of 1894. According to Hon. Frank Carwell, federal minister of Public Works, the work at Nicomen Island would cost \$289,000 (*Victoria Daily Times*).

August 13, 1921

Source: *The Ashcroft Journal*, August 19, 1921; Evans 1986b; Clague and Evans 1994.

Details: On August 13, a landslide dam occurred near the Hammond Ranch at Basque, 6 mi. (9.6 km) south of Ashcroft. The slide with about 0.5 mi. (800 m) of frontage came down in stages completely changing the aspect of the country. The dam formed by quaternary sediments blocked the Thompson River for several hours (Clague and Evans 1994 p. 8). Several miles upstream, the river rose about 12 ft. (3.6 m) before it broke.

October 24-29, 1921

(Rain-on-snow).

Discharge (m³/s): Max. daily: October 28: Capil.: 479 (extreme record); Rainy: 144; October 29: L. Qual.: 85.0; Nan.: 1,160 (second highest for period of record); Sooke: 96.8 (extreme record for period 1916-66); Sproat: 219; Stamp A.: 566E; October 30: CR/CL: 490; max. instant.: N/A.

Source: *Vancouver Daily Province*, October 29 and 31, 1921; November 29, 1921; *The Daily Colonist*, December 13, 1921; January 1, 1922; *The British Columbian*, October 28, 29 and 31; November 1, 2, 3, 4, 5 and 8, 1921; *Victoria Daily Times*, October 28, 29 and 30, 1921; May 20, 1922; *The Coquitlam Herald*, October 19, 1971; *The New Westminster Columbian*, October 27, 1971; *The Squamish Times*, September 10, 1991; Eisbacher and Clague 1981; Eisbacher 1983; Ramsay 1967 (pp. 59-67); Evans 1986a; Skermer 1988; Environment Canada 1991; Phillips 2005.

Details: During the last week of October, heavy rains occurred on Vancouver Island and the Lower Mainland. The rain, unabated for three days ceased on October 29. On October 28, the severe storms were centred over Prince Rupert. At Sitka, Alaska, the barometer fell to 28.91 Mb. During the 24-hour period ending 5 a.m. on October 28, Victoria and Vancouver recorded 0.84 and 2.24 in. (21.3 and 56.9 mm) of rain, respectively. Between October 28 at 5 a.m.-October 29 at 10 p.m., Victoria received an additional 1.35 in. (34.3 mm) and Vancouver 1.78 in. (45.2 mm). A rainstorm with a maximum daily precipitation of 59 mm, a two-day maximum of 83 mm or 144 mm for the storm total in the downtown Vancouver area, caused landslides in the Vancouver region (Eisbacher and Clague 1981).

According to the *Victoria Daily Times*, “never in the history of this section of the Pacific coast, have flood conditions been so serious.” Floodwaters roared through Port Coquitlam streets, leaving behind a wide area of devastation. *1) Water spilled over the banks of the Fraser, Pitt and Coquitlam rivers. It burst through torn dikes, sweeping through the Fraser Valley from Mission to Port Coquitlam, 26 mi. (41.6 km) away. Over half of Chilliwack was submerged. The Myrtle Hotel, a jewellery store, a barbershop and several homes were swept away. A safe belonging to the jewellery store was later found on a sand bank miles away. The city’s two bridges were swept away, after logjams formed. The CPR lost a considerable amount of rolling stock. The railroad later sent sleeping cars from Vancouver to provide temporary shelter for those who had lost their homes. All access roads into the city were under water. As a result from the recent high water, roadbeds were softened.

Emergency supplies had to be brought in by rail. Port Coquitlam faced a real threat of famine. The special edition of *The British Columbian* carried a huge headline, which read, “Water Famine Threatens.” This threat was eventually averted by close co-operation between the various local authorities. It was months before things returned to normal. Requests for compensation were made for damages, including the pipeline, sustained on October 28 by the city of Coquitlam. *2)

Floodwaters in the Capilano River tied up railway traffic on the PGE line. Between Vancouver-Lytton, heavy rains fell for several days, causing washouts to railway tracks and bridges. CNR officials initially confident that they could get a train through later on October 29, later found the damage to be worse than anticipated. Mudslides on the CNR line at Boston Bar and in the Fraser Valley were holding up traffic. No. 2 train, due in Vancouver on the morning of October 28 was cancelled again on October 29. It was hoped to get it through later on October 30. CPR announced it would be at least five days before trains would be running again in and out of Vancouver. A big washout, 100 ft. (30 m) long and 40-60 ft. (12-18 m) deep, cut the CPR line just east of Mile 121 on the Thompson subdivision. On the morning of October 29, the water at this point had not gone down. Another big washout occurred a few hundred feet east of the west switch at China Bar. At Mile 8 on the Cascade subdivision, a 40-ft. (12 m) long and 8-ft. (2.4 m) deep rockslide came down. Three small washouts occurred between Mile 12-14. The washout at Mile 12, was 60 ft. (18 m) long and 20-25 ft. (6-7.5 m) deep. Serious damage occurred to the bridge at Kale Creek. Part of the west pier of the approximately 60-ft. (18 m) was destroyed. West of Albion, the westbound track was covered with a slide 30 ft. (9 m) long and 8 ft. (2.4 m) deep. At the Coquitlam-Westminster junction, water was running over the main track all the way from the Coquitlam River to the bridge at the east end of the Coquitlam yards. The west span of the Coquitlam River

gave way and water cut through the dump of both main tacks west of Westminster Junction station. All ground north of the station and south and west of the Coquitlam River was under water.

Early on October 28, the Coquitlam River had risen rapidly, flooding a considerable area from Gregory Tire Works to the CPR yards. The tire works and the blacksmith shop were forced to close. CPR employed a gang of men keeping one span of the bridge free of debris. At noon, the river was still rising. The CPR roundhouse was isolated and part of the track leading to the Pitt River was flooded. The residents of a home that flooded near the Agricultural Hall had to evacuate. Schools would not open till November 7 after temporary arrangements were made to supply water for sanitary purposes. By then, the CPR bridge would be walkable for the children.

The Dewdney Trunk road was closed indefinitely to all trucks and heavy vehicles from the Pitt River bridge to Latty Road. Low-lying sections on McLellan and Johnson roads, and the Pacific Highway detour were flooded. Cars had difficulty coming through at Meridian as the Vedder River was swollen. At the Queen's Park (Hatchery?), 20,000 salmon fry were lost when the water failed. A minor washout occurred on Simpson Street at the junction of 10th Street/Royal Avenue. On October 28, the Brunette River rose rapidly. When a logjam formed at the Pitt River bridge, water was lapping against the underside of the deck. Some industrial plants, particularly the Swift Canadian packinghouse suffered from flooding. On November 1, CPR rail service was resumed for the first time since the Coquitlam washout. The Kettle Valley No. 2 went over GN tracks to Sumas and Mission and then over the main CPR line over the Coquihalla Pass to Nelson.

On October 28, heavy rainfall caused flooding conditions on Britannia Creek, (gradient 17%) 40 km north of Vancouver. During the 24 hours previous to the flood, 5.74 in. (145.8 mm) of rain fell in the district. Warm Chinook winds melted the snow added water to the already swollen streams. Then, according to "Japanese eyewitnesses" that were in the mountains at the time, at 8 p.m. a cloudburst took place. An enormous cloud which hovered over Goat Mountain literally changed into a "flash of solid sheet of water" (*The Vancouver Daily Province*).

Halfway between the dams and the beach was a wider valley, ending in a considerable gulch and canyon. A few miles above the town, where the mine railway crossed a narrow gorge, a culvert had plugged. The railway embankment acted as a dam, ponding an estimated 14 million Gal. (63 million L) of water (Skерmer 1988). One of the unstable banks of the creek collapsed, temporarily blocking its flow. When the barrier broke, a devastating deluge of logging debris, sediment and water hit the town of Britannia Beach at 9:30 p.m. *3) A watchman at the "railway fill" above the town first saw a solid wall of water coming towards him. Britannia Mines manager S.J. Donahue, at the mine 3 mi. (4.8 km) back from the beach, sent an urgent message over the mine telephone. It was received by Ms. Elaine Patterson, who was on duty at the compressor plant in the village. She instantly rang everybody connected by telephone, simply carrying the manager's message, "For God's sake get out of your houses, flood coming down the creek." Before the warning could be understood and passed on to all residents, the waters crashed down, sweeping away the transmission lines and plunged the village into darkness. In its 3-mi. (4.8 km) journey, the water had fallen 2,000 ft. (600 m) and left Britannia Creek running through the village itself. Dynamite had to be used to divert it back to its former course. The flood came upon a community confused by the sudden darkness. Falling timbers injured many people. Most of the survivors who lived in the centre of the town were left with nothing "but the clothing they stood in."

Later reports put the height of the wave that struck the town, between 3-70 ft. (0.9-21 m) (Skерmer 1988). Eyewitnesses described the torrent, which swept the residential part of the mining village as a "wall of water 70 ft. (21 m) high" (*The Vancouver Daily Province*). Homes were sheared off their foundations, crushed, or buried. More than 50 of the 110 homes in the settlement were destroyed. A number of buildings were seen drifting out to sea. Howe Sound in the immediate vicinity was covered with floating debris. Thirty-seven people lost their lives and 15 others were seriously injured. (Ramsey 1967; Eisbacher and Clague 1981; Eisbacher 1983). *4) As some of the bodies were washed into the muddy waters of Howe Sound, some of the missing were never recovered. The body of a miner killed in a mine accident just before the flood was carried out to sea. Six gangs of men each under a foreman, all of whom were sworn in as constables, carried out rescue and recovery operations under the senior police officer Const. North. The assay office was turned into a temporary morgue. Much of the centre of the town was under a 10 ft. (3 m) deep mass of matted and tangled cables, poles and parts of damaged or destroyed buildings, as well as mud, rocks, logs and trees up to 5 ft. (1.5 m) in diameter (Skерmer 1988). Telephone and telegraph communications to Squamish and Britannia Beach were cut off.

Survivors said that the worst part of the disaster was the crying of the injured or bewildered villagers. One man climbed onto the roof of his house, which was bobbing about in Howe Sound (Phillips

2005). A survivor who was asleep in Bunkhouse No. 3 woke up “by a shock of such force “ that he thought the powerhouse at the 800-foot level had been blown up. The floodwaters took out the original “high level” bridge over the creek. It was later replaced by a steel span. (Ramsey 1967).

It is possible that during this event a small failure along the delta front caused retreat of the shore face near the mouth of the torrent. Several large blocks deposited during the disaster are still scattered about in the vicinity of the highway bridge crossing Britannia Creek (Eisbacher 1983).

On December 12, the Attorney General’s Department announced it would immediately undertake a criminal prosecution of the responsible managers of Britannia Mines. The action charged negligence on the part of the managers in protecting human life. The *Victoria Daily Times* referred to the outcome of the loss of some 14 lives, three weeks (?) prior. Later, the coroner’s jury found that the company had been criminally negligent in constructing a crossing with an opening so small that it could be blocked by debris (Skermer 1988).

The coroner’s jury found that the accident was caused by the collapse of a culverted railway fill that had become blocked thus damming the rain-swollen Britannia Creek. The jury noted that “it was criminal neglect on the part of Britannia Mining and Smelting Co. Ltd. for deliberately allowing the blocking of.... Britannia Creek, causing a menace to persons living at Britannia Beach (*Vancouver Daily Province*, November 29, 1921).

Bob Philip, manager of the Britannia Mines store until his retirement in 1958, said the construction of the houses then contributed to their demise. “They had built the houses on the worst footings I had ever seen. They rested on cedar blocks with a little cement around them.” (*The Squamish Times*, September 10, 1991).

New Westminster’s water supply was cut off. Water service was restricted to two hours a day until the pipeline was repaired. It was not until December 12, that New Westminster’s water supply was back to normal. Since the breakdown, water had been supplied to the city from Burnaby and Silver Creek. With Queen’s Park reservoir full, the entire system was working and water was backing up into the high level reservoirs.

On Vancouver Island, the Island Highway was flooded in many places. Island highways were damaged in several places and all low-lying lands were flooded. The Chase River bridge near Nanaimo was damaged. The official statement issued by the Public Works department on October 29 reads, “Heavy floods are reported in the districts of Esquimalt, Cowichan, Newcastle, Nanaimo, Comox and Alberni. The Duncan wagon road is closed for heavy traffic. The roads at Cowichan flats and at Westholme are under water. Rivers and streams are bringing down large quantities of logs and driftwood endangering other bridges. A washout at a culvert near Hillier blocks the road to Alberni near Bowser station. A heavy downpour between 7-9 p.m. on October 28 was reported at Little Qualicum River damaging roads. The public is advised not to travel by motor until the floods subside. The rainfall north of Victoria has been very much heavier than in the city.”

At the Jordan River dam, a record amount of 7 ft. (2.1 m) of water was running over the dam’s spillway. This tremendous freshet did slight damage to the flume below the dam. Service was maintained using the auxiliary flumes at Alligator Creek. On October 27, Sooke River commenced rising rapidly. Early on October 29, the Sooke River bridge span, the fourth in 30 years washed away. Residents of Sooke Harbour, Otter Point, and Jordan River were cut off from Victoria by road. Temporary boat service at Milne’s Landing replaced the bridge. Victoria’s Sooke Lake water works was threatened with serious damage and perhaps partial destruction by torrents of water overflowing the Sooke Lake dam. On the night of October 28, some 100 million Gal. (450 million L) was going over the dam. Following a rainfall of 9.36 in (237.7 mm) in two days, 3.5 ft. (1.05 m) of water was rushing over the spillway dam at the north end of the lake. *5) Logs and debris carried down Sooke River cracked joints in the pipeline supplying water to Victoria. On October 28, the water reached its maximum height and the rains ceased before serious damage occurred. The main pipeline at a point below the dam moved slightly. Lower down, about 200 yd. (180 m) below the dam, water rushed over the riverbanks and cracked joints in the flow pipe. Though the joints were leaking, the pipe still carried water to Humpback Reservoir. According to William Campbell, caretaker of the city’s Sooke Lake property, “it was the worst rain I have ever seen out here.” The damage claims of landowners around the Humpback Waterworks Reservoir were later settled in favour of the city at a much lower figure. The property owners, in their claim for damage as a result of flooding of their land they asserted flowed out of the reservoir, had asked for a total of about \$3,000.

Early on October 29, the Sooke River bridge span washed out. From all sections damaged highways and bridges were reported. Due to the heavy rain, Nanaimo’s water supply at South Fork was cut off. The bridge spanning the Nanaimo River near Boulder Creek washed away. The damage was estimated at \$3,000. A heavy rush of water at No. 1 dam washed away the sides, exposing the heavy pipeline in danger of collapse. The No. 2 pipe broke in two places. On Wentworth Street, the water rushed out of a manhole to a height of 18

in. (45 cm), closing the street between Selby-Richards streets. Fitzwilliam (Street?) resembled a river. Houses at the foot of the ravine slope were severely flooded.

*1) Port Coquitlam, at the time only eight years old, was almost completely destroyed by fire the previous year.

*2) Though the Coquitlam River is in the Railway Belt, a tract of land 40 mi. (64 km) wide along the CPR route from the Rocky Mountains to tidewater granted to the Dominion of Canada as compensation for the enormous cost of building the railway), the Dominion government rejected the request. Premier Oliver had earlier denied a similar request.

*3) Britannia Beach was a closed town where Britannia Mines Co controlled everything. This company looked after all the relief work and did not ask for government assistance (*Victoria Daily Times*). The Britannia Mine operated from 1905 till 1974. It is presently the site of the B.C. Mining Museum (Eisbacher 1983).

*4) Judging from contemporary photographs, (Ramsay 1967) a large proportion of the Britannia Creek basin had lost its forest cover during initial exploration and development activities related to mineral exploration (Eisbacher 1983).

*5) The previous record at Jordan River had been 5 ft. 7 in. At the Sooke River dam some years prior, when rushing waters carried away a portion of the pipeline, only 2.5 ft. (75 cm) of water ran over the dam. A retaining wall built to prevent a recurrence of this damage at the point where the pipeline was carried away, withstood the water (*Victoria Daily Times*).

December 9-12, 1921

(Rain-on-snow).

Source: *The British Columbian*, December 10, 12, 13, 14 and 15, 1921; *The Daily Colonist*, December 13, 1921; *The Daily News*, December 12, 13 and 14, 1921; *Victoria Daily Times*, August 29, 1922.

Details: In Victoria, the "heaviest rain in 47 years" caused flooding of basements, gardens and fields in and around the city. The basements of the Parliament Buildings were flooded and firemen had to pump out one of the downtown theatres (*The Daily News*, December 14, 1921).

On December 10, the Coquitlam River was in flood again, cutting its bank at new locations. It threatened the newly re-laid section of the 25-in. (62.5 cm) water main. Though one concrete pier to which the pipe was connected had gone out, city engineer Stewartson expected the line would hold. Early on December 11, portions of the temporary CPR bridge and the vehicular bridge over the Coquitlam River washed away after a logjam formed against the piling of the CPR bridge. Two bents of the government bridge were carried away. Further upstream, logjams in the old course diverted a large amount of water to the north and south. The southern flow passes below the Agricultural Hall past the Dewdney Trunk Road joining the main channel by the railway embankment. Though on December 10 wrecking crews tried to prevent a debris jam on the upriver face of the bridge piles, which had been erected after the last flood had swept the iron causeway off its concrete piers. Later another bent was swept out. The remaining piling of the temporary section of the traffic bridge was protected from the current by the wrecked portion of the former steel CPR bridge, one section of which still remained on its concrete foundations on the south side.

Part of the northern section of Coquitlam was flooded and Shaughnessy Street on the south side was covered with water. This was the second time this fall that the northern and southern sections of Coquitlam became separated. The previous flood had filled in the river channel causing the river to seek a new channel. The Westminster road was reported under water in many places. Waters flowing around the tire factory, crossing the paved road flooded the northern section by the Anglican Church towards New Westminster. The city could only be reached from New Westminster by a detour from opposite Essondale by the Red traffic bridge. Some sections of the road there were also flooded. Outside the bridges, very little damage was reported.

Rain overnight December 11-12, brought water levels higher. The Coquitlam River started to cut into the north bank undermining the sandbank near the house of "Chinaman" Tom Lee's restaurant near the bridge. Old-time residents, who recalled that at one time the Coquitlam River flowed in a south direction to the Pitt River across the flats west of the CPR tracks, feared a diversion of the current into some new channel very imminent. This in view of the narrow channel into which the current was confined at the location of the bridges. A wider span on the CPR bridge might avoid recurring disasters. By making no changes, the current would be confined in its old channel and straighten its course towards the bridges. The

river would eventually turn south towards the Methodist Church and past the Agricultural Hall, and be forced to seek a new channel into Pitt River east of the CPR tracks and the Dewdney Trunk Road. On December 11, a large volume of water was flowing past the Hall, being turned by the Dewdney Trunk Road back to the main river channel. The river had not broken out of bounds for 10 years. It was as yet unknown what the conditions were in Coquitlam Lake at the Coquitlam power dam when large volumes of floodwaters were cutting new channels. The Coquitlam River tore three gaps in the 25-in. main water line. Floodwaters were roaring over the re-laid section of the new line. One of the concrete piers to which the pipe was attached had already gone out. It was almost certain that the old 14-in. (35 cm) line would have to be abandoned. The line, laid a quarter century earlier, had already outlived its allotted time span. The 25-in. main line had originally been intended to replace the old 14-in. line. No attempt would be made to repair it and the 25-in. line would now have to be carried to the high level reservoirs. On December 14, floodwaters receded, returning the Coquitlam River back to its old channel.

The Vedder River, which rose 12 ft. (3.6 m) in a short time, also flooded. *1) At Huntingdon it washed out the tracks of the BC Electric Railway in two places at Wilson Road. Passengers were transferred between Woodroffe-Chilliwack by car. Ballast washed away over a distance of 70 ft. (21 m). Some lands were under water, but there was no loss of life. No residents were threatened and the water receded rapidly on December 12.

All traffic on the GN, CPR and CNR rail lines was delayed due to slides and washouts. Rail connection with New Westminster was cut. Eastbound CPR trains were rerouted out of Vancouver by GN to Abbotsford and then by CNR tracks to Hope where transfer was made to the Kettle Valley line. The CNR line was blocked by slides north and east of Hope, including a mudslide at Yale, forcing CNR trains to detour over CPR tracks between Hope-Basque. Due to a washout at Port Coquitlam, CPR trains had to use CNR tracks past Hope. Service on the main CPR line resumed on December 13. GN trains were held up at Richmond Beach by a washout.

The Nooksack and Skagit rivers and numerous smaller streams flooded their banks.

*1) Referring to the recent flooding Vedder River, on August 28, 1922, property owners affected by the annual freshets of the Vedder River endorsed a scheme costing about \$75,000 to control the river. It included straightening out the channel, clearing the logjams above Vedder Crossing and rebuilding the rockwall at that point. The cost would be shared as follows: provincial government 50%, Sumas Dyking Commission 25%, property owners 18.5%, Municipality of Chilliwack 3%, BCER 2.5% and the City of Chilliwack 1% (*Victoria Daily Times*, August 29, 1922).

May 17-18, 1922

(Spring runoff/flooding?).

Source: *Victoria Daily Times*, May 18 and 19, 1922; *The Daily Colonist*, May 19, 1922.

Details: On May 18, the Upper Sumas dike broke near Huntingdon, flooding a large portion of Sumas Prairie. Engineers acknowledged defeat in their efforts to stem the Sumas flood. The waters swept over brush fills, through rock and under palings. The flood, which swept over the dam, was not expected to do any damage to dikes and other works of the Sumas Reclamation scheme. The gap was not closed yet on May 18.

At a meeting on May 17, farmers expressed their disappointment with the contractor's failure to hold back the water as promised. A committee was named to meet with Hon. E.D. Barrow to ask to have the government assume responsibility for losses incurred and to insist that every effort would be made to avert further flooding.

May 18, 1922

(Dam burst/flooding).

Source: *Victoria Daily Times*, May 18 and 19, 1922; *The Daily Colonist*, May 19 and 22, 1922.

Details: On the morning of May 18, Nicola River rose an estimated 30 ft. (9 m) in less than 20 minutes after an irrigation dam holding back water for a Nicola Lake stock farm broke. Warm weather during the previous few days caused the water levels in the lakes to rise rapidly. Efforts to open the sluices in the dam failed due to the great pressure. The dam's spillway gates got out of control when workmen were trying to close them. It caused a wall of water many feet high to sweep through the small town of Nicola. Heavy damage occurred but no lives were lost. The roar of the torrent surging down Clapperton Creek, or Mill Creek as it is locally known, was heard in Nicola shortly before 9 a.m. The residents saw tons of debris and water surging across the town. The rushing water swept through the streets and lanes with a terrific force and a sound "like that caused by a big

wind storm” or “roar which terrified the inhabitants.” The mass of water and trees struck the old post office and telephone office with such a force that the big building was torn off its foundations. It swung around ending up in two sections in the middle of the highway. At least three houses were swept away.

The first rush of floodwaters swept out all government bridges in the area. Many farmers, having most of their arable lands already sown, sustained crop damage. In addition to the bridge in town, 4 mi. (6.4 km) of government road were also taken out. Total damage was estimated at \$20,000. This amount included the dam on Major J. Goldman’s Ranch, three houses in town that were carried out, and the losses of the farmers in the valley. Farmers on adjacent creeks may also have suffered extensively. The barn, a team of horses and six head of cattle belonging to G.H. Gowing were carried away. One farmer lost a team of horses and three or four milk cows, while others lost one or two cows.

June 5-7, 1922

(Spring runoff/flooding).

Source: *Victoria Daily Times*, June 5, 1922; August 29, 1922; Environment Canada 1991.

Details: In early June during a hotspell, the Fraser River rose at a rate of 1 in. (2.5 cm) an hour. According to Hon. E.D. Barrow, though the Fraser River could still rise higher, no serious flood damage was expected this year. With cooler temperatures, the flood situation eased. On June 7, the Fraser River at Hope recorded a maximum daily discharge of 9,910 m³/s. (Environment Canada 1991).

June 2, 1923

Source: *The Daily Colonist*, June 3 and 5, 1923.

Details: Due to heavy rains in early June, the Elk River overflowed its banks in many places near Fernie. Due to flooding, some 125 families were cut off from the town. Late on June 2, the government bridge under construction at Hosmer went out. During the afternoon on June 2, the river started to drop, going down nearly 2 ft. (60 cm) in 24 hours. On the CPR Crow’s Nest branch, passengers had to make two transfers, at Cowley and at Michel, to get to Fernie.

December 11-13, 1923

(Storm surge/tidal flooding).

Discharge (m³/s): Max. daily; December 11: Nan.: 612; Sooke: 46.7; December 13: Stamp A.: 515.

Source: *The Daily Colonist*, December 11, 12 and 14; Environment Canada 1991.

Details: On December 10, “the worst gale of the year was reported in the Gulf (Strait?) of Georgia.” Victoria was sandwiched between two storm centers. At Cape Flattery, the 60-mph (96.6 km/h) south-southeast gale forced the Norwegian vessel *Augvald* loaded with lumber for Japan to return to Esquimalt after the deck load had shifted during the storm.

On December 13, Victoria was again hit by an exceptional intense storm with a wind that for a time equaled the 60-mph (96.6 km/h) storm of the previous week. The greatest velocity was recorded between 10:50-11:05 when it blew from the south at 60 mph. Huge waves sweeping across the Ross Bay seawall caused property damage. The waves had such a force that they swept half way across the Ross Bay cemetery. When the tide was at its full, winds upset a car parked on Government Street, throwing it against a fence which was taken down.

December 15-19, 1923

Discharge (m³/s): Max. daily; December 15: Capil.: 163; Rainy: 60.0; December 18: Sproat: 289; December 19: CR/CL: 476; max. instant.: N/A.

Source: *The British Columbian*, December 18 and 19, 1923.

Details: Heavy rain caused to flood part of Yale Road. Since early on December 15, Old Yale over the Clayton Flats was entirely submerged. Although the Serpentine Flats section of the Pacific Highway remained above water, the fields on both sides of the roads flooded up the nearly 3 ft. (90 cm). Not since the record heavy rains of 1921, lower lands in the Fraser Valley had been under so much water. All rivers, streams and drainage ditches filled to overflowing. The Nicomekl River at the bridge on Yale Road came to within a short distance of the decking of the structure. All the lowlands on either side of the stream flooded.

The South Westminster Flats section of Scott Road and much of the surrounding land also flooded. On the Pacific Highway near the foot of Peterson’s Hill, floodwaters slightly undermined a portion of concrete. One-half of the road closed in order to allow repairs to be made. Around December 19, high water caused a

“most formidable” logjam to form against the traffic bridge across the Brunette on the North Road, seriously endangering the structure.

January 28-31, 1924

Discharge (m³/s): Max. daily: January 31: Nan.: 643; Rainy: 115; February 1: Sproat: 208; max. instant.: N/A.

Source: *Nanaimo Free Press*, February 1, 1924; Environment Canada 1991.

Details: At the end of January following heavy rains during the previous three to four days, floodwaters threatened to wash away bridges on the E&N railway. On January 30, the Cowichan River came close to overflowing its bank. From that point north to Nanaimo, practically every stream crossed by the railway was in the same condition. On January 30, logging operations near Cowichan were suspended due to high winds and heavy rain. By January 31 when the rainstorm ceased, the danger of washouts passed.

February 10-12, 1924

(Rain-on-snow?).

Discharge (m³/s): Max. daily: February 11: Capil.: 354; February 12: Sooke: 66.5; max. instant.: N/A.

Source: *The Daily Colonist*, February 12 and 13, 1924; *The British Columbian*, February 12 and 13, 1924; *The Chilliwack Progress*, February 14, 1924; *The Daily News*, February 12 and 13, 1924; Eisbacher and Clague 1981; Environment Canada 1991.

Details: A rainstorm with a maximum daily precipitation of 65 mm, or a two-day maximum of 82 mm in the downtown Vancouver area, caused landslides in the Vancouver region (Eisbacher and Clague 1981). Between the afternoon of February 10 and the morning of February 12, warm rains caused unusual flood conditions all along the Fraser River valley. Washouts and mudslides disrupted train service into Vancouver. Almost 5.5 in. (140 mm) of rain fell in the Valley in 36 hours. The Vedder River rose 8 ft. (2.4 m) in a short time, coming within 1 ft. (30 cm) of the 1917 high mark, when so much damage was done. At the CNR bridge at Sumas, a huge debris jam formed, the weight of which shifted the bridge 1 ft. out of alignment, tying up railroad traffic.

Heavy rains and the pounding of accumulated logs undermined and moved 1 ft. out of alignment a small one-span trestle bridge east of Popkum. On February 11 at midnight, the baggage car and *Colonist* smoker of the eastbound CNR train dropped to the bottom of the gulch, injuring 23 passengers, three said to be seriously. It took two hours to pull the injured men from the debris. At this time a slide had occurred 2 mi. (3.2 km) west of the collapsed bridge, making it impossible for a relief train from Chilliwack to get through. Due to the other slide, the injured and the Hope local reached Chilliwack late. The wrecking train dispatched from Port Mann was held up by the impassable condition of the drawbridge over the Sumas River, about 8 mi. (12.8 km) west of Chilliwack. At Hell's Gate, a rockslide on the CPR line injured two members of a train crew.

Following heavy rains on February 10 and the afternoon of February 11, parts of Yale Road flooded for a second time this winter. The Clayton Flats section of Old Yale Road was completely submerged. Several sections of Scott Road at South Westminster were also under water. At Langley Prairie, the Nicomekl River came close to the decking of the bridge on Yale Road. All other streams and drainage ditches were “filled to capacity.” Following a 3-in. (75 mm) rainfall on February 10-11, freshets and a logjam threatened BCER's Stave Lake dam.

Victoria reported the heaviest rain of the winter with 1.93 in. (49.0 mm) of rain between February 10 at 4 p.m.-February 11 at 5 p.m. During the same period, Vancouver and Pachena Point recorded 2.53 and 4.22 in. (64.3 and 107.2 mm), respectively. In the Sooke district, two small bridges washed away. On February 11 following the torrential rains of the previous few days, which were said to be “the worst on record,” a bridge the Mile-16 post on the Sooke Road was carried away by floodwaters. A creek crossing at that point had overflowed its banks. On the same road, other bridges were awash up to their decks. Long stretches on the Sooke Road were inundated under 4 ft. (1.2 m) of water.

On February 11, floodwaters rose to the lower cords on King's Cross bridge near Goldstream on the Malahat. Bridges on the E&N railway were threatened on several points: north of Goldstream a mudslide came down on line and an avalanche buried the E&N tracks for a length of 150 ft. (45 m) to a depth of 3 ft. (90 cm).

September 20-23, 1924

(Storm surge/flooding).

Source: *The Vancouver Sun*, September 23, 1924; *The British Columbian*, September 22 and 23, 1924; Sanford 1978 (p. 214).

Details: On September 22-23, torrential rains and a strong southeast gale caused severe damage in the Lower mainland. Between the morning of September 20-5 a.m. on September 22, Vancouver recorded 4.26 in. (108.2 mm) of rain. The heaviest rain occurred in the 12-hour period ending 5 a.m. on September 22, during which 1.37 in. (34.8 mm) fell. *1)

Lillooet River, which flows into Pitt Lake, rose into a torrent overnight and carried away the government wharf at Alvin. The Captain of the mail steamer *Lake Buntzen* estimated the precipitation at the head of Pitt Lake between September 20-22 at 8 in. (200 mm). The strong southeast gale of the previous two to three days, scattered a boom of logs along the beach from Ocean Park to White Rock.

On September 21, the wind caused heavy damage to the late pear and apple crops throughout the Fraser Valley as far as Huntingdon. Near Murrayville and Langley Prairie, there was hardly a tree on which there was any fruit left.

According to waterworks manager E.M. LeFluffy, the sudden rise in the Capilano River was no doubt due to the logging operations in the higher reaches of the valley. "Knowing the way the river used to act, we are in a position to judge the effect of the removal of trees. The water rushes down the bare hill, filling up the creek much more rapidly than formerly." This was one of the main reasons for the council objecting to the alternation of further timberland in the Capilano Valley.

On September 22, the Squamish railway bridge was damaged by high water in the Mamquam River. Traffic on the PGE rail line was rerouted by stage to Ashcroft. The government bridge at Squamish also went out. As the conditions in the river were too dangerous due to high water, it was decided not to transfer the passengers. The damage, estimated in the thousands of dollars was expected to be repaired in two to three days.

Hon. Dr. J.H. King, federal minister of Public Works, was shown the conditions on the delta bank of the Fraser River near the Ladner sawmill and also at Canoe Pass, where the current had encroached on the foreshore to such an extent that there was great danger of the dike going out in the freshet. Dredging Ladner Channel to the Ladner wharf, which had become silted up, or carrying out some alternative work so that the ferry might operate without difficulty at low tide was deemed necessary.

On September 23, a slide came down on the KVR 2 mi. (3.2 km) east of Romeo. It plugged the west end of a tunnel, forcing trains to be diverted via Spences Bridge. Four days later, another slide came down upon the crews who were trying to clear the first slide, seriously injuring a number of workers. More rockslides came down in October and in November deep snow blocked the line. (Sanford 1978).

*1) On December 24, 1923, Vancouver reported a record 4.16 in. (105.7 mm) in 24 hours. (E.B. Shearman, Dominion Meteorological Office).

December 11-14, 1924

(Rain-on-snow)

Discharge (m³/s): Max. daily: December 12: Squam.: 932; December 14: CR/CL: 470; max. instant.: N/A.

Source: *The British Columbian*, December 13 and 15, 1924; *The Evening Empire*, December 15, 1924; Sanford 1978 (pp. 214-215); Environment Canada 1991.

Details: On December 13-14, due to a combination of mild weather, heavy rain and melting snow, the water levels in the streams of the Fraser Valley rose. On December 15, low-lying sections of the Fraser Valley were still under water. On the north side of the river, all streams reached exceptionally high levels. Floods broke down the dikes on the Fraser River on the side of the Vedder River. Impeded by a logjam, this river again went on a rampage that caused damage to BCER tracks at Woodroffe. On December 13, after repairs were made, direct service to Chilliwack recommenced.

During the night of December 11-12, the east section of Sumas Prairie flooded after the stream changed course again south of Yale Road, sweeping away buildings and flooding a considerable area of the Cherryvale Ranch near Sardis. On December 13, an eight-roomed house, fruit packing sheds, stables and outbuildings of the Cherryvale Orchard Ranch, owned by E.G. McBride of New Westminster, were swept away. The Red Mountain mine, 40 mi. (64 km) from Chilliwack was completely flooded. The powerhouse washed away, halting all mining work.

On December 11, a section of the flume pipeline of the Elk River Waterworks Company, which supplied Chilliwack and district with water, washed out. Service on the line, which carried water to the pumping station, was halted. Residents were without water until December 13 when temporary repairs were completed, but the water was reported to be still very muddy.

In the Pitt Meadows and Maple Ridge dyking areas, the Alouette River rose to a point 1 ft. 2 in. (35 cm) higher than the mark reached by the disastrous flood of 1921, when the dikes washed out for a time and

caused a very grave situation. A section of the Dewdney Trunk road near Laity Hill was reported washed out after Laity Creek overflowed its banks. Until repairs were completed, traffic detoured through Pitt Meadows. On December 14, a sudden rise of water impeded the work on the CNR bridge over the Sumas River. Traffic on the line was halted and pending completion, trains were rerouted over CPR tracks. In the Port Kelly gravel pit, work on the construction of drains was temporarily halted when the pit was flooded.

On December 11, after the KVR line had just been reopened, a chinook hit the Coquihalla Pass. The wind melted much of the snow that had fallen during the previous month. At Portia, a bridge washed out and the Boston Bar Creek bridge was severely damaged. Dozens of minor slides and washouts hit other sections of the line, trapping two freight trains through the Coquihalla Pass. On December 15, in a matter of hours, temperatures dropped from 40° F (4.4° C) to -25° F (-31.7° C). The stalled trains literally froze to the rails as the previous day's wet snow turned into ice. For three days temperatures remained at -34° F (-36.7° C) accompanied by a stiff wind. Rail traffic across the Coquihalla Pass was suspended until spring. (Sanford 1978).

May 18-23, 1925

(Spring runoff/flooding).

Source: *The Vancouver (Evening) Sun*, May 20, 21, 22 and 23, 1925; *The Daily Colonist*, May 20, 21 and 22, 1925; Environment Canada 1991.

Details: Between May 19-22, the Fraser River rose 12, 9, 6, and 3 in. (30, 27, 15 and 7.5 cm), respectively, until cooler weather occurred in the interior. On May 20 at 10 a.m., due to continued warm weather, the Fraser River at Mission went over the 20-ft. flood danger level. Overnight May 20, the river reached the 19.8 ft. mark, steadily rising at a rate of 0.5 in. (1.25 cm) an hour. By 1 p.m., it reached 20 ft. 1.5 in., an increase of 4.5 in. (11.3 cm) since 5 a.m. On May 23, the Fraser River at Hope recorded a maximum daily discharge of 9,970 m³/s (Environment Canada 1991). The Fraser River flooded thousands of acres of land in crop in the undyked areas of Glen Valley, Fort Langley, the lowlands of Nicomen Island, and southern Westminster. On May 19, the low dikes protecting the Dewdney district, 10 mi. (16 km) east of Mission failed to hold the rising waters of the Fraser River. On May 21, Nicomen Island had a 1-ft. (30 cm) margin on its dikes. Thousands of acres in crop were inundated in the Dewdney district. Water was coming through the Newton dike, which broke on the night of May 19. South of the CPR tracks between Hatzic-Dewdney, about 1,000 ac. (400 ha) were flooded after the dikes broke in several spots. After all efforts failed to check the flow of water, the ranchers concentrated on protecting the main Dewdney dikes. Bridges at the Dewdney dike canal and West's Creek were rendered unsafe and threatened to be washed out. In many districts, efforts were made to strengthen dikes that showed seepages. Miles of road in Glen Valley, including Kiefer Road, Glen Valley Road, County Line Road and McKay Road, and Fort Langley districts and other parts of the Fraser Valley were flooded to a depth of 3 ft. (0.9 m).

The Salmon and Vedder rivers were backing up and flooding low-lying farmland. The highway from Fort Langley to Langley Prairie was under water 5 ft. (1.5 m) deep. Nicomen Island was threatened with almost complete inundation. Road communication with these districts and other parts of the Fraser Valley were suspended. During the night of May 21, water at the Mission gauge rose to 20 ft. 2 in., a rise of 13 in. (32.5 cm) since the morning of May 19. Sections of the main dike guarding Nicomen Island and Dewdney districts showed signs of weakening. During the night of May 20, three huge pumps were set up behind the Nicomen Island dikes. Traffic between Fort Langley-Langley Prairie was cut off by floods with between 2-5 ft. (0.6-1.5 m) of water on the road. The lake at Nelson reached a level 13.8 ft. (4.14 m) above the low water mark after rising 1 ft. (30 cm) on May 18 and 0.5 ft. (15 cm) on each of the following two days.

On May 21, only a small additional portion of undyked land in the Glen Valley and Fort Langley districts flooded. Numerous wooden bridges in the Glen Valley were strengthened by cartloads of rocks. Several small breaks in Nicomen dikes were repaired by a gang of about 30 ranchers that were patrolling the dikes. *1) In Fort Langley on the south bank of the Fraser River, floodwaters backed up the Salmon River which in turn flooded its banks and inundated large areas of land. On May 22 at 3:30 p.m., a floating snag threw the center span of the BCER bridge on Lulu Island out of alignment. The 40-ft. (12 m) snag that crashed against the piers threatened the submerged water main from Westminster to Richmond. On May 22 at 4 p.m., the gauge at Mission registered 20 ft. 9 in. The many unsettled valleys in the interior that were flooded, helped to dispose large volumes of water.

The hot weather in the interior caused the Quesnel and Duncan Head rivers to come up rapidly. On May 19, Kamloops and Barkerville recorded temperatures of 84° and 70° F (28.9° and 21.1° C), respectively. On May 21, heavy rains in the Crows Nest Pass area sent streams to flood stage and caused panic among

residents along Kootenay Lake. At Kitchener, the Paulson Lumber mill on the flats was flooded to a considerable depth. Residents of the flats who evacuated their homes congregated on the CPR grade. A big CPR steamshovel, at work east of canyon, was carried off the track and partially buried by a slide. In the Cranbrook section, four parties of delegates returning in cars from the Associated Boards of Trade convention at Cranbrook, were caught between washouts on the highway near Moyie.

*1) In 1921, the Nicomen Island dikes went out at the 21 ft. 5 in. level, only 8 in. (20 cm) higher than during the 1925 flooding.

August 9, 1925

Source: Garden 1991 (pp.196-197).

Details: On August 9, a rock and mudslide came down Cathedral Mountain at Yoho. The serpentine nature of the Spiral Tunnel Line, with Partridge located directly from Yoho and Cathedral siding directly below resulted in cutting the mainline in three places (Garden 1991).

September 23-December 1925

Source: Sanford 1978 (p. 218).

Details: On September 23, a rockslide came down at Romeo, blocking the KVR line. Two days later, before clearing work was completed, another slide hit followed by another. All through October, slides continued to come down as fast as previous one were cleared away. On November 9, the line was finally reopened only to be closed again the next day by another slide. After that slide was cleared yet another one ripped out the bridge at Iago. These troubles continued through all of December. Just before Christmas, CPR officially stated that the railway was considering abandoning the line. (Sanford 1978).

December 13-18, 1925

Discharge (m³/s): Max. daily: December 11: Capil.: 232; December 13: CR/CL: 388; December 18: Sproat: 134; max. instant.: N/A.

Source: *The British Columbian*, December 16-17, 1929; *The Daily Colonist*, December 15, 1925; Environment Canada 1991.

Details: During the first 15 days of December, New Westminster recorded 9.56 in. (242.8 mm) of rain, almost as much as fell in August, September, October and November combined. As a result of the exceptionally heavy rain, slight damage was done to culverts and several thoroughfares in the Langley municipality. The Nicomekl and Serpentine rivers overflowed their banks flooding low-lying lands in Langley and Surrey, respectively. *The British Columbian* considered this "an annual occurrence."

March 22, 1926

Source: Sanford 1978 (p. 221).

Details: On March 22, a slide damaged the trestle at Iago. An engine crashed through the damaged trestle and fell to the canyon bottom. (Sanford 1978).

December 30, 1926-January 3, 1927

(Rain-on-snow).

Discharge (m³/s): Max. daily: December 30: Capil.: 241; December 31: CR/CL: 385; Nan.: 600; Sproat: 275; Stamp A.: 382E; January 1: Nan.: 430; January 2: CR/CL: 504; Sproat: 354; Stamp A.: 515; January 3: Sooke: 19.2; max. instant.: N/A.

Source: *The Daily Colonist*, December 30, 1926; January 1, 2 and 4, 1927. Denison 1932 (p. 252); Environment Canada 1991.

Details: At the end of December-early January, abnormally low barometric pressures were recorded over the Aleutian Islands, sometimes falling to 28.60 mb. The influence of the great storms caused by this extended for several thousand miles. The storms set up abnormal ocean currents along the Pacific coast, causing a tremendous precipitation in the north and a general rise in temperatures on the Pacific seaboard (Napier Denison, Director Meteorological Bureau, Gonzales Heights In: *The Daily Colonist*, January 1, 1927). On December 30, Henderson Lake on the west coast of Vancouver Island recorded 16.61 in. (421.9 mm) of rain in 24 hours.

On January 1, one man was killed, a second seriously injured and three others less seriously hurt when they were hit by a rockslide on the Kettle Valley railway on the Coquihalla. The gang was hit while clearing an earlier rockslide from the tracks at Othello, 5 mi. (8 km) east of Hope.

On January 4, following warm rain melting snow in the mountains, heavy floods were general at many places up-island. Late on January 4, the Sayward Valley experienced a severe flood after the Salmon River overflowed its banks. Many streams, turned into torrents, flooded low-lying areas. The lower section of Cowichan Lake experienced heavy precipitation. The E&N railway tracks were flooded in many places. Washouts occurred on the Alberni branch of the E&N Railway. On January 1, the heavy rain caused a mudslide in the Nanoose cut on the E&N, delaying the southbound train.

1927

(Dam burst/flooding).

Source: *North Island Gazette*, November 18, 1987.

Details: In 1927, four days of torrential rains caused the creek dam above the old Port Alice townsite to burst. A wall of water swept down beside the original hospital killing a man named Clark.

January 8-12, 1928

(Rain-on-snow, tidal flooding and ice jam/flooding).

Discharge (m³/s): Max. daily; January 8: Capil.: 224; Dean: 603B; Rainy: 94.9; Stamp A.: 326; January 9: Sproat: 173; January 10: CR/CL: 462; Wan.: 1,520; January 12: Sooke: 35.4; max. instant.: N/A.

Source: *The Daily Colonist*, January 8 and 12, 1928; *The British Columbian*, January 9-11 and 12, 1928; *Victoria Daily Times*, January 13, 1928; Environment Canada 1991.

Details: Between January 1-11 at 10 p.m., Victoria recorded 5.34 in. of rain. *1) In the 22 hours ending 10 p.m. on January 11, 2.10 in. (53.3 mm) of rain fell.

On the evening of December 7, high water caused flooding in Surrey. The Pacific Highway was under water at three points north of the big hill and up the floor of several homes and barns. A section of Yale Road between Fry's Corner and the foot of Clayton Hill was submerged again. *2) On December 10, melting snow caused the Alouette River to overflow its banks. Stretches of Wilson and adjacent roads were under 2-3 ft. (60-90 cm) of water. B.C. Telephone and BCER reported broken wires and short circuits. Melting snow and rain coupled with high tides backing up the Nicomekl and Serpentine rivers.

Mudslides affected CNR, CPR and GNR transcontinental railways entering New Westminster. The CPR line experienced a slide near Revelstoke; CNR reported a mudslide near Matsqui and a slide at Boston Bar; GNR was closed by a slide at Ocean Park/White Rock.

Early January, an icepack formed on the Fraser River, 7 mi. (11.2 km) south of Lillooet. It caused the river to rise rapidly in the middle stretch of the river. Recent mild weather caused the ice to release and to form a pack. It accumulated near the confluence of Texas Creek. The stream above the jam rapidly rose to a height of 28 ft. (8.4 m). A sudden release of the jam would have threatened the valley. District Engineer of the Dominion Water Power and Reclamation Service C.E. Webb, issued a general warning to the residents of the Fraser Valley south of Lillooet to take the necessary precautions. Over a great portion of the dyked areas of Pitt Meadows and Surrey, 1-3 ft. (30-90 cm) of surface water was reported. Though floodwaters covered portions of a number of roads and caused some inconvenience, no serious damage was sustained. A change to fair weather resulted in a drop in the water levels on the Fraser River.

Logging operations at the Scottish Palmer Logging Co. camp were halted due to weather conditions. Work resumed on January 10.

*1) The average total rainfall for the month of January over the previous 50 years was 4.39 in. (111.5 mm). The heaviest rainfall ever recorded during the previous 55 years occurred in January 1885 when 2.4 in. (61.0 mm) fell in 24 hours (*The Daily Colonist*, January 12, 1928).

*2) At the time this section was not paved and somewhat lower than the highway (*The Daily Columbian*).

May 20-30, 1928

(Spring runoff flooding).

Source: *Kamloops Sentinel*, May 22, 25 and 29; June 1, 1928; June 9, 1948.

Details: On May 20, Kamloops reported the hottest day of the year with 86° F (30° C). Penticton and Grand Forks recorded 94° F (34.4° C) and 92° F (33.3° C), respectively.

On the afternoon of May 22, Little Louis Creek, described as a “sedate respectable little stream,” to suddenly rise far above its usual height at the lower end just before where it joins the North Thompson River.

Heavy rain on May 28 caused floodwaters in Kamloops to almost reach the baseball grandstand while Riverside Park was submerged. On May 30, the Thompson River at Kamloops peaked at 19.3 ft., its highest mark shown here since 1894. *1) By June 1, the river had dropped to 17.7 ft.

On May 24, the Clearwater River went on a rampage. Three hundred feet (90 m) of the government flooded up to 2 ft. (60 cm) deep. The relatively new road was “apparently not built above the high water mark,” observed the *Kamloops Sentinel*. Due to the highwater, the Blackpool ferry was not running. Floodwaters also threatened the Clearwater bridge.

*1) The previous high was reached at North Kamloops was on May 24, 1925 with 16.9 ft. (*Kamloops Sentinel*, May 29, 1928). The maximum level during the 1894 flood was estimated at 24 ft. On June 4, 1936, the river would crest at 18.7 ft. The highest level reached until June 9, 1948 was 20.25 ft. recorded on June 2, at 7 p.m. (*Kamloops Sentinel*, June 9, 1948).

December 25-30, 1929

Discharge (m³/s): Max. daily: December 25: Capil.: 196E; December 26: Rainy: 146; Stamp A.: 270; December 29: Sproat: 124; December 30: CR/CL: 362; max. instant.: N/A.

Source: *The Daily Colonist*, December 27 and 29, 1929; Environment Canada 1991.

Details: Early December 25, the “worst storm yet recorded” in Victoria by the Dominion Meteorological Observatory caused damage to houses, interrupted power and telephone service and tore away part of Rithet Piers. At Jordan River and up-island points, heavy rain was reported but the wind was not nearly as strong as around Victoria.

Between January 21-26, Lake Cowichan rose nearly 16 ft. (4.8 m). The heavy rains relieved the power shortage, which resulted from the previous year’s dry weather. The BC Electric Railway Co. expected to have about 40 million KW-hours in storage at their lakes at the end of 1929. This contrasted with the 94 million KW-hours in storage the previous year. While the storage was far below normal, the company expected, with the aid of its steam plant and power purchased from private plants, to be able to supply its normal load now. Restrictions on the use of electricity were wholly removed and streetlights, tram services and power consumption returned to normal on December 28.

February 18-20, 1930

(Fatal avalanche).

Discharge (m³/s): Max. daily: February 18: Capil.: 167; Sooke: 39.6; Sproat: 127; February 19: CR/CL: 388; February 20: Stamp A.: 250E; max. instant.: N/A.

Source: *The British Columbian*, February 18, 19 and 20, 1930; *The Daily Colonist*, February 20, 1930; Environment Canada 1991.

Details: In the 24 hours ending 8 a.m. on February 18, New Westminster recorded 2.33 in. (59.2 mm) of rain or nearly 9.5 in. (237.5 mm) since February 1. The heaviest rain fell between 8 a.m.-8 p.m. on February 17 with 1.45 in. (36.8 mm). For the month the heaviest 12-hour rainfall was on February 1 with 1.67 in. (42.4 mm).

Flooded basements were reported from all over New Westminster. The frozen state of the ground hampered the run-off of the water. In many cases water was backing up from overloaded sewers through basement laundry tubs. *1) The actual damage was however slight.

Around the foot of 12th Street a “regular lake formed.” This was the result of the big landfill made for the Terminals plant and for the glass works that never materialised. The sand fill cut off the drainage that formerly permitted this storm water, converging from a wide watershed to make its way to the river.

The heavy rains caused Stave Lake to rapidly rise, threatening the safety of the dam and new works at Ruskin. The water rose 6 ft. (1.8 m) in 48 hours, bringing the lake level to within 8 ft. (2.4 m) of the spillway. The water level in Coquitlam Lake rose more than 20 ft. (6 m) in 20 days. On February 19, it reached 27 ft. (8.1 m) below the spillway, compared to 50 ft. (15 m) below the spillway on February 1. (The lake had not overflowed the spillway in three years.)

The heavy rains caused slides and washouts in the eastern portion of the Haney. A slide caused considerable damage to Baker Road bridge, which was expected to be out of service for several days. On February 18 at about 10 p.m., a mudslide on River Road about 1 mi. (1.6 km) east of Haney carried away a

BCER power pole, leaving Whonnock and Ruskin without power. Roads flooded in numerous places when culverts were unable to carry the volume of water.

On February 19 (in Victoria?), recent heavy rains eroded banks on the Bay Road. In the Cowichan Bay area, the Island Highway flooded south of Duncan and near the south Cowichan tennis courts with water "knee deep." Five cars were held up, unable to move either way for a couple of hours. (Cowichan River?)

On February 19 shortly before 6 p.m., a snowslide at Downie 23 mi. (36.8 km) east of Revelstoke, turned over a boxcar, instantly killing two CPR employees: division master mechanic M.W. Boucher and conductor Charles Treat. The "pure snowslide" followed the same slidepath that tied up traffic at the same location on February 17.

*1) This was usually due to the fact that surreptitiously connected stormwater with sanitary sewer were never designed to take such quantities of water. At the time there were no storm sewers west of Sixth Street.

March 28, 1930

Source: Sanford 1978 (p. 221).

Details: On March 28, a train ran into a rockslide on the KVR line and rolled over, killing engineer Bob Barwick (Sanford 1978).

April 12, 1930

(Dam burst/flooding).

Source: *Victoria Daily Times*, April 14, 1930; Saywell 1967 (p. 137).

Details: On the afternoon of April 12, on Currie Creek two dams burst. *1) Large areas of the valley were flooded and entire crops were destroyed. In some sections of the valley, the water reached a height of about 4 ft. (1.2 m). The flood caused extensive damage. It carried away fences and chicken houses. The F.R. Newman farm on Lake Cowichan Road, about 4 mi. (6.4 km) south of the break, suffered severe damage. The Mayo lumber camp was flooded. After the dynamos and pumps in the engine house were disabled the mill was forced to close for several days. The oriental employees were temporarily isolated after the timber support of a bridge at that point washed out. The E&N tracks were flooded and undermined. The flood held up a train bound from Duncan to Lake Cowichan and a lumber train with three cars of logs. A wrecking train had to be sent to repair the trackage.

Although production was temporarily halted, not too much damage was done at the Mayo Lumber Co. mill. The driving machinery, which was under water for some time was soon rehabilitated. (Saywell 1967).

*1) The small stream had been dammed to create a mill pond into which the logs arriving by rail were dumped. A new and better dam was built to replace the lost dam (Saywell 1967)

January 22-31, 1931

Discharge (m³/s): Max. daily: January 22: Capil.: 262; Rainy: 119E; Stamp A.: 278; January 27: Sproat: 154; January 28: Sooke: 35.4; January 31: CR/CL: 292; max. instant.: N/A.

Source: *The British Columbian*, January 23, 1931; *The Daily Colonist*, January 24, 25, 28, 29 and 30, 1931; Environment Canada 1991.

Details: On January 22, New Westminster recorded 1.86 in. (47.2 mm) of rain. On the afternoon of January 22 following heavy rain in the mountains, Seymour and Lynn creeks went on the rampage. Lynn Creek overflowed the bridge on Keith Road, flooding the road at both ends with several inches of water. Seymour Creek broke through the dike protecting the estate of Major R.G. Parkhurst and flooded the nearby highway. Floodwaters swept soil from his gardens and damaged outdoor improvements, including a tennis court.

Heavy rainfalls "for weeks, night and day" in the Port Alberni district caused the closure of the highway. Rain had been falling steadily for over 30 days with a persistent downpour since January 22. The road across the mountain completely washed for about 100 yd. (90 m). Water was running over Port Alberni's new dam with all the sluice gates open. Heavy timbers floating down endangered the dam On January 28, Cameron River overflowed its banks near the Cathedral Grove of big trees. The main highway between Port Alberni-Alberni was flooded in two places and impassable to pedestrian traffic. All wires up the west coast were down, cutting all communications between Port Alberni and the west coast. The main pipeline supplying water to Alberni was swept away where it crossed a creek by big timbers. On January 29, the

heavy rainfall experienced during the previous two weeks subsided and creeks went down to their normal levels. Port Alberni was still without water supply for either fire protection or domestic purposes.

On January 27, a slide at Coal Creek blocked the Jordan Road. At Muir Creek a small slide occurred. Due to the soft conditions of the fills, work on the new bridge over Gillespie Road, now closed, was held up. The wooden forms from the concrete under the bridge were torn away by a freshet. On January 28, Duncan and the Cowichan-Newcastle area reported 1.5 in. (38.1 mm) in 12 hours. In conjunction with high tides the Koksilah River rose and flooded a section of the Island Highway. The road from the Malahat to Shawnigan Lake was flooded to a depth of 11 in. (27.5 cm) on January 27. Torrential rains at Lake Cowichan caused large damage to roads that were flooded in many locations. Late on January 22, two culverts burst causing water to pour over the road near Greendale and near Lohenholmes. Planks were used for temporary repairs.

October 1931

(Glacial outburst flood).

Source: Carter 1932; Evans 1992 (p. 77); B.C. Ministry of Energy, Mines and Petroleum Resources 1993; Jordan 1994; Clague and Evans 1994; Evans, unpublished data.

Details: Devastator Creek, a tributary of Meager Creek was dammed up with quaternary volcanic rocks, causing a devastating flood on Meager Creek (Clague and Evans 1994). The landslide is believed to have occurred in October 1931, since a large flood caused by a glacial dam burst in Meager had been noted by a local trapper at that time (Evans 1992; Evans, unpublished data). Climbers first observed the effects of the 1931 landslide in August 1932 (Carter 1932). Carter and his fellow climbers noted the deposits of a large rock/debris avalanche that had fallen from the flanks of The Devastator. The deposits of the 1931 landslide have been examined by Jordan (1994) who concluded that the landslide was a debris flow with a minimum volume of 3-5 million m³ (Evans, unpublished data). According to the Ministry of Energy, Mines and Petroleum Resources (1993), the Meager Creek debris flow near Pemberton displaced over 5 million m³ of water and debris

A likely source area for the 1931 event is on the western flank of The Devastator adjacent to the 1975 slide and involving similar rocks. The 1931 event was larger than the one in 1975 as is evident in the trimlines in the vegetation in 1947 aerial photographs which extend beyond the Neoglacial limit on Devastation Creek and down into Meager Creek (Evans 1992).

December 20-27, 1931

(Dam burst/flooding).

Source: *The Vancouver Daily Province*, December 19, 1931; *The Daily News*, December 16-17, 1931; *The British Columbian*, December 17 and 19, 1931, January 11, 1932; British Columbia Ministry of Environment 1975.

Details: Around mid December, New Westminster recorded 2.60 in. (66 mm) of rain in 24 hours. According to E.B. Shearman, Dominion meteorologist in Vancouver, during the preceding three days, 5.12 in. (130.0 mm) of rain fell in Vancouver. While the precipitation for the three days did not constitute a record, it was "unusually heavy." (*The Vancouver Daily Province*). *1) Precipitation in the area for the 24 hours ending 8 a.m. on December 17 was 2.87 in. (72.9 mm) or 1.85 in. (47.0 mm) for the 12-hour period ending 8 a.m. The rain in the surrounding districts had been even heavier. Burquitlam reported 3.25 in. 82.6 mm for the 24-hour period ending 9 a.m.

A slide caused by torrential rains buried 200 ft. (60 m) of the new Lougheed Highway at Whonnock. The slide that occurred at 5 a.m. buried the highway to a depth of 5-15 ft. (1.5-4.5 m). It also blocked the westbound track of the CPR rail line and cut the telegraph line. The pony-engine of the westbound train derailed and part of the station platform was demolished.

Further up the line at Ruby Creek, on the Kerr Road crossing of BCER the telegraph lines came down due to heavy snow. On the Marpole line, the heavy rain washed gravel over the tracks to a depth of 3 ft. (90 cm). Overflowing culverts were reported from many locations. At south Westminster, a culvert washed out on the BCER Fraser Valley line and the pumphouse at Haney was flooded.

On December 18, a major flood or debris torrent occurred on Disbrow Creek in the Howe Sound area, destroying a small house and a cottage at Sunset Beach, 3 mi. (4.8 km) northwest of Horseshoe Bay. The roof of one of them was swept far out on Howe Sound. According to British Columbia Ministry of Environment records, a small dam in the headwaters of the creek burst, triggering the event. The stream arising on Black Mountain swept the entire house away, except a 7-ft. (2.1 m) length of water pipe. The damage was estimated

at \$5,000. The house later swept ashore on Gambier Island. The cottage was completely destroyed, even the ground it was standing on, washed away. Two launches moored at the beach on Howe Sound were badly damaged and three rowboats practically destroyed (*The British Columbian*; British Columbia Ministry of Environment 1975).

*1) Between December 1-19, Vancouver recorded 8.56 in. (217.4 mm) of rain (*The Vancouver Daily Province*, December 19, 1931).

January 7-11, 1932

(Rain-on-snow).

Source: *The Chilliwack Progress*, January 14, 1932; *The British Columbian*, January 11 and 12, 1932; *Victoria Daily Times*, January 12, 13 and 14, 1932; Eisbacher and Clague 1981.

Details: A rainstorm with a maximum daily precipitation of 40 mm, a two-day maximum of 66 mm or 100 mm for the storm total for the downtown Vancouver area, caused landslides in the Vancouver region (Eisbacher and Clague 1981). During the night of January 10-11, gales lashed the Pacific coast, extending from southern Oregon to Alaska. The heavy rain and windstorm was followed by a cold wave when on January 11 the winds switched to the northeast. On January 12, snow was reported from British Columbia to California.

Heavy rain caused considerable damage throughout the lower mainland, especially along the Vancouver waterfront and along the north arm of the Fraser River. New Westminster experienced the heaviest rainfall since records were kept. *1) During the 24-hour period ending January 10 at 8 p.m., 2.30 in. (58.4 mm) of rain fell, the heaviest since mid December when 2.60 in. (66.0 mm) were recorded. During the same period, Estevan recorded 3.40 in. (86.4 mm). Many basements were flooded as the sewer system could not handle all the water. Two slight washouts were reported at 6th and 2nd due to runoff from Burnaby slopes. Kingsway near 12th Avenue flooded with about 2 ft. (60 cm) of water and a stretch of Douglas Road near Still Creek was also submerged.

During the night of January 10 at White Rock, a mudslide came down from the bluff above the big boulder, which gives White Rock its name. The slide, which came down onto the tracks of the Great Northern Railroad, derailed the locomotive of a New Westminster-bound train and delayed it for six hours.

On January 10-11, heavy rain caused damage throughout the Chilliwack district. Some 2.5 in. (63.5 mm) of rain in 24 hours caused localised flooding. The rain on January 12 was accompanied by a strong westerly gale. In Chilliwack, several power poles on Young Street north went down. Central School closed as its light and heating were cut off. Classes were resumed on January 12. The city street lighting circuits were put out of commission. Two heavy slides near Hope carried away all Trans-Canada toll lines, interrupting service till January 13. On January 11, some 18 circuits on the Chilliwack system were out of commission due to downed poles. The church at East Chilliwack sustained light damage when it shifted on its foundation due to the gale. The strong wind damaged or brought down many aeries. The heavy rain and melting snow in the foothills caused the Elk and Dumvill creeks to go on the rampage. Waterworks company work gangs on each creek worked continuously for nearly 24 hours to protect the intakes from being carried away. During the previous season, some \$2,000 had been spent on improving the intakes on the two creeks.

On January 11 near Victoria, Sandstone Creek was running 18 ft. (5.4 m) higher than normal. During the night, it tore out the highway bridge and isolated 100 residents of Jordan River. The creek swept down a 38-ft. (11.4 m) gouge under the 102-ft. (30.6 m) bridge. The concrete central pier on which rested the supports of the roadway span was completely carried away. A logjam upstream, which suddenly gave way, was given as the official cause. Extensive flooding was reported from areas immediately adjacent to Victoria. The Big Ditch on Shelbourne Street on the city-side of Cedar Hill Road was filled to capacity. Near Cedar Hill Road, Pear Street was flooded to the danger of stalling cars. It was passable on January 12 but there were "great stretches of water" along the highway.

The heavy rains caused flooding in the Happy Valley district. Several families were marooned in their homes and a third of the students were prevented from attending classes at the Happy Valley school. Similar flood conditions were reported from the Sooke and Jordan River districts where a number of small bridges washed away. On January 11, East Sooke Road was impassable. Near Beecher Bay, there was some 4 ft. (1.2 m) of water on the road. Heavy floods were experienced on the road to William Head but the quarantine was not isolated. On the Jordan River Road, the wooden traffic bridge and logging railway bridge were carried away. On January 12, food supplies were transferred over Sandstone Creek on Jordan River Road. The Public Works department erected a temporary bridge across Sandstone Creek by felling some trees. Bus service was maintained to both sides of the break. The BCER power plant had 3 ft. (90 cm) of water going over the sills at

the plant, which was not endangered. *2) Early on January 12, snow took out one line. Overnight on January 12-13, colder weather turned small ponds near Victoria, flooded by the heavy rains, into skating rinks. Flood hazards were reduced. On January 14 at noon, Victoria recorded a temperature of 29° F (-1.7° C) with a northwest gale blowing. Victoria High and North Ward schools were closed when plumbing froze and heating systems ceased operating.

*1) The total rainfall of 65.30 in. (1,658.6 mm) recorded at New Westminster during 1931, was the highest since John Houston took over the duties as Dominion meteorologist in 1919 (*The British Columbian*, January 11, 1932).

*2) In previous years, 6-8 ft. (1.8-2.4 m) of water had gone over the sills (*Victoria Daily Times*).

January 26, 1932

Source: *The British Columbian*, January 26, 1932; Phillips 2005

On January 26 between 5:30-2 p.m., New Westminster recorded a 4-in. (10 cm) snowfall, which was considerably deeper in residential sections. Heavy snow blanketed Vancouver and vicinity, slowing traffic and causing widespread damage. Thick snow blanketed the waterfront, reducing visibility to a few hundred metres and causing navigators anxiety as they crept into and out the harbour. Gale force winds created blizzard conditions, leading to the collision of two vessels (Phillips 2005). The second storm in two weeks extended as far east as Agassiz. Ten days earlier, overnight January 15-16, New Westminster recorded 9 in. (22.5 cm) of snow.

February 23-27, 1932

(Rain-on-snow and dam burst/flooding).

Discharge (m³/s): Max. daily: February 27: Capil.: 186; Sooke: 71.1; February 29: CR/CL: 365; max. instant.: N/A.

Source: *The British Columbian*, February 24 and 26, 1932; *Vancouver Daily Province*, February 27, 1932; *The Chilliwack Progress*, March 3, 1932; Eisbacher and Clague 1981; Melone 1985 (p. 59); Environment Canada 1991.

Details: During the 24-hour period ending February 24 at 5 a.m., Vancouver recorded 0.95 in. (24.1 mm) of rain; 0.88 in. (22.4 mm) of which fell between 7:30 p.m. on February 23-5 a.m. the next day. The rainstorm with a daily maximum precipitation of 28 mm, a two-day maximum of 57 mm or 97 mm for the storm total in the downtown Vancouver area, caused landslides in the Vancouver region (Eisbacher and Clague 1981). According to records kept by J.L. Davies, in charge of the Chilliwack Meteorological Service, almost 8.5 in. (215.9 mm) of warm rain fell between 5 p.m. on February 23-7:30 a.m. on February 27. In the 24-hour period ending 9:30 p.m. February 26, 4.81 in. (122.2 mm) fell. This downpour was considered by observers to be "one of the heaviest, particularly at this season of the year, ever experienced here."

Slides and washouts interrupted trans-continental rail service both in Canada and the United States. On February 26 at about 7 a.m., a mudslide came down a high clay bank 0.5 mi. (800 m) west of Haney station. Mud to a depth of 5-8 ft. (1.5-2.4 m) covered both railroad tracks of the mainline for about 100 ft. (30 m). The slide also took down the company telegraph wires. On February 27, Vancouver was without rail service as the CPR, CNR and GN railways were all out of commission. In the Cheam Mountain District, the CNR trackage and the Trans-Canada Highway suffered heavy damage. Several serious slides, including a 15-ft. (4.5 m) deep one, tied up train traffic between Cheam-Yale. A slide damaged the CNR bridge at Cox Station, west of Chilliwack. One end of the 40-ft. (12 m) structure was carried away. A mudslide at Ruby Creek cut the CPR line and all direct telephone communications between the Lower Mainland and the rest of Canada. *1)

Chinook winds and heavy rain caused considerable flood damage around Chilliwack. Due to still enough frost in the ground severe flooding occurred. In Chilliwack and Sardis, basements flooded and in some sections homes were surrounded by water. Near Chilliwack, the Elk and Dumvill creeks and smaller mountain streams flooded large areas and the Chilliwack Central Road. When the Elk and Dumvill creeks, which both supply water to the Elk Creek waterworks system, went on the rampage, the city and district were temporarily supplied with water from the reservoir on Little Mountain. In East Chilliwack, domestic water supplies were temporarily cut off when mains across streams were carried away. Repairs to roads and bridges due to floods and slides in the Chilliwack municipality were estimated at \$1,000-1,500. The main damage occurred on Vedder Mountain, Cultus Lake road, roads on Sumas, and Lindell road in the vicinity of E. A. Dumvill's farm.

On February 26, due to the heavy runoff from rivers in the coast range the Fraser River rose 10 ft. (3 m) permitting the Rosedale Ferry to use the summer landing. The Vedder River broke through its east bank above the BCER bridge at Woodroffe, washing out 500 ft. (150 m) of trackage. It flowed 2 ft. (60 cm) deep over the Keith-Wilson Road for a distance of 1 mi. (1.6 km) to the Sumas Prairie road for a similar distance. On February 26, traffic on the BCER between Chilliwack-Yarrow was suspended. The Vedder River washed out or flooded some 1,600 ft. (480 m) of BCER track east of the railway bridge. Previous interruptions had occurred due to slides along Vedder Mountain. The train was brought as far as Yarrow. However, busses were unable to reach Yarrow via the Vedder Mountain road due to washed out culverts and slides. Bus and truck maintained passenger and freight service to Chilliwack until March 1 when train service was resumed. The CNR stopped running on February 25.

In the lower sections of the reclaimed Sumas Prairie area, some 1,500 ac. (600 ha) of farmland were flooded. The heaviest loss was sustained in the lower levels of the new prairie section. Water levels reached 5-6 ft. (1.5-1.8 m) in or around some 15 farms. Several families were forced to leave their homes as floodwaters reached as high as the windowsills. Traffic on the Keith-Wilson and Hopedale roads was interrupted until these were regraded. The March 3 edition of *The Chilliwack Progress* gave detailed damage information. The Chilliwack airport was covered by 3-4 ft. (0.9-1.2 m) of water. Farms lying south, north and west of Woodroffe were inundated as the flood followed the course of Lewis Creek to its conjunction with McGillivray Slough, which carried the drainage water to the pumping station. It was reported that the 12 x 12 ft. (3.6 x 3.6 m) flood gate in the canal dike at the McGillivray pumping plant was not closed in time to prevent the rising Fraser River flood water from backing into the area. On February 28, the Vedder River dropped some 5 ft. (1.5 m). On March 2, water levels at the McGillivray Creek outlet showed a drop between 5-6 ft. (1.5-1.8 m).

Snowslides swept away many telephone poles in the Coquihalla Pass, also tying up the Kettle Valley rail line. A smaller slide interrupted telephone lines between Hope-Rosedale. Slides, the most serious one being 3 mi. (4.8 km) south of New Westminster at White Rock interrupted service on the GN line. For a time, Hope was seriously threatened when the Coquihalla River left its course above the CNR bridge. Part of it flowed down the main street, emptying into the Fraser River near the historical cairn, 1 mi. (1.6 km) distant from its usual junction with the Fraser River. Slight damage occurred to the roadway and some small buildings were upset. At Hope, the Coquihalla River washed out a section of track west of the bridge, leaving the rails suspended in the air. Work crews augmented by men from government camps at Jones Hill, were employed in making temporary repairs. Eastwards, slides caused interruptions in telephone and telegraph service. The new trans-Canada telephone circuit was reported out for several miles. The highway between Hope-Popkum suffered severely from slides and the loss of bridges. Major damage occurred at Silver Creek, interrupting traffic for several days. Trucks ran as far as a point west of Jones Hill and from the Hope side as far as Jones Hill. The mileage between the two points was traversed on foot.

Above Vedder Crossing, some families were isolated by slides on the Mount Baker trail, which was obliterated in many places as the river cut into its banks. The damage to the Mount Baker Road was so great that it was problematical whether repairs would be undertaken. A hundred yards (90 m) or more above the Crossing, a strip of 150 ft. (45 m) of the Teskey orchard was carried away. On February 28, efforts to save the barn on the farm failed when it was carried downstream.

Heavy damage also occurred at Agassiz and vicinity. Slides destroyed the old electric light plant and the reservoir and pipeline at the back of the Experimental Farm. An auxiliary plant supplied the farm with water until repairs could be made. At Trout Lake, the new dam beyond the hatchery on Harrison Lake broke. A dam and reservoir at the back of the Hardy farm, which supplies water for the golf course on the Hot Springs Road, gave way, letting loose some 75,000 gal. (337,500 L) of water. The rush of water upset two bunkhouses of the Green Point Logging Company and covered the railroad track with rock and debris. Many Agassiz residents had their basements flooded.

The heavy rain caused considerable interruptions in the Maple Ridge district. On the evening of February 26, a landslide occurred at Whonnock, which completely blocked the Lougheed Highway. Traffic was detoured via the Dewdney Trunk road. The North Alouette River, swollen by the rain and melting snow, went on the rampage. Wilson Road was under water 2-4 ft. (0.6-1.2 m) deep for a distance of more than 1 mi. (1.6 km).

Victoria recorded more than 50 hours of continuous precipitation totaling more than the average total rainfall for the month of February. All of Vancouver Island suffered under the unusual downpour. In the Duncan area, rain fell for three days steadily. Streams 3 ft. (90 cm) deep blocked the Island Highway at Koksilah. On the evening of February 26, a mudslide halted traffic in the Goldstream section just south of

Malahat Drive for a few hours. Several minor slides occurred on different parts of the road. The Nanaimo stage was delayed for several hours.

*1) The telephone company maintained two lines through the British Columbia Interior; one followed the CPR mainline and the other CPR's Kettle Valley line (*Vancouver Daily Province*).

February 26-28, 1932

(Icejam/flooding and dam burst/flooding).

Source: *The Vancouver Daily Province*, March 1, 1932; *The Daily Colonist*, March 2, 1932.

Details: At the end of February, the British Columbia Interior experienced its "most widespread spring flood period in 20 years." On February 26, following "one of the most sudden and spectacular thaws on record," the ice in the Tulameen and Similkameen rivers broke up. When the icejam broke, a huge wall of turbid water and ice came hurling down the narrow valley "with a mighty roar." The rush of water carried large slabs of ice and tons of debris. The main force of the deluge was felt a few miles below Princeton where the river takes a number of sharp turns. At each turn, the river swept straight ahead piling up huge floes of ice over the highway and a ribbon of land that hugs the cliffs.

At one of the turns in the stream below town, floodwaters suddenly engulfed a car coming towards Hedley. Before the occupant could get out, water poured over the vehicle. When the water receded, the car was left solidly hemmed in by huge packs of ice. Water surged over the Allison flats in Princeton and surrounded the low-lying houses and other buildings near the riverbank further downstream. On Riverside Avenue, at least one small building was picked up bodily and moved several feet. Blasting of the ice averted the flooding of the Tulameen coal mine. Huge piles of ice closed the Hedley-Princeton road, an important southern trans-provincial highway link. It would likely be closed for more than a week till the ice and debris, which swept down when the Similkameen River ice broke up, would be removed.

Following heavy snowfalls, a sudden thaw seriously impaired railway, telephone and telegraph service and blocked highways. Because of many slides on the Kettle Valley rail line in the Coquihalla Pass, all rail traffic was rerouted via Spences Bridge. The Coquihalla River washed out several bridges and much track and numerous slides came down onto the rails. The Kettle Valley Othello station house was seen floating by Hope. The Coquihalla River left its course below the Kettle Valley bridge, its main flow switching to west of the CNR bridge. The rail track washed out for some distance. Part of the raging torrent tore through the main street of Hope, emptying into the Fraser River 1 mi. between the junction between the Coquihalla-Fraser rivers.

Much damage was done to Hope's main street where some small buildings were overturned. With some difficulty the citizens of Hope saved the historical cairn from being washed into the Fraser River. The highway between Hope-Rosedale was left in bad shape due to washouts and slides. On March 2, some 400 highway workers in four camps were still marooned by four washed out bridges on this highway. Between Hope-Chilliwack, all telephone lines were down, while east and west of Hope 18 mi. (28.8 km) of the trans-Canada line were reported down. Slides up to 15 ft. (4.5 m) deep came down onto the CNR tracks in the Cheam Mountain district. The creek tore away at least 1 mi. (1.6 km) of highway along Silver Creek when it flooded its banks. Between New Westminster-Basque, CNR detoured its trains over CPR tracks. A large gang of men was engaged in clearing in the Hope district where the Coquihalla River caused much damage.

At Cox, a snow and mudslide damaged a bridge. It was expected it would take several days before the line would reopen. Late on March 1, with the completion of repairs on the Vancouver-Vancouver line direct telephone communications between the Lower Mainland and the rest of Canada were restored. They had been out since February 26 due to a mudslide at Ruby Creek. The trans-Canada line, which follows the Kettle Valley line through the Coquihalla Pass would not be repaired for several more days. BC Telephone reported about 200 snowslides in the pass.

On the Agassiz-Harrison Mills road, fill washed out 5 mi. west of Agassiz, closing the road to traffic. At the Dominion Experimental Farm, the old lighting plant, reservoir and pipeline were demolished by a slide. Part of the barn on the Hardy farm was carried away. Some 75,000 Gal. (337,500 L) of water were released when a dam at the back of the golf course on Hot Springs Road gave way. Two bunkhouses of the Green Point Logging Co. were upset as a result of the new dam at Trout Creek breaking.

Following a heavy snowfall on February 28, the next day the temperature dropped to -16° F (-26.7° C) compared to 55° F (12.8° C) on February 23. On February 28 at 2:30 p.m., a Kettle Valley railway section man was buried for 26 hours by an immense snowslide east of Hope. The slide covered 550 ft. (165 m) and was 18 ft. (5.4 m) deep in places. The victim was rescued unconscious but alive on February 29. He has worked his

way to within 5 ft. (1.5 m) of the surface and made a narrow opening through which he threw a mitten to attract attention. On March 1, the man was recovering in hospital suffering from frozen hands and feet and exposure.

November 18-21, 1932

(Rain-on-snow).

Discharge (m³/s): Max. daily: November 19: Wan.: 2,130; max. instant.: N/A.

Source: *Victoria Daily Times*, November 16 and 18, 1932; *Evening Empire*, November 21, 1932; *The Province*, November 23, 1932; *The Colonist*, November 23, 1932; *The Vancouver Daily Province*, November 23, 1932; Environment Canada 1991.

Details: Between November 18-21, heavy rains caused the Alouette, Vedder and Sumas rivers to run high, flooding various low areas near Surrey, including Johnson Road north of Sullivan and many fields near Bose Road (*Evening Empire*, November 21, 1932). The water in Alouette Lake was level with the BCER dam in Pitt Meadows. Mud slides and flooding interrupted highway and rail traffic.

On November 18, New Westminster reported heavy rain. In less than three days, 5.18 in. (131.6 mm) of rain were recorded. In November till noon on November 21, some 8 in. (200 mm) of rain fell, bringing to total for 1932 to 59.05 in. (1.5 m).

Recent heavy rainfall and heavy snow followed by a thaw caused flooding near Chilliwack and Sumas. Occasional structural damage occurred to the extent of several thousands of dollars. At Sumas, the Vedder River rose 8 ft. (2.4 m) overnight, flooding the area between the BC Electric Railway bridge and the upper highway bridge. A mass meeting of residents asked Hon. R.W. Bruhn, Minister of Public Works, to come immediately and survey the damage done.

According to Bruhn, the Vedder River created havoc in a large area of the Sumas reclamation area. The force of the water tore up 50 yd. (45 m) of logging railway. Logjams were hurled about the farmlands. H.C. Anderson, Government engineer at New Westminster, was instructed to take all steps necessary in connection with the flooding of the Vedder River. After a conference between Bruhn, Public Works Engineer, Bruce Dixon, Sumas Dyking Commissioner, and Harry Anderson, District Engineer, it was announced that the government would start immediately to clear away the new logjams, allowing the water to escape down their usual course.

Serpentine River overflowed its banks, flooding all low-lying land in the area. Salmon were noticed swimming in some of the flooded fields. On November 16, some were observed swimming through several inches of water flowing across Bose Road near Cloverdale. On the Cariboo Highway, washouts occurred at Silver Creek, west of Hope, and 1 mi. (1.6 km) west of Choate. The road between Barkerville-Quesnel was temporarily closed after 18 hours of steady rain fell on top of 18 in. (45 cm) of snow. After the road was cleared of snow, the surface was covered with solid ice.

On November 15, a big new slide near Princeton on the CPR line between Nelson and the coast delayed the Kootenay Express for about 12 hours.

December 2, 1932

Source: *Victoria Daily Times*, December 3, 1932; *The Vancouver Daily Province*, December 3, 1932.

Details: Early December when the Pitt Meadows area flooded a number of cattle drowned. An SPCA inspector accompanied by a provincial police officer rescued 55 head of cattle marooned in a field. On his way back to Vancouver, the SPCA officer had salmon, trapped in flooded area swim up to his car, "apparently attracted to its headlights."

The Vedder River threatened overflowing its banks again. Under existing circumstances with the west river blocked, high water might cause much damage. To alleviate the situation, it would be necessary to immediately clear the accumulated drift and other obstructions over 4 mi. (6.4 km) of its course near the main highway bridge. Other work would include the dyking behind the BCER line where a washout had occurred the previous season. Hon. R.W. Bruhn, minister and deputy Mr. P. Phillip, who visited the site stated that as no money was available, the government would not be able to meet the cost of dyking.

December 22, 1932

(Storm surge/tidal flooding).

Source: *The Vancouver Daily Province*, December 24, 1932; Reksten 1992 (p. 112).

Details: On December 22, Victoria was hit by a southeast storm described by some people as "the worst in 40 years." According to Cliff Adams, "We had a booming southeaster, a very low barometer and a very high tide. Several yachts took off for the beach. The float in front of the (Royal Victoria Yacht Club) dinghy house went

out and then the dinghy house itself took off – just lifted right of its pilings, drifted over the rocks to leeward and gradually but effectively collapsed into pure matchwood.” (Adams In: Reksten 1992).

The storm also hit the Vancouver area and elsewhere in the Lower Mainland and Vancouver Island. Heavy seas, 13 to 15-ft. (3.9-4.5 m) tides and gales tore a 100-ft. (30 m) hole in the dike in the Colebrook district. More than 800 ac. (320 ha) of farmland were submerged to a considerable depth. An additional 500 ac. (200 ha) were flooded. Thousands of tons were moved up to 0.5 mi. (800 m) into the fields. Many hundreds of tons of stored potatoes, carrots and turnips were washed out. Cattle and sheep wintering on the flats were driven to higher ground. The currents heavily damaged and closed Mud Bay Road. According to Reeve J.T. Brown, in addition to the portion that was entirely washed away, the whole dike was “washed to a shell.” Never in his 30 years experience in the district, had he seen “anything like the force of the sea.” Several farmers in the district were threatened with vacating their homes.

Early on December 22, a combination of high tide and a western gale caused the Campbell River section of the Island Highway to flood. *1) High seas swept over the highway littering it with hundreds of logs. It was not until the morning of December 24 that the road was passable again. At Comox and Hornby Island, wharves were slightly damaged and small boats were cast ashore. The Comox Logging company lost a section of their boom camp, wharves and floats.

*1) A stretch of highway several miles long south of Campbell River is just above the high tide mark.

June 13-16, 1933

(Spring runoff/flooding).

Source: *The Daily Colonist*, June 13, 14, 15, 16 and 17, 1933; Environment Canada 1991.

Details: Around the middle of June, an “unprecedented” heat wave in the Kootenay district caused snow to melt in the mountains and widespread flooding. Highways, bridges and other property were damaged and communications with Nelson from the south were cut off. The highway between Nelson and the international border was washed out in many places. The big 4.5-mi. (7.2 km) long flume of the Schaefer-Hitchcock Lumber Co., constructed at a cost of \$35,000 was wrecked and almost completely carried away.

At Sandon, Carpenter and Star creeks flooded the business section and the lower residential areas and forced residents to evacuate. Carpenter Creek went on a rampage when the big flume through which it flows under the town’s main street became blocked by debris. Many buildings were undermined or had their basements flooded. Between Sandon-Three Forks, two railway bridges and a highway span over Carpenter Creek were carried away. Sheep Creek near Salmo was running high. A logjam below the Reno Mining Co.’s new powerplant up the tailrace caused the plant to shut down temporarily. Near Grand Forks, the Kettle River rose rapidly, causing several basements to flood. Near Arrowhead, the level in Upper Arrowhead Lake rose at a rate of 1 in. (2.5 cm) and hour. Some 150 scientists from the Pacific Science Congress at Vancouver visiting Trail and the West Kootenay powerplant along the Kootenay River were cut off by a large mudslide on the CPR main line.

The Slocan River, “at its highest in years,” flooded the highway in many places. At Slocan City, the bridge at Springer Creek went out. At Fernie, the Elk River rose and flooded some sections in the lower part of town. On June 17, the Elk River at Elko recorded a maximum daily discharge of 564 m³/s., the third highest for the period 1914-1944 (Environment Canada 1991). At Nelson, water levels in Kootenay Lake rose 6 in. (15 cm) in the 24-hour period ending noon on June 16.

July 6, 1933

(Spring runoff/flooding).

Source: *The Vancouver Daily Province*, July 6, 1933; Environment Canada 1991.

Details: Early July, the Fraser River remained at a constant high level of between 19-20 ft. (5.7-6 m). Considerable seepage occurred in the Nicomen Island dikes. Some 200 ac. (80 ha.) of Hatzic Prairie were flooded when the pumps were unable to handle the floodwaters, which rapidly spread over the area. On July 6, high water at the Nicomen and Mission gauges reached 20.3 and 20.1 ft. (6.09 and 6.03 m), respectively.

On July 6, the Fraser River at Hope recorded a maximum daily discharge of 9,290 m³/s (Environment Canada 1991).

November 17-24, 1933

(Rain-on-snow).

Source: *The Daily News*, November 22 and 27, 1933; *The Cariboo Observer*, November 18, 1933.

Details: On November 20, heavy rain occurred in Vancouver, Victoria and at other Lower Mainland and Vancouver Island points as well as throughout the interior. That night, a general storm warning was issued for the entire coast. Heavy rainfall and melting snow caused the Fraser River to rise again. The gauge at Quesnel showed a rise of 7.5 ft. (2.25 m) since November 10.

December 11-13, 1933

(Ice storm).

Source: *The Times Today*, December 3, 1985; Ewert 1986 (p.199); Wilson and Wilson 1998 (p. 51).

Details: In 1933, the Lower Mainland was hit by a "silver thaw." (Wilson and Wilson 1998). On the afternoon of December 11, sleet, freezing as it fell, came driving out of the northeast, coating everything with a heavy wrap of inches-thick ice. Most affected was the area between Abbotsford-Chilliwack. The storm centred on BCER's Fraser Valley line between Delair-Vye, where both high-tension circuits were practically destroyed and 80 sections of line were broken. To the south, Huntingdon was the scene of extraordinary destruction. Company linemen worked through to December 13, when another storm struck. Most of the repairs already completed were undone. By December 14, power was restored to Chilliwack, as well as to the Sumas pumping station, "the instrument largely responsible for keeping Sumas prairie from returning to Sumas Lake."

Squamish resident Rose Tatlow recalls that one winter, "I think it was about 1934, we had a heavy snowfall, about 3 ft. (90 cm), and then it turned cold and the top of the snow froze. The snow covered the fences and John McKinnon, who lived close to us, skated up to the store over the tops of the fences. The snow was so deep that when you cut into it to shovel out the paths, it was the most beautiful blue (*The Times Today*, December 3, 1985).

December 17-30, 1933

(Storm surge/tidal flooding).

Source: *The Vancouver Daily Province*, December 20, 21 and 22, 1933; *The Daily Colonist*, December 29, 30 and 31, 1933; *The British Columbian*, December 19, 1933; January 2 and 3, 1934; *The Review*, January 4, 1934; *The Daily Colonist*, December 31, 1972 (mag. sec.); *The Cowichan Valley Citizen: Millennium Chronicles* p. 39; British Columbia Ministry of Environment 1975; Ewert 1986 (p. 199); Phillips 2005.

Details: On December 17, flooding started with between 1,500-2,000 ac (600-800 ha) of lowlands in the vicinity of the Serpentine and Nicomekl rivers under water. On December 19, floods along the Fraser River inundated thousands of acres of rich farmland, especially Chinese truck gardens and greenhouses. Strong westerly winds pushed high tides inland. The floods drowned 40 sheep and several hogs at the B.C. Livestock Exchange. Horses stood in water up to their neck and whinnied in fear. At Mud Bay, 2-metre rollers roared over the site where the dyke once had been (Phillips 2005).

On December 19, a storm centre off Vancouver Island had moved towards the Mississippi Valley. The storm of even greater intensity had taken its place and beyond it a series of depressions stretched across the entire Pacific Ocean moving swiftly eastward. On December 20, the "worst storm in 30 years" battered Vancouver Island and the Lower Mainland. The storm was also described as "the worst in the memory of some old-timers."

Hurricane-force winds virtually eliminated telephone and electrical service and there was extensive flooding from the Malahat to Chemainus. Newspapers reported, "Many providential escapes from death or serious injury.... by residents who were caught when the gale brought trees down like ninepins over roads and farms in every corner of the district. The forest at some points actually collapsed under the pressure. Residents of longstanding declare the wind to have been the most severe in the district's history." One of the linesmen who attempted to maintain service during the storm said it was worse than anything he had experienced during the war. "I was never so scared as when the trees were coming down all around us on Solly's Hill, Westholme."

In her book "Mr. Chemainus," Joy Land Anderson wrote that she was on her way to the company store had to dodge flying glass when the window was blown out of one of the Japanese stores. "The bay was full of spindrift, and the ships in the harbour had anchors out to keep them from being blown onto Bare Point. Lumber in the (Victoria Lumber and Manufacturing Co.) yard was flying in the air, and houses were twisted off their foundations." (*The Cowichan Valley Citizen*)

The almost unprecedented high tides driven ashore by the gales caused much damage. High tides at English Bay on December 18-20, varying from 15-15.1 ft. (4.5-4.53 m) were affected by southeast and southwest gales. They backed up waters and caused damage. With a wind, the 14- ft. 8 in. (4.4 m) tide at the

Vancouver harbour on December 20 backed the water up to a level of 16 ft. (4.8 m), the highest recorded there since 1887.

During the first 20 days of December, Vancouver recorded 9.72 in. (246.9 mm) of rain. On December 20, the latest of a series of winter storms battered the Pacific Northwest for the fourth successive day. The 60-mph (96.6 km/h) storm off Vancouver Island dumped more than 8 in. (200 mm) of rain in Grays Harbour in 24 hours. Between 11 p.m. on December 19-5 a.m. next day, Vancouver recorded 0.66 in. (16.8 mm) of rain accompanied by a stiff southeast wind. The high amount of rainfall was considered unusual for such a short period. During the 24 hours ending 5 a.m. on December 22, Vancouver and Victoria recorded 0.79 and 1.46 in. (20.1 and 37.1 mm), respectively. *1) On the night of December 20, the storm left Vancouver for a short time without communications with the outside world due to damaged telephone and telegraph facilities.

Early on December 19, dikes of the Fraser River broke in four places near (Westham's?) Blenheim and Main streets. In some places, water reached a depth of 3 ft. (90 cm). This section of the BCER Marpole to New Westminster line was again interrupted by floodwaters. On December 19, interurban car 1211 suffered considerable damage to two of its motors because of storm-related flooding on the Marpole to New Westminster line. West of Glen Lyon, ballast had washed out from under the track (Ewert 1986). Floods covered the area between Heather-Fraser halting traffic. The combination of southwest gales and high tides held back waters on the Nicomekl and Serpentine rivers, flooding low-lying lands. A break in the dike along Nicomekl River behind the town caused the popular Crescent Beach to flood with 2-3 ft. (60-90 cm) of water. The flood occurred shortly after 8 a.m. when a 15-ft. (4.5 m) tide driven by a southwest wind swept into the Fraser River. The Alexandra Fresh Air Camp with its many buildings was the first to flood. The floodwaters pouring in from the rear of the town took the residents by surprise. The entire village turned into a lake with floodwaters reaching the floors of many of the summer cottages. The water was to within 1 in. (2.5 cm) of the floor of Fowler's store. Four of about a dozen families were evacuated by boat, while the others were preparing to leave. About 75 men worked on losing the 400-ft. (120 m) gap in the Nicomekl dike at Crescent Beach. The breaks in the Westham Island dikes caused the only delta land to be seriously affected by floodwaters. At White Rock, the post platform beneath the Canadian Legion quarters on the pier washed out, causing about \$300 damage. *2)

The Dyking Commission's east dike of Colebrook went out, flooding hundreds of acres. The BCER Guichon branch line was reported to be under 4 ft. (1.2 m) of water. Flood conditions on Westham Island worsened when all dike repairs washed out. This rendered useless an all-night fight by residents to protect their property. Woodsheds, small outbuildings, barn approaches and small wooden bridges were reported afloat. After the dike on the Oliver farm breached, water from Mud Bay flooded about 300 ac. (120 ha) of farmland. *3) At Mud Bay, some 1,000 ac. (400 ha) of farmlands were under water. The tide, estimated to be the "highest in 40 years," was 6 in. (15 cm) higher than the high tide that broke through the Colewood dike the previous year. The storm overnight December 19-20 tore out the heavy support poles (of the Colewood dike?) "as if they were matchwood." No repairs could be made to the dikes until the waters subsided. With the tide on the morning of December 20 holding back the floodwaters, the Nicomekl and Serpentine rivers both flooded their banks. Both flats and Mud Bay were flooded. The flood situation looked worse than it actually was, as this time of the year there were no crops out.

On December 29, Britannia Beach was partly flooded (British Columbia Ministry of Environment 1975). The beaches at Britannia Beach were swept clear of driftwood with the drift marking a new high water mark. The business and residential sections of Squamish flooded to a depth of 4 ft. (1.2 m). Considerable damage was done when seas swept in the town. The post office was surrounded by deep water. Part of the PGE right-of-way was carried away and the telephone and telegraph services were cut. At some points, there was 18 in. (45 cm) of water across the railroad tracks. The Union Steamship Co.'s *SS Chelohsin*, was storm-bound at Squamish with 195 passengers stranded at the end of steel. Due to the storm on December 20, the *S.S. Capilano* had been unable to make landings at Squamish and Woodfibre. Water reached the bottom of the cars of the train left on the Squamish pier. Passengers reached Vancouver after spending the night in the parked train sleeping on the seats and the floor.

Following high winds accompanied by more than an inch (25 mm) of rain and snow, communications east and west of Nelson were interrupted. Late on December 19, telegraphic communications with Nelson were almost completely cut due to slides west of Midway in the Coquihalla Pass. Wire service was crippled when five poles were torn out by a slide on Kootenay Lake. At Blake, 30 mi. (48 km) east of Nelson, a big snowslide blocked CPR's Kootenay division. Nearly 200 men were employed clearing the "monster slide," which was about 1,000 ft. (300 m) long and 50-75 ft. (15-22.5 m) deep (wide?). The large crew was engaged in topping the slide in preparation of the arrival of two rotary plows to tackle the slide at each end. Indications were that the

slide would not be cleared for two to three days. Another slide about 5 mi. (8 km) east was cleared. No. 11 train on the Kettle Valley line was delayed for at least one day. Though rail service from the east was cancelled on December 19, a Kettle Valley Express had left Nelson to connect with the lake steamer at Procter to make a transfer at the other side of the slide. On December 20, a blizzard on the CNR mainline and a snowslide near Ashcroft delayed the CNR trans-continental train by eight hours. The Slocan district was isolated due to blocked highways. With warm weather prevailing in the Kootenays on December 21, additional snowslides came down onto the CPR line. West of Nelson, at Jerome near Yahk a slide came down and a washout at Brilliant tore out the track.

The "hurricane-force" winds also swept the Cowichan Valley. Heavy rains preceded the storm. On December 20, the 60-mph (96.6 km) gale crippled communications and caused severe damage. Many low-lying areas such as Cowichan Flats and area along Kelvin Creek were flooded. Communications throughout the area were cut due to hundreds of toppled trees on roads and power lines. Many roads and portions of the Island Highway were impassable. The telephone system was almost totally disrupted. At Ladysmith, the storm reached its highest velocity and caused most damage at 3 p.m. Several houses lost their roofs and some orchards were destroyed. Fences and powerlines were down everywhere. The E&N rail passenger train to Victoria was delayed by 10 hours. The crew had to literally cut their way through a forest of fallen trees on the track. On the 36-mi. (56.7 km) stretch between Ladysmith-Duncan, there were 63 trees on the tracks, some of which 4 ft. (1.2 m) across. It took a logging train wrecking crew some eight hours to clear and travel a 6-mi. (9.6 km) stretch of track. Boats dragged their anchors in normally safe harbours. Many roofs and entire farm buildings were lifted by the wind or crushed by falling trees. In Nanaimo, a two-storey residence was lifted off its foundations and moved several feet. In Nanaimo, numerous windows were blown in, including the big plate-glass panes at the Hudson's Bay Co. store and the editorial office of *The Colonist*. A 45-mph (72.4 km/h) wind blew in the windows of a city hotel. Many roofs were ripped off and chimneys blown down. A boathouse was blown into the harbour. A falling tree pushed a CNR freight car off the track. Highway and rail traffic was tied up for several hours. Near Nanaimo, the Wilson Logging Co. camp was expected to be out of commission for three months, affecting 50 men. The tracks were covered with trees and the power- and telephone wires were down. The roundhouse and many lumber piles were blown away. Between Nanaimo-Chemainus, utility lines were down in numerous places. The 60,000-ft.² (5,575 m²) roof of the loading shed unit of the Victoria Lumber & Manufacturing plant at Chemainus was carried away. Duncan reported considerable damage and was completely isolated for several hours after telephone, telegraph and road communications were cut. Two houses were damaged and chimneys came down. Fallen trees blocked many roads. Fifteen trees were down on a 0.75-mi. (1.2 km) stretch of road. A schoolbus full of children was trapped between fallen trees. At Westholme, the old warehouse building was lifted up. It crashed down on the Island Highway, knocking askew the Westholme Post Office and breaking a gasoline pump. Nearby, trees were mowed down as if by a giant scythe." A damaged road near Niagara Canyon closed the Malahat Drive. Fallen trees as far north as Cousin's Hill made the road unsafe. Pacific Stage buses were running late as they were unable to pass along the Campbell River road except at low tide. Temporary repairs to the new Island Highway were estimated at \$2,500. Damage costs to the permanent highway not estimated yet were considerable. Engineers surveying the route during and after the storm, found 322 trees ranging from 1-7 ft. (30-210 cm) in diameter blown over along the route. Telephone poles came down in strings of half a dozen at one time.

On the morning of December 21, a warm Chinook wind from the south lasting six hours dumped 6 in. (15 cm) of snow on Nanaimo. Ladysmith reported 8 in. (20 cm) of snow, which turned into rain at 9 a.m. Under the weight of 1 ft. (30 cm) of snow, combined with high wind, a large barn housing Vancouver Island Coach Line coaches collapsed. Two stages and a car parked inside were wrecked.

During the third week of December, hard winds hit the Gulf Islands. Saltspring Island, where parts of several orchards were uprooted, lost over 500 trees. Pender, Lasqueti and other islands also suffered severe damage. Communications with Mayne, Pender and Saturna islands were not completely restored until December 29.

During the latter part of December, torrential rains all over the Lower Mainland caused flooding throughout the Fraser Valley. Traffic arteries were wiped out and buildings set afloat. At Marpole, water extended from the dike along the north bank of Marine Drive and from Heather Street to the east end of Twigg Island. Near Marpole, the buildings of a large Chinese truck farm, the extensive greenhouses and boarding quarters were swamped in the flood. Many houses in the surrounding area were entirely flooded out. The wind, which followed the torrential rains, caused extensive damage to power, telephone and telegraph wires.

*1) During December 1933, New Westminster recorded 12.88 in. (327.15 mm) of rain (*The Daily Columbian*). During the same period, with 11.17 in. (283.72 mm) Victoria recorded the second highest rainfall since record keeping began there in 1874. Only December 1917 was higher with 13.02 in. (330.71 mm) (*The Daily Colonist*).

*2) It was put in a year earlier to replace the one that washed out in the big storm the previous year (*The Vancouver Daily Province*).

*3) This was part of the original hand-built dike constructed by the late John Oliver in his pioneer farming days (*The Vancouver Daily Province*).

*4) The previous record was set in 1897 with 11.80 in. (299.7 mm) (*The Vancouver Daily Province*).

January 1934

Source: *The Daily Colonist*, January 28, 1934.

Details: At the end of January, heavy rains turned Marigold Flats near Saanich near Victoria into a lake. The water was the highest on record for Marigold Flats.

April 23, 1934

(Spring runoff/flooding).

Source: *The Daily Colonist*, April 24 and 25, 1934; Sanford 1978 (p. 227).

Details: On April 23, Carpenter Creek was rapidly rising and threatened Sandon and Silverton. The water was just beginning to rise and with continued warm weather residents feared a repetition of previous year's flood. They kept an eye on the flume running through the main street, which had not been repaired. *1) Using sandbags and brush, a gang of men tried to keep the stream from overflowing. At the mouth of the creek at New Denver, about 40 mi. (64 km) north of Nelson, 60 ft. (18 m) of bank washed away. Various slides coming down the Noble Five Slide, spread out for 300 ft. (90 m) but no damage was reported.

Flood conditions, weeks ahead of those in previous years, carried out several bridges and damaged highways near New Denver. Overnight April 23-24, New Denver was left without power. The Kaslo River carried out a large section of the water pipeline to the New Denver power plant. At a fork near the McAllister mine, a slide came down. At Three Forks, it swept away three railway bridges and a highway bridge and washed out about 2 mi. (3.2 km) of the road.

A rockslide had recently badly damaged the Hoodoo bridge on the Cariboo Highway north of Spuzzum. A temporary detour was constructed around it. According to an official of the Automobile Club of Vancouver, it was now possible for cars to proceed over the highway again.

On April 23, heavy rains severely damaged the GN railway bridge at Princeton, forcing GN to suspend service west of Keremeos. After close inspection, GN management decided to seek permission to abandon this line. (Sanford 1978).

*1) In June 1933 when Carpenter Creek went on a rampage, it had damaged the flume and caused flooding.

June 14, 1934

(Spring runoff/flooding).

Source: *The Vancouver Daily Province*, June 14, 1934.

Details: Around June 14, due to a breakdown in the pumping system in the west Langley dyking area about 200-300 ac. (80-120 ha) of crops and pastureland were flooded. Because of an administrative mistake made many years previous, the district was not registered as a dyking area, with the pumping station actually located on private property. All the water from about 3,000 ac. (1,200 ha) drained on this relatively small area. The farmers had no sufficient funds to get the pumps going. According to Councilor Alex Hope of Langley, the failure of several Soldier Settlement places to pay dyking taxes, was a contributory cause of the trouble hurting 10 farmers and their families.

December 26-30, 1934

(Rain-on-snow?).

Source: *The Cowichan Leader*, December 27, 1934; *The British Columbian*, December 27 and 28, 1934; *The Daily News*, December 29 and 31, 1934; January 2, 1935; Won 1971.

Details: On Boxing Day, extreme high winds occurred in southwestern British Columbia. Victoria reported a sustained wind of 74 mph (118.4 km/h) on December 26, a record that still stands today. As the intense storm moved inland, cold air was drawn out from the interior on to the coastal regions, resulting in heavy snowfalls. Campbell River, for example, recorded over 27 in. (68.6 cm) in 24 hours. On December 26 from midnight until 6 a.m., a gale “with hurricane proportions” swept the Cowichan district.

Power and telephone service in the district was severely disrupted. BC Telephone Co.’s long-distance lines damaged by the Christmas Night storm were expected to be back in service by December 28. On December 27, telephone service was restored to Bridge River, Powell River, Salt Spring Island, Duncan, Ladysmith and Chemainus. Communities still without service were all on Vancouver Island and included Campbell River, Courtenay, Cumberland and Port Alberni.

The fire that destroyed the Mayo Lumber Co.’s mill at Sahtlam at a loss of \$150,000 was directly attributed to the gale. Four houses near the mill also burned down. About 1 million ft.³ (28,000 m³) of export lumber on the loading platform were also destroyed. Hundreds of trees were blown down; on a 1-mi. (1.6 km) stretch of Cowichan Road more than 50 trees came down.

Snow fallen on the Grouse Mountain Plateau for several days amounted to nearly 6 ft. (1.8 m) at the Chalet. Deliveries throughout the Fraser Valley were made on sleighs as motor vehicle traffic was totally paralysed (Won 1971). The BC Electric Railway experienced trouble due to ice on the trolley wires. On December 27, the Fraser River at Haney was frozen across. Drift ice from upstream had piled up and formed an unbroken surface across the channel.

On December 28, in Victoria the “heaviest snowfall in 10 years” disrupted vehicular traffic on the highway between Victoria-Nanaimo. Travel and communications were also interfered with north of Nanaimo and in the vicinity of Courtenay and Cumberland.

Menzies Bay reported 4 ft. (1.2 m) of snow. A logging camp at Elk River recorded 3 ft. 4 in. (1 m) while other points reported 27 in. (67.5 cm) in 24 hours. In the Campbell River area, a tractor and a snowplow were stranded 2 mi. (3.2 km) apart. Hard winds and wet snow cut communications between the southern part of the island and Campbell River, Cumberland and Courtenay. Between Mill Bay-Duncan, 0.75 mi. (1.2 km) of pole line was down. North of Ladysmith, 25 poles were down. Trees, poles and wires across roads disrupted bus service.

The Chilliwack district suffered from heavy snow and strong winds. Cloverdale reported about 4 in. (10 cm) of snow on the ground. Snow piled up in drifts made all roads difficult and many impassable. On December 29 with a rise in temperature, the snow turned to rain. In the Lower Mainland, the snow up to a depth of 5 in. (12.5 cm) began to melt. The Fraser Valley side roads were still blocked by drifts of dry snow piled up 10 ft. (3 m) high in places.

1935

Source: *North Island Gazette*, November 18, 1987.

Details: In 1935, a relatively small slide threatened the community store at the Port Alice town site, cutting a path through the golf course. It destroyed a bridge, damaged 15 houses and cut off utilities.

January 20-27, 1935

(Ice storm, rain-on-snow and ice jam/flooding).

Discharge (m³/s): Max. daily: January 24: Sooke: 94.3; January 25: Capil.: 228; max. instant.: N/A.

Source: *The Daily Colonist*, January 23, 27, 30 and 31; February 5, 1935; *The British Columbian*, January 19, 21, 22, 23, 24, 25, 26, 28, 29 and 30, 1935; November 3, 1955; *The Vancouver Sun*, January 18, 19, 21-24, 1935; *The Vancouver Province*, January 21, 22, 23 and 24, 1935; *Victoria Daily Times*, January 29, 1935; *Chilliwack Progress*, January 24 and 31; February 7, 1935; CHWK staff: Fraser Valley Storm and Floods; January 20 to 26, 1935, Souvenir booklet of “Emergency Bulletins” issued by CHWK staff. Chilliwack Library, Chilliwack, B.C.; Sanford 1978 (p. 227); Eisbacher and Clague 1981; Eisbacher 1983; Scott 1970 (p. 74); Williams 1966 (pp. 9-11); Won 1971; Clague 1982; Melone 1985 (pp. 59-60); Ewert 1986 (pp. 203-206); Borrell 1992; Scott 1994 (pp. 90-91); Wilson and Wilson 1998 (p. 51); Environment Canada 1991; Evans, unpublished data.

Details: During the later part of January, the lower Mainland and parts of Vancouver Island were hit by the worst blizzard in years, a fierce ice storm and then torrential rains. The “worst time of snow and ice in the lower mainland’s history” began on January 19, a colder day than any on that date in 26 years. Next day, a raging blizzard dropped 2 ft. (60 cm) of snow in Vancouver and up to 4 ft. (1.2 m) in Surrey on its already frozen

ground. Drifts 8 ft. (2.4 m) deep were “plentiful.” On January 20, cold temperatures and snowfalls immobilised Vancouver and most of southwestern British Columbia. Vancouver recorded 17.5 in. (44.5 cm) of snow on January 20.

The “most intense (snowfall) in Vancouver’s history” paralysed all traffic and caused schools, mills, and businesses to close. It caused the “worst traffic tie-up since 1913.” Traffic on the old Granville Street Bridge was interrupted for hours when the swing span froze while open. Following big storms on January 19 and 20, rail service on three railroads running into Vancouver was disrupted over 10 days. Floods and slides claimed the lives of at least 15 people with another three missing. The ice storm of 1935, described as the “worst storm of the century,” was far worse than previous “silver thaws” in 1912, 1917, and 1933 (Wilson and Wilson 1998).

According to records kept by F.B. Dill, a member of the University of British Columbia Buildings and Grounds, between January 11-18, 22 in. (55 cm) of snow fell. A snowfall of 5 in. (12.5 cm) on January 11, was the beginning of nine days of unusual cold snowy weather. On the morning of January 17, North Hatzic and Mission-Matsqui at the bridge over the Fraser River recorded temperatures of -5°F (-20.6°C) and -7°F (-21.7°C), respectively. On January 19, temperatures were recorded below 0°F (-18°C) in the New Westminster residential districts and in the city 3°F (-16.1°C). *1) At 7:30 a.m. January 19, the temperature dropped to 2°F (-16.7°C). By the early morning of January 20, 18.5 in. (46.3 cm) of snow had fallen in 24 hours, breaking all records and bringing the measured total of snow since January 11 to over 40 in. (100 cm) (Williams 1966).

The cold weather was general throughout the province with temperatures in the Okanagan plunging well below 0°F (-17.8°C). The next day it reported the coldest weather in 26 years with a temperature of 4.3°F (-15.4°C) in Vancouver. According to E.B. Shearman, local Dominion meteorologist, the greatest accumulation of snow for a short period in 38 years, closed all streets to traffic. In the country, some snow piles became solid ice.

Later on January 21, the heavy rain in Vancouver turned once more into sleet. In the Fraser Valley, “silver thaw” froze onto powerlines to a thickness of 10-in. (25 cm). By the afternoon, the crashing lines had isolated Chilliwack, already covered by 29 in. (72.5 cm) of snow. Both the CNR and CPR were unable to move and would not for nine days (Ewert 1986). No trains arrived at New Westminster since January 20.

Sections of the Interior reported tremendous snowfalls. In the Bridge River area, 3,000 people were isolated as a result of 35 mi. (56 km) of road being under 10 ft. (3 m) of snow. Princeton reported 63 in. (160 cm) of snow, and Nelson 12 ft. (3.6 m) of snow and a minimum temperature of -17°F (-27.2°C). The rest of the Kootenays was buried under 4 ft. (1.2 m) of snow). A PGE train, caught in a slide near Pemberton, was snowbound for several days. Huge snowdrifts blocked and closed to all traffic the inter-provincial highway between Abbotsford-Chilliwack and the road between Abbotsford-Mission. All schools in Mission closed and bus service to there was suspended. On January 19, the wind, which lashed the Chilliwack and Sumas districts for several days, shifted to the Matsqui Prairie area. Following the snowstorms in the Fraser Valley, 100 loggers were marooned at the Harrison Lake camp of Green Point Logging Co. Ltd. On the morning of January 19, they received food and meat supplies by air via a Canadian Airways seaplane from Coal Harbour, Vancouver.

Sawmills along the Fraser River started to close as the river started to freeze over. At Haney, the river was already completely frozen over on January 19. Ice on the Fraser River forced many sawmills to close. Dynamite was used in futile attempts to break up the ice. *The Vancouver Sun* had as headline in their January 18 edition “Ice Breakers in Fraser” as headline.

On January 21, Vancouver streetcars came to a halt. That night, some 400 BCER employees shoveled snow and managed to get most of the city’s street railways open. On that same day, BCER officials requested the public to do their cooking after 6 p.m. The powerlines from two central electric power plants had collapsed, and due to snow drifts repair crews could not get to them. BCER asked residents to save power after BCER high-tension wires from the powerplants at Lake Buntzen and Stave Falls went down at 4 a.m.

Near the gypsum plant, a boom of logs consisting of 20 sections for a total of 800,000 ft.³ (22,640 m³) broke loose from its moorings. When the logs on ebb lodged themselves against the Fraser River Bridge, the structure was threatened. Later the boom broke apart.

According to CPR officials, the railway company had never encountered snow conditions like this before in the British Columbia area, especially between Yale-North Bend. At Yale, the snow was reported to be level with the top of the station. Between 8-9 ft. (2.4-2.7 m) of snow fell during a 36-hour period. On January 25, the CPR was still clearing mudslides at Hammond and at North Bend a rotary snowplow was clearing snowdrifts. On January 26, the CNR was trying to open their line to Chilliwack. Another ditcher was sent to Mount Lehman to clear the line where two days earlier a slide came down. The CPR line was blocked by slides at a number of points between Coquitlam-Mission. The PGE had already cleared 150 mi. (240 km) of their total

of 347-mi. (555.2 km) network. It was hoped to reopen their line in a few days. It was also hoped to have the rail connection with Seattle open by January 28.

By noon on January 20, 23 in. (58.4 cm) of snow had fallen in New Westminster during the previous 24 hours. It caused an almost complete tie-up of transportation facilities throughout the lower Mainland. BCER streetcars were unable to operate due to the breakdown in the snow clearing equipment. All busses suspended their operations and the morning train to Chilliwack was cancelled. On January 21 in Burnaby, a slide at Kerr Road disrupted service on the Marpole line of the BCER interurban system. For a considerable distance the tracks were under several feet of mud. Coated with ice, the trolley wire's arcing lit up the Fraser Valley with a dazzling light show.

On January 21, a quick rise in temperatures occurred. In Vancouver, for example, temperatures rose from 5° F (-15° C) on December to 43° F (6.1° C) the next day. On January 21, the coldsnap ended with heavy snow turning into rain. Following the blizzard of January 20, heavy rain fell on January 21. By nightfall, 3.73 in. (94.7 mm) of rain fell in 24 hours, breaking all records. Starting 8 p.m. on January 20, 4.15 in. (105.4 mm) of rain fell in New Westminster. For the period of 36 hours ending at 7 a.m. on January 22, New Westminster recorded 5.77 in. (146.56 mm) of rain. Between 8 p.m. on January 21-7 a.m. the next day another 1.62 in. (41.15 mm) of rain fell. It caused hundreds of basements throughout the city to flood. On January 21, New Westminster recorded 2.35 in. (59.7 mm) and 18 in. (45.7 cm) of snow. The total of 4.15 in. (105.4 mm) of precipitation made it an all-time record.

In the Lower Fraser Valley the situation was the worst. Blowing snow and sleet rapidly accumulated, downing power lines throughout the Lower Mainland and leaving Vancouver with only two out of nine power circuits. Wires and trees began to fall in the first violent snowstorm. Chilliwack reported 29 in. (72.5 cm) and all power lines down. Melting snow washed out bridges and tracks. More power lines were downed by debris. Flooding forced line crews into boats to repair the damage. Though they worked feverishly under dangerous conditions, they were unable to restore service until mid-February. Electricity did not even reach the Vedder Mountain substation until early February (Wilson and Wilson 1998).

The freezing rain or "silver thaw," which started during the night of January 21-22, covered roads, telegraph and telephone wires and trees with a layer of ice. The intense ice storm, in its sweep down the Fraser Valley, struck to a point about 3 mi. (4.8 km) west of Aldergrove. From there through to Abbotsford, most apple trees were down; huge fir trees had their tops snapped off and alder and birch trees were strewn around. Many of the orchards were ruined as trees were stripped clean. It would take weeks before the telephone and BCER line crews could untangle the wires, erect new poles and restore the systems. It appeared that the ice storm was much more severe from Abbotsford east than west of the town. Travelling towards the coast, the silver thaw stopped in Surrey at Kennedy Station on the BCER. The actual damage by sleet stopped at Craig. Murdo Maclachlan of Chilliwack described the ice storm that paralysed Vancouver and the Lower Fraser Valley in the last week of January as follows, "Trees, powerlines and roofs crashed down; pistol and cannon-like sounds accompanied the crashing and the freed ice-sheaths. It was like a battlefield, with crashing transformers providing awesome fireworks displays." (Maclachlan *In*: Borrell, 1992). On January 23, Chilliwack, Matsqui and Mission were still without power.

On January 24, *The British Columbian* called the conditions in the Mission area as "indescribable." It was thought that not a single tree was left standing. Poles and wires were down and strewn about the streets. Miles of telephone wires were down with the poles snapped off at the butts because of the tremendous weight of the ice, which formed on the wires. All the smaller trees were flattened to the ground and there was a continual booming as the larger trees on the hills were snapped off and sent hurtling to the ground. The streets were covered with glare ice and the wires as thick as a man's forearm. Transit was paralysed. The streets, impassable even for pedestrians, were virtually impossible for the streetcars. When they did leave the garage, they often got stuck on ice tracks or short-circuited in flooded areas. Streetcar workers and linemen worked for days to chip ice off the tracks and restore lines. Crews quickly restored one circuit from Stave Falls; two Buntzen Lake circuits were re-energised by January 22. Next day, some local transit lines were operational and by January 25, power was restored to Vancouver (Wilson and Wilson 1998).

The residents' food supplies were running low and general conditions infinitely worse than in any previous experience of silver thaw. Due to the ice, it was impossible to use horses and most people in the district did not leave their houses for days. In Chilliwack, residents were using toboggans to transport coal and store supplies. The streets were so slippery that boards with nails driven through them were put down on the ice so pedestrians could get around. Throughout the upper Fraser Valley, conditions resembled the situation following the disastrous sleet storm in the winter of 1917-18, though then there was less snow on the ground.

In Mission, an estimated 40-50% of all the electrical house connections were torn down. On January 27 at 5 p.m., the first electricity since the storm began was restored to places where house connections were still intact. By January 28, 220 of the 287 local telephone connections were still out of order.

Many roofs caved in under tremendous weights of accumulated snow and water. In some places, 4 or 5 ft. (1.2-1.5 m) of snow was covered with a thick layer of ice. In Vancouver, the roof of the Forum sustained \$70,000 damage. A number of small craft moored at Coal Harbour sank and several boat sheds collapsed under the strain of the heavy snow. The roof of K & D Service station at Dublin and 12th St. collapsed and damaged cars stored inside worth between \$3,500-4,000. The Elks Garage at 129 E. Cordova St. caved in under the weight of the snow, causing some \$50,000 worth of damage. In White Rock, a large building in Maple Street, housing R.E. Steed's Bakery and a garage collapsed under the weight of the snow. F. Peter's garage on Campbell Road also collapsed onto four cars. The roof of W.E. Taylor's store sagged. Barns and many older homes collapsed under the heavy burdens. In Elgin, many farm buildings collapsed, including the large barn on the Lamb farm, Wm. Haddon's machine shed, as well as a sheep shed and pigpen belonging to Stuart Stevenson. Chicken houses were also destroyed on the farms of Ernest Johnson and Harry Gerow. On Nicomen Island, several old barns on the lower road were demolished. At the Deroche end of the island, the huge new barn of Butter and Inman collapsed under the heavy snow and several head of cattle were killed.

Telegraph service was suspended to the south and east when the wires went down south of Bellingham and east of Mission. With the communication wires down, the west coast was cut off from direct contact with eastern Canada. Urgent messages could be sent via Australia on the undersea cable. It took nearly a week to get the main roads plowed so that horse-drawn sleighs could haul supplies (Maclachlan In: Borrell 1992).

By January 22, the Serpentine Flats around Cloverdale were flooded and even the BCER rails almost went under water. On the Marpole to New Westminster line, a washout near Kerr Road brought that line to a halt. By 11 p.m., rail traffic on Dunbar, the last line still operating in Vancouver, stopped (Ewert 1986). On January 23, there was no service on the Chilliwack line. Although a train had started out for Coglan, it had to turn around at Sullivan where the track was flooded with water 2 ft. (60 cm) deep over the track "as far as the eye could see." The next day, flooding in the Fraser Valley assumed yet larger proportions. By January 25, evacuation was the only solution for thousands as the bed of reclaimed Sumas Lake filled to a height of 10 ft. (3 m), even 15 ft. (4.5 m) in places.

The country between Rosedale-Hope was buried under about 7 ft. (2.1 m) of snow, covered by about 1.5 in. (3.8 cm) of ice. Up to the beginning of the Sumas reclaimed area, there was little snow but from there on there was 4 ft. (1.2 m) of snow and more.

A slide at Albion, 20 mi. (32 km) west of Mission blocked the Lougheed Highway. Overnight January 23-24, another slide occurred which carried down a portion of the road for its whole width and piled it up onto the CPR track far below.

On January 24, *The Vancouver Sun* reported the "wettest January ever." In addition to the 6.49 in. (164.8 mm) of rain, 18.5 in. (47 cm) of snow fell. At New Westminster between 9 a.m. on January 20-8 a.m. on January 24, 11.78 in. (299.2 mm) of precipitation, including snow fell in a continuous downpour. For several days following the sudden thaw, torrential rains came down in the Lower Mainland. In four days, Vancouver recorded 10.5 in. (266.7 mm) of rain. *2) During a 60-hour period ending January 23 at 8 a.m., a total of 6.77 in. (171.96 mm) of rain fell in New Westminster. The Highschool and McBride School flooded and all schools in New Westminster closed. At Albert Crescent, a small lake formed after the storm drains had previously frozen. Schools in New Westminster reopened on January 24, except Queensborough where the area was still under 2 ft. (60 cm) of water.

In Surrey, roads were blocked by water. On Scott Road at southern Westminster, water was reported 3 ft. (90 cm) deep. Also at Fry's Corner there was water over the highway. On January 23, Ladner service was still suspended. Sumas Road east of the pumping station closed due to fairly deep snow with a 2-in. (5 cm) crust. When Chantrell Hill went out overnight January 23-24, it was impossible to get to Crescent Beach by way of Crescent Road. The collapsed cribbing blocked the road.

On January 24, when tracks were flooded east of Sullivan, the BCER Fraser Valley line went out of commission. About 1 mi. (1.6 km) east of Sullivan a 1-mi. stretch was under water and covered with driftwood. Overnight January 24-25, Bear Creek tore a gap under the tracks near Sullivan. The swollen Bear Creek demolished the Chilliwack line's bridge at that point. About 100 ft. (30 m) of rails were left suspended over a chasm 15 ft. (4.5 m) deep. At this point, 0.5 mi. (800 m) west of Sullivan, there used to be a long trestle. The gully was filled in and a timber culvert installed to carry off the waters of the creek. As the fill had vanished, the

skeleton of the trestle was now showing. It was estimated service would be interrupted at this point for at least five days. It was rebuilt in record time and completed on January 28.

On January 25, breaks were developing in the dykes along the north side of the newly paved Abbotsford to Rosedale highway across Sumas prairie. At 10 p.m. that day, a washout destroyed one of BCER's new transmission lines, throwing the crucial water-clearing Sumas pumping station out of operation (Ewert 1986).

Rail service was also halted at Hyland, 1 mi. (1.6 km) west of Sullivan. Two other breaks occurred on the Fraser line. East of Abbotsford, a washout was 50 ft. (15 m) long and 20 ft. (6 m) deep and on the Mount Lehman Hill a 300-ft. (90 m) long washout occurred. At the latter point, the fill washed out 6 ft. (1.8 m) deep and left the tracks suspended. The BCER tracks were also flooded at Cloverdale and at Hunter. At the latter point the track was under water and unsafe for a distance of three or four poles. On the Burnaby Lake line, the track was flooded at Still Creek. On the Fraser Mills line, a shuttle service was maintained with passengers being transferred at a gap caused by the rising of the Brunette River, which was lapping at the bridge there. Due to slide at Kerr Road, the Marpole line also depended on shuttle service. The 6th Street line from 4th Avenue went down again, after it had been reopened the previous day. On the CPR branch line to Port Coquitlam, a washout occurred at Essondale. The bus was unable to make its return journey from White Rock due to the Campbell River flooding Campbell River Road at the easterly end of Washington Avenue.

On January 25, the government bridge over the Brunette River on the North Road was declared unsafe. Because of earlier trouble at the other bridge at Pitt River Road at the city boundary, Pacific Stage busses on the route to Haney had switched to use this bridge. They were now stopped at the bridge and passengers transferred across the gap over a hastily improvised plank roadway above the water, which was flowing over the bridge deck. The Abbotsford bus was forced to make a detour via Cloverdale and the McLellan Road to Langley Prairie. Deep water near Fry's Corner at Clayton Hill made it impossible to use that route. At South Westminster, the water at Scott Road was also reported to be deeper than the previous day. At Whonnock, a slide blocked the Lougheed Highway and the CPR main line. *3) The by-pass road down to the railway station, which was used on previous occasions when small slides occurred, was also blocked.

On the morning of January 26, the rain abated somewhat. Twelve in. (300 mm) of rain had fallen in Vancouver since January 21. At the eastern end of Vedder Mountain, "tremendous" snow slides had occurred, as well as at Mount Lehman and Kilgard. One snow cut was 1 mi. (1.6 km) long and 7 ft. (2.1 m) tall along one side of the track (Ewert 1986).

On January 28, BCER service was restored to Chilliwack and the next day the first interurban train made it as far east as Mount Lehman. On January 30, service was extended to Abbotsford. Freight trains were only working to Huntingdon to pick up long stalled goods at the border connection with the Milwaukee Road and Northern Pacific. Steam derrick B 3 was working ahead of augmented BCER line crews who were untangling wires, straightening poles. Whole sections had been washed out and miles of trolley wire were down (Ewert 1986).

Vancouver Island also experienced serious flooding and suffered extensive damage. At Jordan River, 5 ft. (1.5 m) of snow fell. Landslides took out the transmission lines and the BCE power plant at Goldstream was shut down entirely. BCE's general superintendent on Vancouver Island G.M. Tripp, saluted the work of his crews who "dared hazards on the snow-covered, steeply sloping banks of Jordan River repairing the major washout in the flume to keep Victoria supplied with electrical power." (Wilson and Wilson 1998).

In Victoria, hundreds of water pipes froze and a shortage of fuel was evident. The CPR steamship *Princess Elizabeth* reached Victoria from Vancouver with a coating of ice on her decks. Victoria recorded the greatest downpour of snow and rain since meteorological records were first kept in 1879. Between January 1-23, nearly 10 in. (250 mm) of rain fell in Victoria. Coupled with a heavy snowfall followed by a quick thaw, it caused flood conditions over a wide area. Floods on Vancouver Island were the worst on record. In Victoria, hundreds of basements flooded and over 200 homes were marooned. Telephone communications in the city were partially paralysed. Island schools closed and rowboat ferries operated in many parts of the lower island. Railroad and bus routes were blocked by land, rock and mud slides. The heaviest damage was sustained by the E&N Railway, BCER, BC Telephone and on the public highways. The E&N Railway sustained heavy damage and rail service between Victoria-Duncan was suspended. In Port Alberni, sawmills closed, throwing about 500 men out of work. For three days, the resident's water system was shut off. Comox Lake reached the highest level on record.

Around January 21, in Cumberland nearly 5 ft. (1.5 m) of snow fell which followed a dump of 4 ft. (1.2 m) of snow a week earlier. The Island Highway closed for several days. The snow depth around Cumberland and up to Campbell River averaged between 4-5 ft. (1.2-1.5 m). Mines were idle, the theatre

closed and business came to a standstill. Comox village and the town of Courtenay were under 3 ft. (90 cm) of snow.

In Vancouver, homes in the Point Grey area were threatened as canyons gouged out by streams undermined the foundations. On the campus of the University of British Columbia (UBC) torrential runoff carved a large canyon. "Campus Canyon" was created during a two-day period (Eisbacher and Clague 1981). Two days of torrential rain, which fell after a week of heavy snowfall, caused seepage erosion at the Point Grey sea cliff at the University campus. In less than two days, about 76,000 m³ of Quadra sand was displaced, creating an instant canyon about 100 m long (Evans, unpublished data).

The January 31 issue of *The Daily Colonist* gives a artist's impression of the washout of the bridge on Marine Drive near UBC. On January 23, a slide started on Marine Drive near the Ravine, closing the road at the foot of Acadia and at Ravine (Williams 1966). *4) A minor gully changed into a major badland canyon that extended far back into the Point Grey upland (Clague 1982). A torrent, 4 ft. (1.2 m) wide and 1.5 ft. (45 cm) deep formed itself and cascaded into the ravine, gullying it back reportedly at a rate of 10 ft. (3 m) per hour. A combination of uncontrolled runoff and the collapse of oversteepened embankments caused the event. A contributing cause of this rapid erosion was the digging of a trench to help drain an extensive pond, which had flooded University Boulevard opposite the site of the present Wesbrook Building. It extended over the present track and playing field northward to be drained by the small stream valley mentioned above. Downstream, two bridges crossed the small stream. On January 24, the bridge on Marine and Chancellor was closed to all traffic. The Upper bridge was cut and guards were put on both sides (Williams 1966). A total volume of 100,000 m³ of sand swept in surges towards the sea where a fan was built. The \$50,000 Levevre home on Marine Drive was threatened of collapsing into the gully. The garage and servants' quarters resting on the edge of a 200-ft. (60 m) wide ravine were dismantled.

A thesis submitted by H.T. Carswell, a candidate for the degree of B.A. in the UBC department of geology describes the event, "In a period of a few days an estimated 100,000 cubic yards of uncontrolled sediment was excavated south of the present Law Buildings and west to include much of the area near the Women's dormitories. The stream cut to sea level at the gully's mouth but this part was filled when the stream reached near-equilibrium. The bulk of the excavated material was spread in an alluvial fan extending to sea for 350 ft. (105 m) and has since gradually been removed by wave action and longshore currents." Carswell puts part of the blame on the deforestation of Point Grey, "The heavy undergrowth and thick mat of roots retarded runoff greatly. This perhaps explains why there is little evidence of old surface drainage on the upland, and why it remains undissected. The marks of the old surface drainage are present on the banks, however." (Carswell In: Williams 1966).

Floodwaters swept away two wooden bridges, including one on Marine Drive. It was preceded by a period of heavy snow, followed by two days of torrential rains (167 mm) (Eisbacher 1983). On January 30, a considerable "sluf" occurred on the east bank of the ravine above the second (lower?) bridge site. The creek bed was not receding (Williams 1966). The huge slide that closed the highway along Spanish Banks supplied material to fill the Campus Canyon not far away. Bulldozers and trucks moved the slide material to the head of the canyon. Working around the clock the canyon was filled to its present condition providing for crossing of both roads without the need of bridges. The University was closed for four-and-a-half days, re-opening at noon on January 25 (Williams 1966).

McLellan Road towards Scott Road, was under water and impassable between Cloverdale-Johnson Street. A bridge over Bear Creek washed out after this creek went on a rampage. The Kensington and Mud Bay roads had up to 3 ft. (90 cm) of water in spots. At the Nicomekl bridge, the Pacific Highway had up to 18 in. (45 cm) of water over the road, which undermined the roadbed. The new dike recently put up on Wm. Stewart's farm on the south side of the Nicomekl River broke again. The North Road to Port Moody was blocked between the steel bridge over the GNR tracks and Rochester Road just beyond the gravel pit. A culvert had given way which caused a ravine 8-9 ft. (2.4-2.7 m) deep and 5-6 ft. (1.5-1.8 m) wide. On January 26, traffic on the North Road still detoured around the washout at the gravel pit. The Brunette River threatened to flood Pitt River. The river flooded Pitt River Road just east of the traffic bridge at the city boundary. At this low point, the river formed a lake.

The GNR experienced the "worst tie-up in its history." On the line between Blaine-Bellingham, 57 poles were down, disrupting the wire service. The rail line was cut by a slide south of White Rock and washouts south and west of Bellingham. An undetermined number of slides came down between Crescent-Ocean Park. At least four of these were 150 ft. (45 m) long and 4 ft. (1.2 m) deep. The PGE had its whole line blocked by snow piled 12 ft. (3.6 m) high in the cuts and slides cut off the only plow at the other end. A torrent

on 20th Street flowed over the BCER tracks and cut a huge gully in the roadway. The drainage system, which had been recently put in on the west side of 20th Street in DL 172 under provincial auspices, proved inadequate. Consequently the residents in the area suffered considerable damage.

In the interior, snow continued to fall intermittently on January 23, and later that day turned into rain. The Kootenays were still snowbound. So far this winter, Nelson had received more than 12 ft. (3.6 m) of snow. In Nelson, city roads were blocked and extra gangs tried to get the street railway going. At Farron and east of Nelson, the CPR was employing extra gangs of snow shovelers, while rotary plows were digging at slides at Crows Nest, Alta. According to an unofficial report, an engine and three coaches were buried in a snow avalanche near Three Valleys, between Revelstoke-Sicamous. The CPR passengers who spent all day January 21 in the big slide at Three Rivers (Valleys?) returned east on a westbound CNR train that had to turn around as the line was blocked near Boston Bar. Three CPR snowplows were still marooned. Around January 27, there was a bad washout on the CPR right-of-way at East Nicomen Island, just beyond the quarry. As it was impossible to reach the site from the western end, material to repair this had to be brought all the way from Calgary. Piles had to be driven and this break was holding up the entire line. There were also several bad slides on the line west of Mission. By January 28, train service was still non-existent, except for work trains and the "south stub." On January 29, the first trans-Canada train since the floods reached Vancouver.

Chinook winds (on January 25 and 26?) ended the deep freeze. Rapid snowmelt occurred on January 25. The melting ice and snow caused the Fraser River to flood. Lulu Island was a series of lakes with Lansdowne and Brighthouse racetracks completely flooded. When River Road flooded, Kingsway was the only usable highway between Vancouver-New Westminster. The Pacific Highway just south of Cloverdale was under 2 ft. (0.6 m) of water, immobilising all traffic in that part of the valley.

The Sumas Reclamation Area became a lake again. *5) The Nooksack dyking system in Washington State gave way and backed up across Sumas Prairie. When the Nooksack River, which ordinarily flows towards Bellingham overflowed its banks, the floodwaters joined the Sumas River, which flows nearby. The Sumas River was unable to carry the tremendous flow of water. In the Sumas Prairie, the level of the water in the marginal lands outside the former lake bottom reached an all-time mark 2 ft. (60 cm) higher, breaking even the 1984 record.

On January 25 at 8 a.m., the Fraser River registered 8 ft. 6 in. on the Mission gauge, and by 3 p.m. that same day it reached 15 ft. As the Fraser River rose, the floodgates on the Sumas Canal, which carried the water from the Sumas and Nooksack rivers, were closed. The water in the canal rose rapidly until finally the Sumas dike gave way and flooded the entire former lake area. On January 25 at 10 p.m., a break occurred in the Sumas Prairie dike. With the break in the dike, the water in the reclaimed lake area rose rapidly, but the flood on the marginal lands receded. By January 29, the dike was broken in two places. The breaks were about 100 ft. (30 m) and 75 ft. (22.5 m) in width, respectively and both about 8 ft. (2.4 m) deep. The washed out section of the Sumas dike, about 3 mi. (4.8 km) from the pumping station, was about 400 ft. (120 m) long. A pile driver had to be trucked in to where the road was flooded east of Abbotsford and from there skidded to the scene of the break. Piles had to be driven to form cribbing on each side of the washout to hold the new fill. According to provincial police Cpl. Sidney Pattenden of the Provincial Police at Abbotsford, a total of 250 Sumas Prairie residents were being cared for in Abbotsford.

A fleet of boats equipped with outboard motors rescued marooned stock. The boats belonging to David Spencer Ltd. towed large fishing boats brought to the area by trucks. The toll of drowned livestock was steadily rising and on some farms the barns were completely submerged. One entire herd of 32 cows drowned in the upper area of reclaimed land near Yarrow station on the BCER. On Sumas Prairie, 20 calves of one herd drowned and another Sumas farmer shot 20 cows to prevent their being drowned. Though the floodwaters did not cause a great loss of livestock, mortality among flocks of poultry farmers was believed heavy. Wild stories about farmers shooting their cows to "save" them from drowning proved unfounded. The total loss was expected to reach several hundred head of cows and horses. Tobacco farmers had their crop of tobacco leaves, which had been drying on laths, carried away. On February 3, the day after the flood, representatives of practically every organisation met to plan relief measures for the flood victims (*Chilliwack Progress*, February 7, 1935).

The dikes on the north side of the prairie also broke. On morning of January 26, a washout knocked out a BC Electric 34,000-V power line and put the Sumas Pumping Station out of order. Power had been restored for only a few hours when the break occurred, about 8 mi. (12.8 km) east of Abbotsford. The station filled with water, and hand pumps were rushed from Chilliwack in an attempt to keep the water from damaging the electrical pumps. The BCER line washed out in two places on Sumas prairie and electrical power poles were floating away. Dyking Commissioner Bruce Dixon directed the mass-refugeeing of the settlers from

midnight on January 25 till early next day. On the morning of January 25, Cpl. Pattenden brought a load of lumber to the Sumas reclamation area to build rafts to rescue residents from their homes. The home of Fred Noble was carried from its foundations and swept against a power pole. A short distance away, floodwaters partly turned around Herbert Brown's house, but it was apparently still resting on its foundations. Due to downed powerlines and subsequent failure of the pumps to operate, floodwaters continued to rise. Several miles of the trans-provincial highway across Sumas Prairie were washed out. Water 8 ft. (2.4 m) deep rushed through a break in the road at the same location where the powerline break occurred. The area resembled Sumas Lake before the vast reclamation scheme was undertaken. Pending repairs, temporary bridges were erected across the breaks. It was impossible to determine the water level on the flooded area. At some points, it was reported to be 8 ft. (2.4 m) deep. When rescuing one family, Cpl. Pattenden reported the water in the home as about 3 ft. (90 cm) above the main floor and lapping at the windowsills.

The streets of Huntingdon, several miles from the Sumas Lake area, were flooded to depth of 9 in. (22.5 cm). Between Huntingdon-Yarrow on the BCER, there were three washouts in the track and six slides in the section around Vedder Mountain. Wires were across the rails at many points and the track had been heaved and shifted badly. The Greater Vancouver water district water main from Lake Coquitlam was threatened. The river current was piling brush and debris against the upper side of the main.

The low-lying areas near Kensington and Mud Bay and Johnson Street in Surrey were flooded. Between January 23-24, water levels on the Kensington and Mud Bay roads rose 18 in. (45 cm). On January 24 in the Mud Bay area, five families were evacuated in rowboats and taken to neighbours on higher ground. Next day rescue operations continued with about a dozen boats being employed. An estimated 15-20 families were moved to higher ground. The area between the Nicomekl-Serpentine rivers and east from Johnson Road to the Pacific Highway was flooded and resembled a vast lake. On January 26, part of the Pacific Highway were closed and subsequently Pacific Stage cancelled bus service to points south of Cloverdale. Bus service to Fort Langley was also cancelled.

By January 25, Cloverdale and Surrey Centre were the only two spots that were dry land. Large areas, including all roads, were flooded with water up to 6 ft. (1.8 m). The road from Mission to Abbotsford was under 6 ft. (1.8 m) of water and the greater part of Matsqui Prairie was submerged about 3 ft. (0.9 m). Hatzic Prairie turned into a huge lake. Hatzic farmers were reported to have been forced to live in the upper rooms of their homes to escape from the rising waters. McConnell Creek, at the head of Hatzic Prairie went on the rampage and changed its course. Suicide Creek was also a raging torrent and caused great damage. The CPR bridge over Suicide Creek, which was parallel to the highway bridge, was endangered. Linemen of BC Telephone Company and BCER were working from 12-14 hours daily to restore the lines, but due to the large amount of damage made very slow progress. With the gradual restoration of telephone service additional news of the tremendous damage caused by the storms and floods filtered into Mission City. Due to a complete breakdown in communications and blocked or cut off road links, for several days Mission residents were totally unaware of the critical situation in the outlying communities. As most of the land was high enough to escape flooding, the Mission district itself did not suffer much damage, except some business premises in Mission City that were flooded and had their floor covered with mud and debris.

Overnight January 25-26, when temperatures dropped from 50°F (10°C) to 40° F (4.4° C), floodwaters in the Fraser Valley started to recede. On January 29, the Fraser River receded to 6 ft. 9 in. All four pumps at the pumping station were operating at capacity handling from 450,000-500,000 Gal/hr. (2.025-2.25 million L). The Fraser River had dropped sufficiently to permit a rapid runoff from the Sumas River canal by gravity through the floodgates at the pumping station. This was the first improvement since snow and rain started to fall on January 20, which created the situation unparalleled in recent history. On January 26, water on the Serpentine Flats went down about 1 ft. (30 cm). The inter-provincial highway was again passable through the low spot between Fry's Corner and the foot of Clayton Hill. The situation at Pitt Meadows also improved. The water level of the Alouette River fell 2 ft. (60 cm). It had reached the top of the dike. Residents had moved to the municipal hall. With the fall of the river, pressure on the dike was relieved. Near Cloverdale and Surrey, floodwaters receded from 4 in. (10 cm) to 1 ft. (30 cm) in various places. Families evacuated from their homes in the Mud Bay district prepared to return. By January 28, in Matsqui the water started receding rapidly and no further trouble was expected there.

By January 28, the situations was as follows: Practically all of the former Sumas Lake area, comprising of about 10,000 ac. (2,500 ha) was flooded. The main Vedder dike was intact but the breach in the smaller Sumas dike was about 400 ft. (120 m) long. The inter-provincial Highway across the prairie was submerged for about 1 mi. (1.6 km), and a section of it was carried away. It was still uncertain how much of the highway was washed out.

By January 29 east of Chilliwack, the trans-provincial highway was open to a point 12 mi. (19.2 km) east of Rosedale. From Hope west, the road was open for 6 mi. (9.6 km) but through-traffic between Rosedale-Hope was blocked by a huge slide, which occurred in the vicinity of Floods. On Matsqui Prairie, floodwaters were receding rapidly and the road between Abbotsford-Mission was expected to be open later on January 29. The Lougheed Highway on the north bank of the Fraser was open as far as Haney. It was in fairly good condition, but east of Haney numerous slides and washouts blocked it. The Lougheed Highway west of Mission was still impassable at several points. Wherever there was a culvert, the highway was washed out and impassable. The hole on the Lougheed Highway 1 mi. (1.6 km) east of Mission was big enough "to contain a six-room house." The worst break was at Ruskin where the centre span of the Stave River had dropped 8 ft. (2.4 m) as piles sank into the mud. New piles had to be driven and the span lifted. It was estimated that it might take a month to restore the highway at this point. The alternative route by the old highway to the lower dam was also out. The Stave River, eddying into the bank just below the power plant, tore a hole in the highway. An old poolroom, a relic of construction days, fell into the raging torrent. With the reopening of the road from Abbotsford it would be possible to reach Mission by way of the inter-provincial highway on the south shore of the Fraser and crossing the CPR bridge at Matsqui.

According to C.H. Harvie, New Westminster municipal engineer, at least nine bridges were lifted and floated from their position and would have to be rebuilt. Casualties included the bridges on Campbell River Road, Hjorth Road and Townline Road. Although one bridge on the Campbell River Road was wrecked, the bridge built in the summer of 1934 survived. South of the highway, 0.25 mi. (400 m) of the Johnston Road washed out. Every farm crossing on Kensington Prairie had floated away and many could not be found. Road damage in the White Rock area was extensive. Washouts occurred in the fill on the road into Crescent, on Hall's Prairie and Elgin Road. Washouts also occurred on the State Road, near the sandpit at the easterly end of Washington Avenue, on Martin Street back of the Post Office, on Alta Vista Road, Columbia Avenue, F Street, and Victoria. Some of the washouts were 7-8 ft. (2.1-2.4 m) deep and 300-400 ft. (90-120 m) long. Also many of the cedar culverts were carried away.

The January 1935 weather events claimed several lives in a number of snow and debris avalanches. Around January 23-24, a snowslide on the CPR mainline at North Bend took the life of a railway worker named George Michelle while employed clearing the line. A slide 4 mi. (6.4 km) east of Golden carried away a CPR foreman. The victim was buried in the snow and presumed dead. On January 28, Mr. and Mrs. Joseph Damich were killed at Granite Creek when a slide demolished their small home at the confluence of the Tulameen River and Granite Creek. Around January 24-25 at Clanwilliam in the Eagle Pass, 11 mi. (17.6 km) west of Revelstoke, a snowslide swept down on a relief camp and killed three men and injured three others. Around the same time, three CPR workers were killed when a snowslide came down at Paulson, about 50 mi. (80 km) west of Nelson. The three men were among a party of 40 working on the slide as members of a plow crew. Two of the bodies were dug out of a cut 13 ft. (3.9 m) deep and the third was found 25 ft. (7.5 m) down the side of the hill entangled in telegraph wires. There were 14 slides between Nelson-Grand Forks. The worst one, which was 650 ft. (195 m) long and 35 ft. (10.5 m) deep, was at Blake, 23 mi. (36.8 km) east of Nelson.

On January 24 at 9:30 p.m., a slide came down at Kilgard, near Sumas Mountain. Rocks and debris continued to come down for some time. On January 26, it was reported that at Kilgard still some small intermittent slides were coming down. For about 0.5 mi. (800 m) along the base of the mountain, mud and muck oozed to a depth of at least 12 ft. (3.6 m). Steel rails leading to the brickyards were twisted and behind the plant boxcars stood on end, half buried in mud. On January 24 in the late afternoon, the Great Northern Railway embankment carrying tracks to the Kilgard brick plant on Sumas Mountain gave way. The about 100 ft. (30 m) slide, which carried a barn down into a blacksmith shop below it, came down near the plant of the Imperial Oil Company plant on the main road to Chilliwack. It killed a 16-year old boy, whose body was later found under 5 ft. (1.5 m) of debris. Only a few hours earlier, the boy and his family had moved here after being evacuated to escape the storm and flood on Sumas Prairie. On January 25 at 10 a.m., a mudslide occurred at the Kilgard plant of the Clayburn Brick Company on Sumas Mountain, about 8 mi. (12.8 km) from Abbotsford. Ten homes were swept down the mountain and buried in the brick plant below.

The fleeing residents, Mr. and Mrs. Tom McGee, lost their only child, three-year old daughter Joyce, who was buried by the slide. Mr. & Mrs. Dan McKee (also reported as McGee) were seriously injured and their five year-old daughter was killed. It was later reported that a man by the name of Hall was also killed in the slide. Hall's shack on the side of the mountain was swept away by the slide. A later report also names an aged crippled farmer by the name of Theodore Haugh as missing. His horse was also unaccounted for. Haugh was believed to have been buried in the ruins of his house or barn. (*The British Columbian*, January 28, 1935). Given the confusion with the names McGee and McKee, Haugh may refer to the Hall mentioned in earlier

reports. Slides in the Kilgard area may have claimed another fatality. By January 28, a farmer named McKay who lived alone some distance up the mountain, was still missing, and presumed buried under the debris. Four days later, a huge crack developed in Sumas Mountain. It was feared that another slide might bring down half of the hill to the flats below (J.R. McDonald In: *The British Columbian*, January 28, 1935). Huge chunks of soil and clay were still rolling down the slopes.

In addition to the slide victims during the storm, a number of people died because of drowning or exposure/exhaustion. Near Cloverdale, the body of an aged "Chinaman" was discovered presumably died of exhaustion. In Sumas Prairie, two brothers were reported missing.

On January 25, an ice jam, set free by the warm weather, swept down the Tulameen River and struck the KVR double-span Howe-truss bridge 5 mi. (8 km) west of Princeton. It crushed the centre-supporting pillar and destroyed one of the trusses. The second truss escaped damage but was carried so far downstream that recovery was impossible. At the town of Tulameen, the 3-mi. (4.8 km) long and 30-ft. (9 m) deep jam blocked the river. Tulameen streets were flooded with 4 ft. (1.2 m) of water. The fast flowing river changed course.

The effects of snowstorm, which in less than 24 hours dumped a record 3 ft. (90 cm) of snow in Vancouver by early on January 21, were magnified many times over in the Hope Mountains. At Coquihalla, 12 ft. (3.6 m) of fresh snow had fallen. Buildings in the community were completely out of sight. All the way south to Princeton and north to Merritt, the snow was more than 6 ft. (1.8 m) deep. Train No. 11 from Penticton with 150 people on board was stalled in a snowdrift at Coalmont. In the Coquihalla Pass, a freight and a plow train were also buried.

On January 22, a massive snowslide came down 3 mi. (4.8 km) west of Brookmere, blocking the KVR line and trapping the belated train No. 11, which earlier had been cleared by a plow. Meanwhile the plow train itself had become trapped in a snowdrift at Kingsvale. Two days later at 2 a.m., the line was opened and the passenger train finally reached Merritt on the morning of January 24. But this was only the first delay for the passengers of a long journey to the coast. For nearly two weeks to come both the CPR and CN mainline would remain blocked east and west of Spences Bridge. The fierce rains and mild temperatures caused slides in the Fraser canyon. When the stranded passenger train finally left Merritt on January 26, it did not travel west but rather east to Sicamous and then Kelowna where the passengers were transferred by lakeboat back to Penticton. The passengers that still wanted to get to Vancouver, traveled on a special train eastward to Nelson and Yakh, then south over the Spokane International to Spokane and finally west to Seattle from where a CPR boat carried them to Vancouver. On the evening of January 29, the passengers reached Vancouver, ending a journey of nine days, which should have only take nine hours. The Coquihalla, with trapped freight and plow trains, remained blocked until spring. (Sanford 1978).

The unusually heavy snowfall was followed by a sharp increase in temperature and heavy rain. Temperatures jumped from below zero (-18° C) to 50° F (10° C). The deep snowdrifts melted causing flooding and massive avalanches. At Iago, a slide completely buried a snowshed under more than 50 ft. (15 m) of snow, temporarily trapping 18 members of a plow train that had sought sanctuary inside. Nearby, another slide trapped a 19-year old trackwalker, who was dug out after a day and a half and survived.

An unusually heavy snowfall in the Canadian Rocky Mountains was so heavy that the railway snowplows were unable to cope with it. Trains were stalled on both sides of the mountains, about 5 mi. (8 km) apart. Since there was no microwave system across Canada in those days, all communications went by landline and were disrupted by the snowfall. The CPR in Vancouver wishing to send a message to trains on the other side of the Rockies asked the Pacific Cable Board office in Vancouver around the world to the other side of the mountains. The flash message was relayed across the Pacific Ocean to Australia, across that continent, the Indian Ocean, Africa, the Mediterranean and on to London – thence across the Atlantic Ocean to Halifax and across Canada to the Rockies – all in record time (Scott 1994).

For the first time since the stormy night of January 20, trains arrived in Vancouver. In afternoon and evening of January 30, the CNR and CPR trans-continental trains arrived, respectively. Trans-continental train service was resumed on January 29, with Canadian National No. 1 arriving at New Westminster, exactly one week late. The CNR local to Hope left earlier that day and the eastbound transcontinental later in the afternoon, thus resuming normal service on CNR lines. CPR also resumed trans-continental service on January 29, using CNR tracks as far as Hope. Beyond that point CPR and CNR were both using CPR tracks. The GNR tracks were clear between Blaine-Seattle. On January 28, service was operating between these two points. The portion of the GNR line to New Westminster was expected to be cleared later in the afternoon on January 29 with a southbound train scheduled to leave New Westminster early on January 30.

Around January 30, 4-ft. (1.2 m) waves whipped by high wind battered against the Sumas dike adjacent to the 400-ft. (120 m) break. Near Spence's Ranch about 4 mi. (6.4 km) east of Kilgard, water rose 4 in. (10 cm) during the previous 24 hours.

On January 27, large consignments of clothing were received from New Westminster and Vancouver citizens. Relief efforts by rescue parties dispatched from Abbotsford and Clayburn were hampered because the roads leading to the brick plant were flooded. Between 200-300 residents, including those who lost their homes in the Kilgard disaster and people from Sumas Prairie who had taken refuge in the Kilgard school when floods threatened their homes were evacuated to Abbotsford. They were taken out in boats and on rafts and quartered in various public halls and private accommodations.

There were 31 Kilgard families, comprising a total of 151 adults and children. In addition, 70 others from the Sumas Lake area were also taking care of in Abbotsford. The refugees were sleeping in the Odd Fellows' Hall, in vacant stores and private homes. In feeding the people, the United Church hall was being used, the provincial government supplying all the food required. Some 50 people marooned at the upper end of the reclaimed area took refuge on two farms near Yarrow and five other families escaped the flood to a three-room shack in the same area.

By January 28, there were 220 refugees from the flooded area and from the slide-devastated hamlet of Kilgard being cared for at Abbotsford. Under the supervision of the Provincial Police, they were provided with food, extra clothing and blankets. It was estimated that these residents of Sumas Prairie and Kilgard would not return to their homes for two months. Most of the settlers were allowed to return to their farms only six weeks later.

The provincial government was looking after 300-400 flood victims pending return to their homes and final settlement of arrangements for their maintenance. Upwards of 300 of these were from Sumas, which was once again a lake. The Red Cross Society was standing by to render aid. They had made arrangements with the military authorities, which held themselves ready to supply the society with camp equipment and bedding at moment's notice when asked for.

Low-lying areas throughout Victoria were under water. Heaviest hit were the Shelbourne and Haulain section. Some 200 homes reported flooded basements, and deliveries were made by rowboat. In the Burnside-Island Highway intersection cables were installed to haul waterlogged cars through 2 ft. (0.6 m) of water. Heavy damage occurred on the E&N rail line where mud and rockslides further delayed the train traffic. A big slide occurred between the Palmer-Langford stations. The Colquitz (River) damaged highway embankment in west Saanich.

Records kept by Roderick L. Haig-Brown show in 1935 the escapement water at Forbes Landing at 28,000 cfs (792.9 m³/s) (*Campbell River Courier*).

By January 30, there was some improvement in the flood situation, except west of Chilliwack where areas were still flooded. East of Chilliwack, ice and snow kept in the water. In Sumas Prairie, floodwaters had stopped rising. Late on January 31 after more than nine days of serving Pacific coast papers by wireless, telephone and round-about slow telegraph wires, Canadian Press resumed regular service via Calgary over main circuit CP telegraphs.

On February 5, the first bus since January 21 reached Chilliwack via Agassiz. The next day, power was restored as far east as Vedder Mountain substation. On February 8, the high-tension line to Chilliwack was back in service. The first interurban trip to Chilliwack since the beginning of the storm left New Westminster on February 11. Full passenger service resumed the following day. It would be weeks before electric service would be fully restored throughout the valley (Ewert 1986).

From preliminary estimates, the total bill would not be as high as once feared as much of the damage was more spectacular than permanent. Apart from loss of lives, the aggregate cost would run into several hundred thousands of dollars. On February 5, it was reported that flood damage throughout the province might exceed \$250,000, of which \$100,000 was on Vancouver Island, and the balance mainly on the Lower Mainland. The repairs at Sumas might require some \$35,000 (*The Daily Colonist*).

*1) The all-time low for this area was set in 1893 when temperatures dropped to -12.5° F (-24.7° C) (*The British Columbian*, January 19, 1935).

*2) The final total precipitation for January was 20.65 in. (524.5 mm) including 38.1 in. (96.8 cm) snow for Vancouver and 13.28 in. (337.3 mm) for Victoria. The January averages for the two cities were 8.44 in. (214.4 mm) and 4.39 in. (111.5 mm), respectively. Bamfield recorded a total of 35.29 in. (896.4 mm) for the month of

January. (Scott 1970). More than 52 in. (1.3 m) of snow would fall during the winter of 1934-35, all except 14 in. (35 cm) fell in January, during the period known even today as “the big storm” (Ewert 1986).

*3) Slides at this point had been frequent during the previous years. Before the new road was built on a cut in the side hill, the CPR line suffered similarly. The gumbo soil tends to boil up under the roadway (*The British Columbian*, January 25, 1935).

*4) At the time, the University campus was not pipe-drained, and the Ravine No. 4 served as a natural surface runoff outlet into which a continuous small stream was discharging (Williams 1966).

*5) In 1926, Sumas Lake had been drained to provide about 30,000 ac. (12,000 ha) of fertile farmland and was settled in the next few years (Borrell 1992). The Sumas reclamation scheme has two main systems of dikes. The main dikes are those which confine the Vedder River to a straight channel across the prairie. The other is the Sumas dike, which controls the Sumas River (*The British Columbian*, January 28, 1935).

January 31, 1935

(Rain-on-snow).

Discharge (m³/s): Max. daily: February 2: CR/CL: 762E; max. instant.: N/A.

Source: *The Daily Colonist*, January 31, February 1, 2, and 3, 1935; Saywell 1967 (p. 118); Environment Canada 1991.

Details: Flooding on Vancouver Island continued. Mild weather and steady rain melted deep snow on the Forbidden Plateau and mountain slopes of the high range extending northward into Strathcona Park. The high runoff caused severe flooding at Comox. It was described as “the worst condition of the locality for the past 40 years.” In the Comox Valley, several bridges were carried away and root crops stored in pits and roothouses suffered heavy losses. Rising waters of the Puntledge and Tsolum rivers overflowed their banks and flooded farmland near Sandwick and the lower part of Comox. *1) The Courtenay River overflowed into the lower section of Courtenay inundating roads and several buildings. Lewis Park was under 3 ft. (90 cm) of muddy water, which was still rising. The Island Highway was under water and Condensory Road was blocked by a slide. Though losses to livestock were believed to be low, at least one dead cow was seen floating down the Courtenay River.

In January, “one of the worst floods in the history of the Lake Cowichan settlement” took place. Many houses along the river were flooded out. Water surrounded the school buildings and flooded the basement. The school was closed for two weeks. Boats were needed to get from the bridge along Riverside Drive and also up King George Street as far as the E&N tracks. The road in front of Gordon’s Store was completely submerged (Saywell 1967).

On January 31 at 11 p.m., a slide came down beneath the Comox Logging Co.’s trestle. Government trucks and road equipment were moved from the government sheds to higher ground. At Cumberland, 6 ft. (1.8 m) of water was going over the dam. As a precaution, Comox Lake residents moved into Cumberland overnight. Near the Canadian Collieries Farm, the Cumberland to Courtenay road was under a considerable depth of water. The Courtenay bridge over Puntledge River on Condensory Road collapsed. Though a debris jam piled up against the bridge was broken up, the piling of the old structure was damaged. As the water undermined it, the bridge gave way and collapsed. The Cowichan River caused serious damage to the highway about 0.5 mi. (800 m) south of Duncan. Here, a mudslide came down onto the road about 170 yd. (150 m) from the white bridge. The E&N put a trestle across the gap caused by a washout at Millstream.

At Koksilah, floodwaters caused considerable damage to the roadbed. The Cowichan River also flooded the Tzouhalem Indian Reserve near Duncan. On the CNR line near Colwood, the temporary but substantial bridge across Cottonwood Creek washed out. The Island Highway was blocked near Goldstream by a big rockslide at the “First Big Slide” location. The bluff, at the site where the road entered the narrow gorge, came down onto the road. A truck was partially buried by the slide.

Flood conditions in the Courtenay area peaked on the afternoon of February 1. By midnight, the swollen streams were reported subsiding. Though floodwaters covering Lewis Park had dropped 18 in. (45 cm), the level in Comox Lake rose 3 ft. between February 1-2. Residents at the foot of Comox Lake evacuated their homes and removed furniture by boats. Near Cumberland, the Comox to Cumberland road was under 1 ft. (30 cm) of water. The Cumberland to Royston road was also flooded in one location. The Courtenay to Campbell River road, also closed by flooding, was feared to be undermined in several places.

While the Puntledge and Tsolum rivers started to go down, the Somass River emptying into the head of Alberni Canal went on the rampage. It flooded the low-lying areas, driving residents from their homes along the river. In Port Alberni, Indians assisted with canoes in helping people to evacuate. The Somass River formed a logjam against the Somass River bridge, backing up water and threatening the bridge. The jam was later broken. One small house was seen floating downstream. Great Central Lake rose to a higher level "than ever before recorded," flooding the local mill and cutting off road communication to Alberni. Three bridges on the road to Great Central Lake were carried away. The road to Sproat Lake was covered with water at several places. A number of summer cottages on the lake were flooded.

*1) The Puntledge and Tsolum rivers join north of Courtenay to form the Courtenay River.

Ca. 1935

Source: Thurber Consultants 1983; VanDine 1985 (p. 67); Jackson et al. 1985 (pp. 4-19).

Details: Sometime in the early to mid 1930's, debris torrents or flooding events may have occurred in the Howe Sound area on Alberta, Newman and Unnamed #1 creeks. Interpretation of 1936 vertical air photographs indicates these events to have taken place prior to the date of the photography (Thurber Consultants 1983; British Columbia Ministry of Environment, air photos 1936). VanDine (1985) puts the date for the Alberta Creek event at ca. 1935.

Between 1932-1939 (See Government of Canada air photos A4441:74-77 and Government of British Columbia air photos BC143:80-81, respectively), a debris slide into Alberta Creek near 1,060 m elevation, triggered a debris torrent that ran all the way to Howe Sound. The debris slide occurred in an area burned early in this century. *1)

Apparently, at the same time, debris torrents occurred in a small unnamed water course between Alberta-Harvey creeks, stopping at 550 m elevation, and in Harvey Creek, stopping near 500 m on a gradient of about 12 degrees, above the 33-degree plunge into the lower basin (Jackson et al. 1985).

* By 1968, slide scars had healed and torrent debris was revegetated (Jackson et al. 1985).

July 1, 1935

(Dam burst/flooding).

Source: *The Daily Colonist*, July 4, 1935.

Details: Near the headwaters of Tranquille Creek, two dams burst, turning the stream into a torrent. One life was believed lost in the raging stream, which also swept away the 150-ft. (45 m) bridge on near Tranquille, 18 mi. (28.8 km) east of Kamloops. The dams burst under pressure of water resulting from days of continuous rain.

Rain-swollen creeks caused washouts in the mountains holding up trains for two days. In the Kootenay and Okanagan districts, five bridges were wrecked. At Kelowna, Mission River (Creek) broke all flood records. At Penticton, two bridges were carried away. In Kamloops, the police building was surrounded by water.

At Chase, where Chase Creek went on the rampage on July 1, seven bridges on the CNR line were swept away. The buildings were reported to have piled up causing floodwaters to spread across open land. According to a Public Works official, it would take a month to rebuild the highway bridges destroyed at Chase. The temporary crossing at Chase would probably be completed and open to traffic by July 5.

Fall 1935

Source: Schultz 1984 (pp. 73-74).

Details: A storm and cloudburst with torrential rain overnight caused heavy damage to the Comox Logging Company float camp on the other end of Comox Lake. The catwalk to the shore washed away. After the company's railway flooded logging operations were suspended for the remainder of the season. One bridge, normally 30 ft. (9 m) above a stream was found covered with fair-sized logs. (Schultz 1984).

May 15, 1936

(Dam burst/flooding).

Source: *The Vancouver Daily Province*, May 16 and 18, 1936.

Details: In the afternoon of May 15 at Okanagan Falls, south of Penticton, a large dam on Shuttleworth Creek gave way. *1) Two days of heavy rain climaxed by a cloudburst had weakened the structure 16 mi. (25.6 km)

back in the mountains. The little time to settle might have accounted for the failure. Releasing some 100 ac/ft. (123.35 dam³) resulted in a 6-ft. (1.8 m) wall of water. When it reached the townsite, floodwaters were about 500 ft. (150 m) wide and up to 12 ft. (3.6 m) deep in places. Though there were no fatalities, several residents narrowly missed being carried away by the floodwaters. Farms were inundated, houses demolished and livestock drowned. More than 1 mi. (1.6 km) of highway and a small bridge were destroyed. Many acres of valuable fruitland and trees were washed into Okanagan River. A large house on the riverbank near the bridge was lifted off its foundations. After floating downstream, with smoke still coming out of the chimney, it was completely demolished after being smashed against a logjam several feet high that had formed against trees. One house was lifted and turned around. In less than two minutes, floodwaters moved yet another house 0.25 mi. (400 m) while two children slept inside unaware. Many barns and outbuildings were moved, some of these heavily damaged. Many fences were uprooted. On the CPR branch line between Penticton-Oliver, more than 1 mi. of track was badly damaged. In several places, only the rails and ties were left suspended in the air. The main highway leading from the south was cut off.

*1) The dam of earth construction had been built in 1935 to store water for late summer use. Another small dam on the same creek gave way six years prior. That dam burst caused relatively little damage (*The Vancouver Daily Province*).

May 29-June 3, 1936

(Spring runoff/flooding).

Source: *Vancouver Daily Province*, June 1, 2, 3, 4, 1936; *The News-Herald*, June 25, 1937; Environment Canada 1991.

Details: At the end of May, a sudden rise in temperatures caused snowmelt and flooding conditions province-wide, as well as in the Yukon and Alaska. In the southern interior, the Fraser, Thompson and Columbia rivers flooded their banks. The Revelstoke district experienced the “worst flood conditions since 1894” when the Columbia and Illecillewaet rivers flooded their banks. The Fraser Valley was badly stricken by the floods. Dikes along the Fraser River gave way near Hammersley Prairie, Chilliwack and Agassiz, flooding thousands of acres. Government officials estimated the loss at \$300,000, but this figure was expected to rise, as the floods had not peaked yet. Forty families were evacuated from the Dewdney Townsite, which was under 5 ft. (1.5 m) of water.

On June 1, the Fraser River at Mission rose 14 in. (35 cm) to 19 ft. 8 in., coming within 4 in. (10 cm) of the 20-ft. (6 m) “danger mark”. *1) At Haldi bridge, which joined Fort Langley with McMullen Island, the Fraser River rose 2.5 ft. (45 cm) in 48 hours. Glover Trunk Road, between Fort Langley-Jardine, was closed to traffic. The Salmon River Flats and the far end of the Allied Road leading into West Langley were under water. Towboating on the Fraser River from the gulf to New Westminster mills came to a standstill when the vessels failed to buck the fast flowing current. Three powerful deep-sea tugboats strived for 48 hours to tow 15 sections of logs upriver, only reached Marpole, where they tied up. Deep-sea ships could only make it as far as New Westminster. Beyond that point, where the river narrows, the 10-knot/hr (18 km/h) current created large whirlpools and boils. In the west Langley district, dikes broke and flooded 400 ac. (160 ha) up to 8 ft. (2.4 m). *2) Early on June 1, the dike privately built by W. Nixon the previous year went out with “a roar like Niagara.” About 20 ft. (6 m) of the dike was carried away and the floodgates broken. Several settlers along the White Road had to remove their stock from the low pasturelands.

In Kamloops, low-lying areas flooded as the Thompson River rose another foot (30 cm) overnight. It reached to within less than 3 ft. (90 cm) of its record high level of 19.2 ft., established in 1928. The river rose nearly 2 ft. (60 cm) in the previous two days, registering 16.9 ft. An electrical storm accompanied by a torrential downpour of rain the previous night brought some relief from the severe high temperatures of the past week. During a 20-minute cloudburst on June 1, huge drops of rain bounced 2 ft. (60 cm) in the air and the streets in Nelson were covered with tons of silt from uphill streets and gardens.

On June 2, district engineer of the Dominion Water Power and Hydrometric Bureau C.E. Webb expressed the opinion that the Fraser flood situation would be less acute within a day or two. On June 2 in Kamloops, city workers were anchoring buildings in the park as the overflow of the Thompson River surged into the streets. The frame structures were chained to heavy weights. At Nelson, the Columbia River was reported to be rising at 1 in. (2.5 cm) an hour. At west Revelstoke, numerous families moved to higher ground when early on June 3 floodwaters exceeded the record high of 1894 by 1.5 ft. (45 cm). At Mission, the Fraser River had risen to 21.7 ft., the highest level for many years. The Columbia River at Trail rose to the 37-ft mark. At Nicholson near Golden, it reached 19.45 ft. and at Arrowhead 22.65 ft., all marks above the danger level.

In the Mission area, large stretches of farmland across the river at Glen Valley and in the Chilliwack district were inundated. On June 3, floodwaters went over the Glen Valley dike, flooding 60 ac. (24 ha) of grain fields. By early June 4, flood levels at Chilliwack were expected to reach the second highest recorded, that of 1903. It was estimated that the flow on June 3 was equal in volume to that of 1894. For nearly four weeks the Fraser River had been carrying a constant wall of water ranging from 12-16 ft. (3.6-4.8 m). If this rise would have reached its peak in the next two days, it was predicted that the level would remain stationary for four to five days. The real danger of the dikes would be a prolonged period of high water with seepage threatening weak spots.

The river was still rising at the rate of 0.5 in. (1.3 cm) an hour. Between the Chilliwack-Luk-Akuk (Luckakuck) rivers, the distance of 0.5 mi. (800 m) of the Yale highway had water flowing across 2-6 in. (5-15 cm deep). The fast Fraser River waters threatened the big timber caisson of No. 4 pier of the new \$3.5 million Fraser River bridge project. The caisson had been floated into position several weeks earlier. It had been steadily driven down into the river bottom until it was resting 15 ft. (4.5 m) in the bed of the Fraser River. Early on June 3, the caisson took a decided list of 15-20% to the south side when the river scoured out the river bottom on that side of the structure. Scowloads of rocks were dumped to prevent further scouring at the bottom. No. 4 pier would support the main span of the new bridge on the south side of the river. The raging waters were boiling around the piers of the old Fraser River bridge as they piled up logs and debris.

Agassiz, Harrison Mills and Hatzic were isolated due to road washouts. Some land near Chilliwack and the lower section of Mission and farmland near Dewdney were under water. An area south and west of Chilliwack, commonly known as Chinatown and undyked land was flooded. Early on June 3, 5 mi. (8 km) of privately-owned dikes near Dewdney were washed away. The dozen families occupying the few hundred acres affected were forced to evacuate their homes. At Hatzic Prairie, about 300 ac. (120 ha) were under water. Though three pumps were handling 40,000 Gal. (180,000 L) per minute, the water was coming in twice as fast. At Silverdale, more than 1,000 ac. (400 ha) were flooded. The Agassiz to Rosedale ferry was temporarily taken out of service due to the flooding of the highway on the Agassiz or north side of the river. The road from Agassiz to Rosedale washed out in numerous places and to the west the main highway from Vancouver was flooded. The Fraser River gauges at Rosedale-Agassiz ferry landing, Minto Landing and at Sumas pumping station showed a rise of 1 ft. (30 cm) during the 24 hours ending 8 a.m. on June 3.

By June 4 after the dikes breached in three places, some 1,200 ac. (480 ha) of farmland and homes near Agassiz were under water. Many families were moved from their homes after the dike system went out in two more places on June 3 and 4. Two-thirds of the farms at Dewdney were under water. One farmer was reported to have shot cattle marooned on a ridge. On June 4, the gauge at Mission registered 22.34 ft. and the Columbia River rose to 37.7 ft. On June 4, the Columbia River at Trail recorded a maximum daily discharge of 7,670 m³/s. On June 5 the Fraser River at Hope recorded a maximum daily discharge of 10,600 m³/s (Environment Canada 1991).

*1) On the north side of the Fraser River, the danger level was considered to be at 21 ft. (6.3 m), while elsewhere the dyking would hold to 25 and 26 ft. (7.5 and 7.8 m). On the south side, the dikes had been built 2 ft. (60 cm) higher to over 26 ft. since 1934 (*Vancouver Daily Province*). During the summer of 1937, additional dredging was undertaken in the North Arm of the Fraser River near Michell and Twigg islands and Fraser Avenue bridge. Four new cuts were dredged each 150 ft. (45 m) wide and 10 ft. (3 m) deep at low water. They were in addition to three other cuts completed earlier in the section near New Westminster. B.C. Bridges & Dredging Ltd. undertook the work at a cost of \$59,500. An additional \$170,000 was provided for various jobs on the main river and also on the North Arm.

*2) The area flooded at west Langley was a non-dyking area flooding every year. It once was under the dyking system in an attempt to develop a soldier settlement there. When the settlers were unable to maintain their end of the dyking expense, the area was withdrawn.

December 1936

Source: Evans, unpublished data.

Details: In December, a rockfall in Granite Canyon near Coalmont killed one miner.

December 19-23, 1936

The Daily Colonist, December 22 and 23, 1936; *The Vancouver Daily Province*, October 20, 1940; Environment Canada 1991.

Discharge (m³): Max. daily: December 21: Capil.: 142; December 22: Sooke: 32.0; December 23: CR/CL: 273; max. instant.: N/A.

Details: On December 19-20, the Lower Mainland and the west coast of Vancouver Island reported considerable rain. Estevan received nearly 2 in. (50 mm) in 24 hours. According to wireless reports from shipping, heavy weather was being encountered at sea.

Victoria reported high southwest winds with squalls of rain from midnight December 20 until early on December 21.

Service on the PGE railway was interrupted by slide between Lillooet-Quesnel. The Cariboo highway was also blocked by rockslides between Alexandra Lodge-Lytton.

February 12-17, 1937

(Fatal avalanche).

The British Columbian, February 12, 17 and 18, 1937; *The Cariboo Observer*, February 27, 1937.

Details: On February 12, a huge avalanche that came down in the Illecillewaet Canyon 25 mi. (40 km) east of Revelstoke hit a CPR train. The 600-ft. (180 m) snowslide released by rapid thaw hurled an engine, spreader, a wingplow and a caboose 50 ft. (15 m) into a snow dump where they became partly buried. A conductor and a fireman died of scalds suffered when they were trapped in the other caboose, which continued down the embankment for another 25 ft. (7.5 m) becoming partially submerged in the Illecillewaet River. Rescue crews dug for two days before recovering the bodies. The main slide occurred on the opposite side of the river to the track and climbed the bank about 100 ft. (30 m) before sliding back across the rail track.

On February 16-17, a storm dropped 8 in. (20 cm) of snow on North Vancouver. At 3 a.m., the 34,600-V powerline to West Vancouver, Horseshoe Bay and Britannia broke. The North Vancouver high school was left without heat. At Deep Cove, the 2,300-V distribution line came down. High winds that swept the Fraser Valley downed a number of telephone poles on the Pacific Highway and a 2,300-V powerline of B.C. Electric Railway at Langley Prairie. Collapsed poles near Fry's Corner interrupted telephone communication to Cloverdale and all points south.

The storm also caused numerous snow and rockslides, blocking railways in the mountains. Slides were also reported to be blocking the Cariboo highway. On February 17, a slide between Stout-Yale tied up traffic on the CNR line. The line was expected to be cleared later on February 18. The CNR experienced a series of slides at three points; 10 mi. (16 km) west of North Bend, east of Revelstoke in the mountain subdivision near Downey, and at Drury in the Nelson subdivision. Traffic on the CNR resumed at 3 a.m. on February 18.

During the second and third week of February, the Cariboo region reported "exceptionally heavy snowfalls." The lower Cariboo Highway was blocked at the "lower end" while the Prince George road suffered from drifts, especially at the north end. Except for minor slides in the Devil's Canyon and along Jack of Clubs Lake and some drifts near Wingdam and Beaver Pass, the Quesnel-Barkerville road was kept open without serious delays.

It was estimated that the recent heavy snow in the province would cost the Public Works Department about \$200,000. All the main roads with the exception of the Cariboo Highway were reported cleared after 48 hours of continual work. In some districts, side roads were still closed on February 27.

On Vancouver Island, where the snowfall was the heaviest, government tractors were unable to cope with the weight of the snow and some heavier equipment had to be hired from logging companies. Conditions were not as severe on the Island since 1916 when snow blocked transportation in Victoria for a month. The Malahat Highway was the hardest hit while Victoria reported only a few inches of slush.

February 20, 1937

The Prince George Citizen, February 25, 1937.

Details: On February 20, engineer J.C. Robertson and fireman Herrington were killed when their eastbound CNR freight train ran into a snowslide 5 mi. (8 km) west of Hope.

October 27-29, 1937

Discharge (m³/s): Max. daily: October 27: Capil.: 276; October 29: CR/CL: 422; max. instant.: N/A.

The Daily Colonist, October 28, 29 and 30, 1937; *The Vancouver Daily Province*, October 28, 1937; October 20, 1940; Mitchell 1975 (p. 76); Environment Canada 1991.

Details: Heavy rain in October, caused Lower Campbell River to spill over Campbell River Timber Company's railroad mainline, isolating woods Camp 1, Garrett for several days. The 70-ft. (21 m) high trestle spanning Greenstone Creek collapsed. One night during a wind and rainstorm, a considerable amount of debris had battered against the piling of the bridge until it collapsed (Mitchell 1975).

On October 28, the Alberni district reported torrential rains. The highway between Nanaimo-Port Alberni washed out, cutting off passenger and freight stages. About 50 motorcars were held up at the washout near Cameron Lake. In Alberni, the water main pipeline washed out near the Alberni Pacific Logging Co. railway. Some \$30,000 had just been spent this year installing the new water line. The Bloedel, Stewart and Welch logging camp at Franklin River closed down after the logging railways washed out, throwing about 100 men out of work.

Storms that dropped more than 3 in. (75 mm) of rain over the southern coast district of British Columbia tied up all railway communication. Slides in the Fraser Canyon delayed CNR and CPR trains arriving in Vancouver. Both companies restored regular service on October 29. The Trans-Canada Highway was closed by a 0.75-mi. (1.2 km) slide in the Fraser Canyon. Traffic was not expected to resume for two days.

Early on October 28, the raging Mamquam River tore out a railway bridge 4 mi. (6.4 km) east of Squamish. The bridge was not expected to be repaired before early November. The river changed channel, rushing down its old bed near the Squamish school.

A few miles further east, the Cheekye River flooded the railway tracks to a depth of 4 ft. (1.2 m) and forced the railway bridge over Cheekye River out of alignment. Between these two breaks, Brackendale with a population of 200 was isolated. See reference to flooding in the Squamish valley, which struck first at Brackendale, 7 mi. (11.2 km) up the valley (*The Vancouver Daily Province*, October 20, 1940). *1) On October 28, the Lillooet River near Pemberton recorded a maximum daily discharge of 510E m³/s (Environment Canada 1991). The BC Electric Railway Co.'s high-tension wire to Britannia Mine was washed out on a steep mountainside along Howe Sound, leaving the mine without power. Service was expected to be restored late on October 29.

*1) On October 25, 1940, Rev. F.L. Rimmer, Anglican clergyman wrote that gradual silting up has moved the (Lillooet?) river channel farther and farther east. In October 1937, the flood was several hundred yards from the crossing. (See: October 17-20, 1940 event).

November 12-15, 1937

Source: *The Chilliwack Progress*, November 17, 1937; *The Vancouver Sun*, November 15, 1937 and November 13, 1991.

Details: Around the middle of November, a heavy snowfall occurred in the Fraser Valley. Between the evening of November 12 and the afternoon of November 15, some 14 in. (35.6 cm) of snow fell. On November 12, Vancouver recorded 30.2 mm of rain in 24 hours, setting a record for November 12. *1) On November 15, snow ranging from 6-14 in. (15-35 cm) and blown to even deeper depths by strong wind on December 13-14 covered the entire Fraser Valley. The highway between Agassiz and the ferry wharf was flooded with water believed to have backed up from a slough, which became clogged with snow. The storm made the main roads impassable since November 12 and the Valley's secondary highway system was almost completely bottled up. At Sumas Prairie seven trucks were stuck within a distance of 2 mi. (3.2 km). East Chilliwack and Atchelitz were badly struck, only opened up by November 17. East of Chilliwack, the Trans-Canada Highway was reported open on November 17 but in dangerous condition. Six trucks had been abandoned near Spuzzum where roads were icy and drifted.

According to Coun. H.W. Storey and Reeve Ryder, two graders and a Vedder River Logging Company bulldozer were used opening the roads. On November 13, the bulldozer crashed through a bridge on Prairie Central Road, but was extricated without damage. Telephone service was interrupted as many poles came down east and west of Hope. Other breaks occurred 1 mi. (1.6 km) west of Sumas Mountain and at Fry's Corner where several poles went down. Some power service interruptions occurred in the west section of Chilliwack and at Cultus Lake due to fallen trees.

According to the provincial department of Public works, the road was clear as far as Harrison Hot Springs. Motorists were urged to use chains from east of the Harrison River bridge. Two feet (60 cm) of snow was reported to be lying on the ground at Hope, Laidlaw and Alexander Lodge and 6 in. (15 cm) at Boston Bar. B.C. Telephone reported to have re-established many of the circuits, which were thrown out when the storm unexpectedly arrived. The big storm in the Fraser Valley resulted in only a small percentage of the usual milk supply reaching the city of Vancouver.

*1) The record still held in 1991.

December 28-29, 1937

Discharge (m³/s): Max. daily: December 29: Sooke: 62.3; max. instant.: N/A.

Source: *The Daily Colonist*, December 29 and 30, 1937; *The British Columbian*, January 3, 1939; Environment Canada 1991.

Details: On December 28, Bowker Creek overflowed and covered low-lying parts of Kings Road and Shelbourne Street with several feet of water. Pavement and sidewalks were inundated. The water rose almost to the doorstep at J.K. Gordon's store and post office. Even late in the afternoon, there was still a considerable depth of water in front of the store. An editorial in *The Daily Colonist* stated that there was still much left desired in the city's drainage facilities. Any rainfall out of the ordinary, especially if proceeded by snow, seemed to overtax the existing facilities.

Records show that on December 29 the Fraser Valley was hit by flooding and that during the first week of January 1938 the Fraser Canyon highway was blocked by snow (*The British Columbian*, January 3, 1939).

March 19, 1938

(Storm surge/tidal flooding).

Source: *The Zeballos Miner*, March 21, 1938.

Details: On March 19, a combination of a gale and high tide caused flooding in Zeballos. As the tide was coming in, the gale drove the water far up the main street, carrying along "anything loose such as woodpiles and boats." Most of the residents had taken refuge at the beach where they were marooned when the tide came in. Although there were some narrow escapes, nobody was injured (*The Zeballos Miner*).

April 18-19, 1938

(Dam burst/flooding and rain-on-snow).

Source: *The Vancouver Daily Province*, April 19, 1938.

Details: On the Easter weekend, torrential rains caused almost complete disruption of traffic east and west of Fernie. A bridge washout near Morrissey, 9 mi. (14.4 km) west of Fernie badly disrupted rail traffic. Highway traffic was also interrupted by a bridge washout between Fernie-Lizard Creek. Though the 24 hours of rain subsided, winds and mild temperatures in the mountains melted snow, increasing the danger of freshets.

In Okanogan, Wash., 25 homes and business buildings were swept into the Okanogan River. On April 19, many thousands of dollars of damage was done when water broke through the Wagner dam on Loop Creek. Floodwaters swept through the centre of Mallot, a town of 400 near Okanogan. More than 600 ac/ft (740 dam³) of water came down the gulch. Residents had half an hour warning of the broken dam to flee.

May 29-June 7, 1938

(Spring runoff/flooding).

Source: *The Vancouver Daily Province*, June 1, 6 and 8, 1938; Environment Canada 1991.

Details: On May 29, the Fraser River near Hope recorded a maximum daily discharge of 6,820 m³/s (Environment Canada 1991). On May 31, floodwaters first burst through the protecting dikes at the south end of the Creston reclamation district. More than 3,000 ac. (1,200 ha) of wheat fields were flooded. On June 3, another dike gave way, flooding an additional 4,200 ac. (1,680 ha). Little farm equipment was destroyed as farmers had previously been warned to remove their belongings. Wheat crops sustained the largest damage.

During the night of June 7, another 7,300 ac. (2,920 ha) flooded after a dike along Kootenay Lake at the north end of the Creston dyking area broke. Almost all the arable land Creston-Wydell on the east side of Kootenay River was under water. This newest break in a week of spreading floods also threatened an additional 2,200 ac. (880 ha) on nearby Hicks Island. By June 8, floodwaters from the Kootenay River and overflow from Kootenay Lake covered some 14,500 ac. (5,800 ha) of farmland near Creston. Damage to the wheat crops estimated by the farmers was almost \$500,000. *1) Frank Putnam, Liberal MLA for the Nelson-Creston riding, was one of the heaviest losers, with 1,500 ac. (600 ha) of land under water.

*1) In 1937, the district produced more than half a million bushels of wheat (*The Vancouver Daily Province*).

Ca. October 15, 1938

Source: *The Zeballos Miner*, October 17, 1938.

Details: Around the middle of October, swollen by the first heavy rain of the season, the Zeballos River overflowed its banks. The river's floodwaters cut across the road and joined the sea via a slough. Although no actual damage was reported, floating logs, debris and bars combined to make the river "a menace."

December 9, 1938

(Rain-on-snow).

Source: *The Zeballos Miner*, December 12, 1938 and January 9, 1939; Phillips 2005.

Details: On December 9, a howling gale ravaged the coast from Northern Vancouver Island to southern Oregon, sending ships scurrying for cover, tearing down trees and flooding homes. A logging train plunged into the Franklin River, injuring 26. The engine fell into a gully, dragging the passenger coach with it (Phillips 2005).

A knee-deep water surge filled the main street of Zeballos with logs that blocked traffic. *The Zeballos Miner* reported: "The heavy rain of the past few days threatened serious consequences to the place known as the Goat Ranch. Situated nearly a mile from town at the low point where the river floods, it was half under water when the occupants were rescued by boats rushed by truck from the beach. The heavy rain reached its worst at night. Melting snow in the hills formed cascades down the steep mountainsides, swelling Zeballos River to over flowing. Occupants of the Goat Ranch awakened when their beds began to float." *1)

*1) The official December rainfall for Zeballos, taken at the Centre Island Post Office, was 22.73 in. (577.3 cm) with the heaviest rainfall of any one day of 2.55 in. (64.8 mm) on December 6 (*The Zeballos Miner*, January 9, 1939).

December 27, 1938-January 2, 1939

(Ice storm and rain-on-snow).

Source: *The British Columbian*, December 28, 29 and 30, 1938; January 3, 1939; *The Daily Colonist*, January 7, 1939; *The Zeballos Miner*, January 9, 1939.

Details: Overnight December 27-28, an ice storm, "the worst in three years," hit the Sumas-Chilliwack area. The "silver thaw" that hit Sumas delayed the Chilliwack train. The westbound train was stalled at Sumas by ice 2 in. (5 cm) thick on the trolley wires. While the ice storm was serious on the south side of the river, high winds caused deep snowdrifts in the Nicomen-Agassiz district, blocking traffic between Mission-Harrison. High winds caused drifts at Nicomen and at Floods. At Albion, the weight of the snow brought down 27 telephone poles. East of Langley, the Canadian National Telegraphs lines were reported down. At the Sumas pumping stations, a maximum of 20 in. (50 cm) of snow winds caused drifts eastward. Early on December 28, "scores" of fruit trees were near the breaking point under the weight of the snow and ice.

A snowfall of 2.5 ft. (75 cm) of snow was reported on the flat at Dewdney. On December 29, roads between Mission-Harrison were still blocked. The road to the Agassiz ferry wharf was blocked and the ferry still out of service. Rising temperatures and rain on December 30 released the Fraser Valley from the grip of the silver thaw. On the afternoon of December 29, the Cariboo Highway reopened to traffic and the road between Mission-Agassiz later that night.

New Westminster recorded a rainfall totalling 5 in. (125 mm), including 6 in. (15 cm) of snow on January 2. In the 24 hours ending 8 p.m. on December 30, 2.05 in. (52.1 mm) fell, 1.20 in. (30.5 mm) of which came down between 8 a.m.-8 p.m. Nearly 3 in. (75 mm) of rain on December 31-January 1 added to 5 in. (125 mm) of rain, which had fallen earlier, made a total of 8 in. (200 mm) in seven days. In the Fraser Valley, the Pacific Highway was under about 1 ft. (30 cm) of water at the Nicomekl flats south of Cloverdale most of December 31-January 1. In Surrey, thousands of acres of fields were inundated near Fry's Corner and in various parts of Delta. In New Westminster basements in the lower area near 8th and 10th avenues and between 8th-12th streets were flooded with up to 4 ft. (1.2 m) of water. Other basements had between 6 in.-1 ft. (15-30 cm) of water. *1)

The provincial department of public works reported the flood damage on Vancouver Island at \$15,000. Near Courtenay, the cost to replace bridges was \$5,000. One road in the Cowichan-Newcastle district required extensive repairs (*The Daily Colonist*, January 7, 1939).

Starting the night of December 30, Zeballos experienced "heavy rain driven by a gale." Reported as "the worst storm of the season," it caused the Zeballos River to rise and overrun the low places on the highway.

The road remained closed till the afternoon of January 2. The storm was general along the Pacific coast as well as the west coast of Vancouver island. Although the gale subsided to a large extent, the rain fell "in torrents" until January 4 (*The Zeballos Miner*, January 9, 1939).

At North Bend, mudslides came down onto the CPR tracks.

*1) This was the area that was to have been drained by the proposed storm sewer, which had recently been turned down by residents (*The British Columbian*, January 3, 1939).

January 24, 1939

Source: *The Vancouver Sun*, January 24, 1939; Evans, unpublished data.

Details: On January 24 at about 1:30 a.m., a thaw-induced rockfall near Hedley damaged nine houses and killed two people in their sleep when 20 tons of rock crashed into their home. A number of boulders rained down from a bluff on Stemwinder Mountain on two blocks of houses of this mining town between Princeton-Keremeos. *1) One occupant of another house was injured before the home was destroyed by fire. Cracked rock on an overhanging bluff, about 1,000 ft. (300 m) above the houses was believed to have become loosened by a sudden thaw and a sharp frost on January 23. The rocks crashed down the mountain, swathing a scattered path 600 yd. (540 m) wide.

Debris from the slide covered the main street at the southeast corner of Hedley and crashed into houses on the opposite site of the street. Chunks of rock ranging in weight from 10-100 tons rolled down the mountain. As the slide happened in the town proper, 2 mi. (3.2 km) from the mine and 1 mi. (1.6 km) from the mill, mine operations were not affected.

*1) Following the accident at Hedley, B.C. Government Order-in-Council 1576, dated December 2, 1940, found that, "certain portions of the townsite of Hedley were indicated as being dangerous for residential purposes," and specified the relevant portions of the townsite were considered as such. Several houses in the danger zone at the foot of the talus slope and to the west of Hedley Creek were dismantled (Evans, unpublished data).

March 27-28, 1939

(Ice jam/flooding).

Source: *The Vancouver Sun*, March 29, 1939; *The Daily Colonist*, March 29, 1939.

Details: On March 27, an ice jam at Soda Creek Canyon, 50 mi. (80 km) south of Quesnel caused a 20 to 30-ft. (6-9 m) rise in the Fraser River level when the jam broke early on March 28. The Soda Creek ferry, in dry-dock, was pushed onto the bank. Though it was surrounded by ice, it sustained only minor damage.

On March 28, placer miners along the Fraser Valley in the Interior Cariboo district were forced to abandon their operations on the riverbanks. Huge ice flows had jammed and caused a 6-ft. (1.8 m) rise in the stream in 24 hours. Late on March 28, the water was still rising taking out all the river ice. At least 12 outfits operating on the river reported to have lost equipment in the sudden rise. The flood was the quickest and earliest ever reported.

June 18, 1939

Source: *Victoria Daily Times*, June 20, 1939.

Details: On June 18, a cloudburst in the nearby hills caused tons of rock, sand and dirt to sweep into Trail, Annable and Warfield. Basements were flooded as the downpour sent 2 in. (ft.?) of water racing through the streets in the western section of Trail, blocking culverts.

October 2, 1939

Source: *The British Columbian*, October 20, 1939.

Details: On October 2, a loose rock from a hillside killed a 54-year old sectionhand on the Kettle Valley Railway, while at work 30 mi. (48 km) east of Hope. The victim died on October 2 after being struck on the head.

October 19-20, 1939

Source: *The Daily Colonist*, October 21, 1939; *The British Columbian*, October 21, 1939; Smith and Vallieres 1986 (p. 4).

Details: According to an unpublished report, at 5:30 on October 19 the maximum instantaneous discharge (of

the Lillooet River) at Pemberton was estimated to be 1,640 m³/s. This flood consisted of the main channel flow of 1,120 m³/s and channel flow of 250 m³/s. The dikes, which closed off the old flood channels and also the then PGE railway trestles spanning these channels, were damaged (Smith and Vallieres 1986).

On October 21, a 40-ft. (12 m) slide caught and killed Francis Green, employee with General Construction Co. while on a road construction job near Invermere. The victim's body was recovered several hours later.

November 14-20, 1939

(Storm surge/tidal flooding).

Discharge (m³/s): Max. daily: November 16: CR/CL: 858 (extreme record); Sproat: 247; max. instant.: N/A.

Source: *The Daily Colonist*, November 18 and 26, 1939; *The Vancouver News-Herald*, November 18 and 21, 1939; December 2, 1939; *Comox District Free Press*, November 16, 1939; *The Zeballos Miner*, November 18, 1939; Environment Canada 1991.

Details: Overnight November 14-15, heavy rain in the mountains, coupled with a high tide in the Strait of Georgia and a strong southeast gale, pushed the Courtenay River over its banks. Almost a week of torrential rains climaxed at Courtenay with an all-time record precipitation of 3.25 in. (82.6 mm) for the 24 hours ending 8 a.m. on November 15. Floodwaters rose rapidly aided by a 14-ft. (4.2 m) tide and a southeast gale. Many rivers and streams flooded their banks, temporarily paralysing traffic in and out of Courtenay and many other sections in the area. Flood conditions were generally conceded to be the "most severe in the district for many years." *1)

Swirling muddy water stretched across low-lying farmlands both sides of the highway near the Courtenay Hotel. The highway was inundated between Dike Mill on the Comox Road Sandwich corner. Families in these areas were forced to leave their homes. North of the Courtenay Hotel, three cars stranded and were abandoned on the highway after being trapped by rising waters overnight. Many other cars were reported stranded at other points. Three loggers spent the night in their car stranded on the highway near Skinner's blacksmith shop. They were rescued early on November 15. On Cottonwood Court, more than 6 ft. (1.8 m) of water covered the entire property with water coming in from three sides. Being one of the first places to be flooded, the residents had been moved out on November 14. Early on November 15, waters had risen as high as the windows and firewood and other loose debris floated around. Some 2,000 ac. (800 ha) of land were covered by water.

Many residents of the outlying areas around Courtenay were unable to traverse the flooded highways. Lewis Park was entirely submerged. The Courtenay Hotel had 5 ft. (1.5 m) of water in the basement. The Public Works department's office and work yard were flooded, forcing employees to leave. Early on November 15, the Courtenay River ran full through the city, completely covering the high cribbing. After 10 a.m., it started to recede. *2)

At Oyster River, the Fisherman's Lodge was surrounded by water. Oyster River changed its course, ripping new channels across the highway. A stream 7 ft. (2.1 m) deep and 100 ft. (30 m) wide flooded land on both sides of the highway. Ed Hunter and family, farming in the area were hard hit. The Oyster River tore out a dredged cut west of the highway and ran wild through their property. Their home was flooded and the barn in the lower section was demolished and washed away. The barn's roof was reported resting on the other side of the highway. The swollen rivers weakened Rosewell Creek bridge and the bridge over Big Qualicum River. At Cumberland, the bridge over Coal Creek between West Courtenay-Comox Lake was reported washed out and the unused trestle across the lower end of the lake to be out. Condensory Road, the only other communication between Sandwich-Comox when the highway was flooded, was rendered impassable. The river rose over the cribbing and flooded the road to a depth of 5-6 ft. (1.5-1.8 m). A logjam against its piling, which caused the structure to shake dangerously, threatened the Condensory bridge.

In Campbell River, many basements and some lower floor of houses were flooded. About a dozen homes on the shore of Campbell River were threatened for a while to be swept down the river. Between Campbell River-Campbellton, 25 families were moved to higher ground. The earlier rain and southeast wind died down in the afternoon of November 17. Late on November 17, the Campbell River at its mouth had dropped 5 in. (12.5 cm). Confident that the worst was over, the evacuees were standing by to return to their homes. Though the pilings and other equipment of the Elk River Timber Co. in the Campbell River sustained damage, none of the homes in Campbellton were seriously damaged. Schools in the district, closed on November 16 and 17, were expected to reopen on November 20.

Near Alberni, the Somass River flooded low-lying ground forcing residents along the Great Central Lake Road to flee their homes. The River Bend bridge over the Somass River was threatened. Fearing that this important bridge would be swept away, sandbags were piled against the pillars.

During the flood period, old-time residents reported the Salmon and White rivers to have reached the “highest levels in the past 30 years.”

On November 14, the “worst storm in the history of Zeballos” blocked roads with trees and slides and did thousands of dollars worth of damage to highway bridges and roads. A continuous downpour of rain “almost of cloudburst proportions,” which was not as severe as the rain of the previous night, caused the Zeballos River to overflow in places. About 60-70 families on the Tagore and Privateer flats, 4 mi. (6.4 km) from Zeballos were reportedly marooned when the river overflowed. Some of the families were taken to higher ground to the Man-o’-War mine buildings and the Central Hotel. In Zeballos, the river broke its bank in one place. It overflowed the main road, but did not reach the central part of the town. On November 15, the Zeballos River overtopped its highest previously known mark by 16 in. (40 cm). The Halfway Inn, 2 mi. (3.2 km) from the beach was flooded and two women were taken out in boats. In this low part of the highway, there was 18 ft. (5.4 m) of water. The occupants of a shack near the Tagore Mine were flooded out and escaped in a boat. Telephone and stage services to the mine were cut off. The Ford suspension bridge was damaged in a few places. The end of Spud Valley bridge on the old road washed out. Three bridges were lifted out and culverts were swung around. The gravel bar road was badly damaged. A small washout occurred on the Central road and the flats road was covered with many logs and trees.

On November 19, the evacuees returned to their homes when the waters started receding after it stopped raining for a short time. Provincial Police Const. Nelson J. Winegarden called the reports that 70 families had to flee their homes on the morning of November 17 “a lot of hooley.” He stated, “it’s like this every time the rains come. The heavy off runs (runoff) from the steep hills overflow the River Road every winter. At no time were more than a few families inconvenienced, and they were living at the lowest point, on Man-o’-War flats, probably 15 of the 40 or 50 families there had to move out for a day. The only people who couldn’t get to work were a few miners living on the flats. Only one house had 5 ft. (1.5 m) of water in it.”

Late on November 20, the incessant rains sent the Zeballos River to flood its banks again in several places for the fourth time in a week. *3) The flats were completely inundated with floodwaters approaching Zeballos itself. Communications were cut as roads flooded. According to Major George Nicholson, Zeballos postmaster who visited the flooded areas, flood conditions there were rapidly approaching those that prevailed during “the great flood of Armistice Day.” Residents of the flats areas were forced to leave their homes a second time in three days. Some of those on the Privateer flats waded to safety often through water neck-deep. The families on the Tagore flats were rescued by rowboats.

*1) Old-timers reported a flood many years previous in which water rose to a greater height. The flood of five years previous was considered to be “milder” than the 1939 event (*Comox District Free Press*, November 16, 1939).

*2) In a letter to the editor of *Comox District Free Press*, W. Duncan pointed out the cause of the flooding and how to possibly reduce it in the future. “A number of years ago, a large stump stranded in the rapids near where Puntledge River and Tsolum River join to form the Courtenay River, more debris accumulated forming a large debris jam. If removed and the gravel bank on which it rests dredged out, inconvenience and expense caused by flood, would be reduced and may be eliminated.”

*3) Zeballos had a record rainfall for November with 63.8 in. (1,620.5 mm), bringing the year’s total until November 30 to 175 in. (4,445 mm) *The Zeballos Miner*, December 2, 1939).

December 7-10, 1939

(Tidal flooding).

Source: *The British Columbian*, December 8, 9 and 11, 1939; *The Daily Colonist*, December 8 and 10, 1939; *The Zeballos Miner*, December 9, 1939.

Details: On the night of December 7 after two days of heavy rain, the Courtenay River overflowed its banks again. A southeast gale with rain caused flooding of the low-lying northeastern fringe of Courtenay. A 6-mi.² (15.5 km²) area flooded to an average depth of 1 ft. (30 cm). Floodwaters cut a 4-ft. (1.2 m) “gash” through the highway north of Oyster River and cut away the approaches to the Willow Point bridge.

For the second time in three weeks, Const. J.J. Osman of B.C. Police department evacuated by rowboat 10 families living at the Cottonwood Auto Camp and in homes near the Courtenay Hotel. At the Cottonwood, four families were flooded out by 2 ft. (60 cm) of water, while another six families near the hotel were threatened to be cut off from the rest of the town. Though the main business section of Courtenay was not affected, the low-lying areas north of town were flooded in much of the same way as three weeks earlier.

On December 8 at Zeballos, a 60-mph (96.6 km/h) gale and a minor tidal wave caused an estimated \$700 damage. The “terrific” southwest gale blew for two hours just before noon. Debris was scattered across the Zeballos main street. Water was reported “knee-deep in front of the stores while logs broken from booms blocked the street. The seaplane floats at the end of the British Columbia government dock were damaged. Six small boats grounded and a boom of logs smashed. Two small boats were torn loose, part of the gravel approach to the wharf was torn out, a small residence was upset and numerous trees came down. A log boom set adrift narrowly missed piling a barge against the new pile driver.

The high tide during the height of the storm drove the water up into the town, covering the road as far as the big store of The Seth Witton Co. Floodwaters floated oil barrels in the Standard Oil and pumphouse yards. The Hammond and Hammer floathouses were driven up the slough against the private bridge leading off Main Street. Falling trees slightly damaged the Kent residence and the old Waugh shack. Small sheds were moved and woodpiles set afloat. The force of the storm whirled 1 x 12s about the sawmill, which adjoins the wharf approach.

On December 8 at 7:30 a.m., at the height of a 50-mph (80 km/h) gale, a Bloedel, Stewart & Welch Co. Ltd. train carrying timber workers between camps crashed through a trestle near Port Alberni. The train fell into an unnamed stream 20 mi. (32 km) from the Franklin River. There were no fatalities but 25 of the 50 men aboard the train were injured. The trestle was believed weakened by recent storms, which were also interfering with communication to the scene of the wreck. Washouts cut the E&N track.

Accompanied by torrential rain, the storm with hurricane force struck Port Alberni on the morning of December 9. Between 10:30-noon, winds were estimated from 65 to over 75 mph (104.6-120.7 km/h). The breakwater 2 mi. (3.2 km) from Port Alberni was damaged. The Somass River, backed up by wind and high tides, flooded the lowlands at the mouth. Old-timers stated that “never in their memory had the city suffered such a sudden and violent storm.” The railway spur on the wharf washed out, roads were flooded and windows blown in. Shortly after 10 a.m., all telephone and telegraph communications were cut for 12 hours. Residents along the Somass River were flooded out again and forced to leave their homes like a few weeks earlier.

On December 9, heavy rains caused a crib failure on the Cariboo Highway at Jackass Mountain, 12 mi. (19.2 km) west of Lytton, cutting truck traffic until December 12 or 13.

December 19, 1939

Source: *The Zeballos Miner*, December 23, 1939.

Details: On December 19, steady rain in Zeballos during the week caused to flood the low part of the road to a depth of over 4 ft. (1.2 m), forcing the suspension of bus and truck traffic.

October 17-20, 1940

Discharge (m³/s): Max. daily: October 18: Capil.: 385; October 21: CR/CL: 484; max. instant.: N/A.

Source: *The Vancouver Daily Province*, October 18, 19, 21 and 30, 1940; *The Daily News*, October 22 and 26, 1940; *Evening Empire*, October 22, 1940; *Victoria Daily Times*, October 21, April 4, 1941; Eisbacher and Clague 1981; Smith and Vallieres 1986 (p. 4); Environment Canada 1991.

Details: On October 18 for the 12 hours ending 8 a.m., Vancouver recorded 2.47 in. (62.74 mm) of rain or for a 24-hour period 3.13 in. (79.50 mm), both being near-records. The rainstorm with a maximum daily precipitation of 80 mm, a two-day maximum of 109 mm or 138 mm for the storm total in the downtown Vancouver area, caused landslides in the Vancouver region (Eisbacher and Clague 1981). The heavy rain caused flooding conditions on Vancouver Island and the southern mainland.

In West Vancouver, high water and debris in Capilano River threatened bridges. The current of the Capilano River was so powerful that vessels passing through the First Narrows had to keep well out from the estuary to avoid being pushed from their courses. Capilano River was described as a “rushing torrent of threatening proportions.” Though the Seymour, Lynn and Capilano rivers climbed several feet between midnight October 17-8 a.m. on October 18, damage was slight.

Following heavy rain overnight October 17-18, in North Vancouver the Seymour River suddenly flooded its banks. The river came up 7-8 ft. (2.1-2.4 m) and overflowed its banks for a considerable distance on

both sides of the Keith Road bridge along Seymour Boulevard. At some points, the riverbank on both the east and west sides washed away. A "score of houses" was surrounded by 2-3 ft. (60-90 cm) of water. A large water main was endangered due to a jam at the small Mosquito Creek bridge. Rainfall in the area in the previous 24 hours was 1.17 in. (29.72 mm).

On October 19, North Shore streams started to drop rapidly. Near Scott Ranch, several miles up the valley, the Seymour River lifted the top logs from a high cribbing. The braces of the old Keith bridge, still standing though condemned some years ago, were threatened by large debris. According to officials of the Greater Vancouver Water Board, a few small slides occurred on the upper Capilano and Seymour. A record volume of water poured over the dam, more than any time since the dam was built in 1928. At its peak, 4 ft. (1.2 m) of water leaped over the top of the retainer. Gauges at the dam indicated a rainfall of 8 in. (203.2 mm) in 24 hours, most of which fell during a 12-hour period.

In the Bridge River district, floodwaters damaged roads and bridges. Bridge River waters reached the "highest marks ever recorded there." Road communications with a number of large gold mines in the district was cut when bridges washed away. At an island at the junction of the Hurley and Cadwallader rivers, three families lost household effects with the flood rising at 1 ft. (30 cm) in 30 minutes. Three small bridges at Pioneer and a logging span at Pacific Eastern were destroyed. Hansen's bridge (across Bridge River?) at the lower end of the valley was weakened considerably. At South Fork, a temporary line was put across the Bridge River to install a cable and pulley arrangement. A bridge was lost and the road was out until October 24-25. One motorist was killed when the vehicle skidded and crashed near Gold Bridge on a flood-damaged road. The Kleena Kleene River flooded and forced a number of families to move to higher ground. Telegraph communications between Kleena Kleene-Bella Coola were cut.

Heavy flooding occurred in the Squamish area and along the PGE rail line between Squamish-Quesnel. On October 18, Squamish recorded 5 in. (125 mm) of rain and an almost equal amount fell on October 19. The Mamquam River flooded Squamish streets with 5 ft. (1.5 m) of water. The current, described as "a 5-foot wall of water," was so strong that a number of cars were overturned. Old-timers agreed it was the "worst river rampage they could remember." *1) Communications in Squamish were temporarily cut when the floor of the telephone exchange was covered with 3 ft. (90 cm) of water. Late on October 19, twenty families had to move to higher ground. *2) Evacuees were taken to Vancouver on board the *Lady Cynthia*. According to the BC Police, almost all livestock in the lower Squamish Valley north of town was drowned. According to Const. John R. White, waters rose 20 ft. (6 m) in the upper valley. Dynamite was used to blast the main sea dikes and some small dikes behind which the water was trapped.

The PGE railway sustained heavy damage. Floodwaters weakened the PGE rail bridge at Mamquam, 4 mi. (6.4 km) north of Squamish. Traffic was halted until repairs could be made. Powder was used to blow a channel through debris that endangered the PGE bridge. Part of the bridge had to be dynamited to save the rest of the bridge. Several other smaller railway bridges also washed away. It took considerable time before traffic was fully restored. Traffic on the rail line resumed on October 28, after having been interrupted for 10 days.

The October 18-19 floods at Squamish were troublesome and costly for the PGE. The railway was just in the process of shipping to Vancouver a large portion of 2,000 head of cattle sold at the Williams Lake Cariboo feeder sale. Twenty-three carloads of livestock were on their way when five railway bridges and a considerable length of endangered track halted the train at Lillooet. It was returned to Kelly Lake where for over a week trainmen had the responsibility to feed and care for the cattle. On October 25, they were loaded again and finally moved to Vancouver. Some 400 sheep, 1,800 head of cattle and a carload of hogs were involved in the traffic tie-up caused by the flooding.

Debris from Squamish River extended from Squamish to the Gulf of Georgia and made navigation impossible for small craft and very dangerous for larger vessels. On the morning of October 21, the Union Steamship Co. waited until light before she came out through the floating debris. The flood at Squamish was more serious than the last one in 1937, which struck first at Brackendale, 7 mi. (11.2 km) up the valley.

At Pemberton, 57 mi. (91.2 km) north of Squamish further up the narrow river bottom, a small bridge washed out. Rev. F.L. Rimmer, Anglican clergyman wrote on October 25 in a letter to Ven. Archdeacon Sir Francis Heatcote: "The (Lillooet?) river situation is more serious than ever. Gradual silting up has moved the river channel farther and farther east. The last flood was only three years ago, when the flood was several hundred yards from the crossing. Now it is 20 yards from the crossing south of the PGE shops. It will take only a mild spell and a few days' rain combined to permanently inundate the town. The next flood brings the river permanently through the main section of the town. The strength of one small dike prevented this from happening last Saturday (October 19). Up the valley, the situation is pathetic. Several houses were washed away, and the farmers lost all their livestock. Many people in the valley and village are planning to remove

from here in the next few days. The rest will journey to Vancouver in their own houses in the next flood. There has been much government neglect of precautions.”

The unpublished maximum instantaneous discharge of the Lillooet River near Pemberton was estimated at 1,640 m³/s at 5:30 PST on October 19. This flood consisted of the main channel flow of 1,120 m³/s and flood channel flow of 250 m³/s. The dykes, which closed off the old flood channels and also the then Pacific Eastern Railway trestles spanning these channels, were damaged. The flow would appear too high an estimate, as it is likely that the flow in the flood channel was due to a storage effect and should not be entirely attributed to the instantaneous flow of the main channel. (Smith and Vallieres 1986)

During the night of October 17 and on October 18 at Zeballos, the rain reached “near cloudburst proportions.” A total of 9.1 in. (231.1 mm) of rain fell in 24 hours. The residents were forced to move to higher ground. Const. Nels Winegarden of the B.C. Provincial Police described the flood as “the highest ever seen here.” The town’s water supply failed and the power system and radio communications were also put out of commission. The water outlet at the dam was blocked with debris. Three bridges were reported washed out. The Zeballos bridge at the Spud Valley Mine was wrecked and one end of the bridge at Tagore Mine was damaged. At CD Mine, large rocks dammed up the adjacent Gold Creek, which flooded the floor of the bunkhouse with 18 in. (45 cm) of water. The heaviest damage was reported at Privateer Flats, 4 mi. (6.4 km) up the valley from Zeballos.

*1) In 1941, the Public Works Department used an aircraft in a flood control survey of the Squamish region. The flood control plans included a diversion of the course of one river mouth, alternation of roads and other changes, which could be best plotted on aerial photos (*Victoria Daily Times*).

*2) There were about 600 people living in Squamish at the time.

1941

(Flash flood).

Source: Waterman 1986 (p. 166).

Details: In 1941, a flash flood occurred at Paradise Ranch near Kelowna. A cloudburst in the hills drained into Pine Creek. The creek, unable to accommodate the flood, flowed over its delta. The flood subsided in less than 10 minutes. It cut the road to the wharf level and house from where it crossed Pine Creek, cut by a couple of ditches, which drained the surplus rainfall away from the house and the wharf.

May 12, 1941

(Dam burst flooding).

Source: *The Vancouver Daily Province*, May 26, 1942; *The Penticton Herald*, May 15, 22 and 29; June 5, 12, 19 and 26, 1941; *Penticton Herald*, May 22 and 27, 1948; Ministry of Environment, Lands and Parks n.d.

Details: On the night of May 12, the 10 m-high No. 4 Ellis Creek dam broke above the town of Penticton. *1) The break in this dam, which concrete core had “no real foundation,” released a flood that struck the Penticton area around 11 p.m. Near the gate, at the point of heavy pressure, seepage had been noted earlier. The failure poured approximately 300 ac./ft. (740,100 m³) of water over the land. The torrent escaped through what eventually was an 80-ft. (24 m) cut in the 1,800-ft. (540 m) dam. About 900 ft. (270 m) of the North Ellis flume and 300 ft. (90 m) of the south flume were taken out. Floodwaters also destroyed the old Ellis Creek intake.

The creek went on a rampage and washed away land in three locations, tearing through orchards and eventually filling its bed with silt. On its way down, floodwaters gouged out banks, destroyed cabins and wiped out the intake where the north and south fork Ellis irrigation flumes are fed. Swirling into Penticton, the waters struck the Skaha Lake Flats. Numerous streets and the main highway in that vicinity were inundated. Floodwaters then washed across orchards and flooded homes. Flood damage to the downstream area caused by the break, which was even larger than the one in May 1942, was confined to the semi-rural properties south of the city. At least one barn and a garage in the Penticton section were lost. Many homes had their basements flooded. Some orchards were coated with silt, others had top soil washed away. Several families in the flat area were evacuated.

The main channel of Ellis Creek was unable to handle the volume of water, causing floodwater to spread out over a wide area. Several old channels on the canyon floor, which had not carried water for many years, were suddenly flooded. A new channel, following an old water course, cut through the R. Wyles orchard. Another one carried a large volume of water 2 ft. (60 cm) deep over the main highway adjacent to the Croucher home. At that point where it crossed Main Street, the stream was well over 200 ft. (60 m) wide. The water piled debris and silt over the Main Street bridge crossing Ellis Creek, completely covering it. Huth and Okanagan avenues turned into watercourses, as was Kinney Avenue to a lesser extent.

On Fairford Drive, J.W. Cockell's barn washed away, while George Broderick lost his garage on the same street. Footings of a small footbridge crossing this street washed out, temporarily cutting off a number of residents at the south end of the drive. Several acres of good farmland, some of which with orchards, between Main Street-Fairford Drive were inundated. A portion of John Horton's orchard on Main Street south of the main highway intersection washed away in another bypass of the flood. Huge boulders were left exposed, while other orchards in this section were covered with a layer of soft silt. Additional land was “guttered” and flooded between the drive and Fairview Road. Along the river bank adjacent to the “red bridge” crossing Okanagan River and Fairview Road, R. Alcock lost a number of bee hives.

Floodwaters cut through a high gravel bank at the junction of Ellis Creek and Okanagan River. From this deposit and/or from soils washed down from high up, quickly a sandbank developed that extended practically all the way across the river. Debris then piled up there caused the Okanagan River to be jammed and to back up. A pile of debris washed upstream in Okanagan River to a point about 100 yd. (90 m) north of the bridge. The sandbank and debris soon formed a dam 200 ft. (60 m) downstream from the Fairview Avenue bridge. It totally shut off the flow of the Okanagan River and thus threatened residents of “the meadow” bordering the river west of Penticton. H. Leir, head of the Penticton Sawmills, saw that the logs near his mill suddenly appeared to be floating upstream. At the outlet of the River into Skaha Lake a jam formed that restricted clear passage of the huge amount of water. The river rose rapidly, threatening the new Penticton airfield. The water reached to within 3 ft. (90 cm) of the field, filling one of the dry sloughs on the east side. To prevent flooding of the meadows between Okanagan-Skaha lakes, the control gate at the inlet of the river from Okanagan Lake was closed.

Following the flooding, an appraisal committee was appointed to study the damage, estimated at \$3,000-4,000, which covered the actual land and crop losses. Allegations that the council had allowed too much water in the reservoir were later proved to be “definitely false.” It had been rumoured that the water came up to within 18 in. (45 cm) of the crest, but the clearance had been more than double that figure. The dam had never been full and indeed never been with 100-125 ac./ft. (123,350-154,188 m³) of being full. At the place where the break developed, there was never more than 9 or 10 ft. (2.7-3 m) of water, this being an ample estimate. This would mean there was no more than 3 ft. of water on the new work completed the previous year. Another rumour was that the dam had given evidence of not being strong as it had been “trembling” as people walked on it. The council denied this and noted that trucks were going back and forth along its crest “causing the slightest difference” (*The Penticton Herald*, May 29, 1941).

*1) The storage capacity of the dam had only been increased the previous year. At a cost of \$12,000 the 1939 council carried out an extensive enlargement and improvements. The whole structure was raised 6 ft. (1.8 m), more than tripling the storage holding.

October 8-15, 1941

Discharge (m³/s): Max. daily: October 9: Capil.: 334; max. instant.: N/A.

Source: *The Chilliwack Progress*, October 8, 1941; *The British Columbian*, October 10 and 16, 1941; *The Vancouver Daily Province*, October 14, 1941; Eisbacher and Clague 1981; Environment Canada 1991.

Details: A rainstorm with a maximum daily precipitation of 59 mm, a two-day maximum of 105 mm or 200 mm for the storm total in the downtown Vancouver area, caused landslides in the Vancouver region (Eisbacher and Clague 1981). On October 8, the Fraser River rose to 12 ft. 1 in. at the summer ferry landing, only 2 ft. (60 cm) lower than past summer's high water mark on June 26.

Heavy rains on October 8-9, caused breaks in New Westminster's sewer and water main line on Albert Crescent. *1) The sewer probably broke first and undermined the water main. New Westminster reported the wettest fall since 1920. In the 36 hours ending 8 a.m. on October 10, New Westminster recorded a total of 3.71 in. (94.2 mm) of rain, equaling more than half the total September precipitation of 6.7 in. (170.2 mm). Between October 1-October 16 at 8 a.m., New Westminster recorded a total of 8.53 in. (216.7 mm) of precipitation.

On October 13, very heavy rains were reported on the west coast of Vancouver Island (*The Vancouver Daily Province*).

*1) The 6-in. (15 cm) galvanised iron water pipe, which was part of the original waterworks system laid some 50 years earlier, crossed the sewer at that point.

November 28-December 2, 1941

(Rain-on-snow and storm surge/tidal flooding).

Discharge (m³/s): Max. daily: December 2: Sproat: 243; Stamp A.: 609; December 3: CR/CL: 643; Cowich.: 157; max. instant.: December 3: Cowich.: 157.

Source: *Comox District Free Press*, December 4, 1941 B.C. Ministry of Public Works 1943 (p. T 4, T 7); Environment Canada 1991.

Details: Between November 28-30, abetted by high tides and unusually warm southeast gales and melting snow, Comox (Courtenay?) River overflowed its banks in several places. At Courtenay, where the river runs through the city, "as usual" it overran its cribbing. Lewis Park was submerged and the highway to Sandwick was flooded and closed for transportation. Comox Road was under water in several places and many basements in low-lying areas were flooded. Due to heavy rains Comox Lake rose to an all-time high on November 29-30. Logging operations were halted in several locations due to damaged grades and bridges. In Cruickshank's River Camp of the Comox Logging & Railway Co., water flooded the cabs of the locomotives to nearly 18 in. (45 cm). The railroad grades leading from the camp into the woods were damaged and partially washed out by the swollen river.

With the railway bridges in the North Fork operations gone, company officials did not expect logging to resume until spring. In the South Fork of the Cruickshank's, a high trestle nearly lost a bent of supports that were torn from under the cap pieces. Other logging bridges at Courtenay and the Tsolum Camp area were threatened the rising water and drifting logs and other debris.

During the night of December 1, widespread flood occurred on upper Vancouver Island. Transportation north of Campbell River was halted. The Oyster River undermined the south approach to the bridge. By late December 2, this damage was repaired. The Campbell River also went on a rampage, overflowing its banks in several places. Near the River Bar-B-Q at high tide, water was over the road to a depth of 12 in. (30 cm). On December 2, children at that end were unable to get to school. On Riverside Drive near the Rogers and Pease homes and around the Community Hall, water was also deep in places. This section had been built up during the past summer but the work proved to be too "flimsy" to withstand the flood. Traffic south on the Island Highway was also disrupted temporarily. On December 2, several southbound motorists were forced to turn around at Nanoose.

In December, a flood of considerable proportion occurred in the Comox district. The south abutment and approach span of the Oyster River Bridge were completely washed out and had to be rebuilt (B.C. Ministry of Public Works 1943).

May 13-14, 1942

Source: *The Vancouver Daily Province*, May 14, 1942.

Details: On May 13, large areas of Fernie in the Crows Nest Valley were flooded. Freshets due to heavy rain caused the Elk River to rise rapidly and overflow its banks in west Fernie. Both the curling and skating rinks on the west side of town flooded with 3 ft. (90 cm) of water. East of Fernie, the Hosmer highway flooded and a small bridge washed out. Some ranchers were forced to evacuate. Rail traffic was blocked by a washed out bridge at East Michel. On the highway between Fernie-Michel, five mud and rockslides were reported and the road washed out in three places. All passenger and mine bus service to the west was cancelled. Michel Creek overflowed its banks and in Natal several residents were forced from their homes. Miners at Coal Creek were idle for several days after the power transmission went out. Mines at Fernie and Michel were operating on May 13 but a shortage of railway equipment was expected to close the plants the next day.

May 23-June 16, 1942

(Spring runoff/flooding and dam burst/flooding).

Source: *Victoria Daily Times*, May 28, 1942; *The Vancouver Daily Province*, May 26 and 27, June 2, 6, 13 and 16, 1942; *Vancouver News-Herald*, May 27 and 28, 1942.

Details: At the end of May, floods hit towns in the Okanagan valley. Around May 23-24, breaks occurred in the Ellis Creek and Penticton River dams and by May 26, the entire business area of Penticton was under 1-3 ft. (30-90 cm) of water. Sandbagging the entrances to the stores on May 25 was of no avail. Around May 25-26, water was running more than 1 ft. (30 cm) deep through the streets of the town, forcing 12 families to leave their homes overnight. On the Green Mountain Road 2 mi. (3.2 km) southwest of Penticton, six people drowned when their car plunged into waters across the highway and overturned. Shingle Creek, which flows through the Indian Reserve south and west of Penticton, overflowed its banks and flooded the highway. Though floods hit Penticton in previous years, this was the first time the downtown business section suffered.

Ellis Creek, which flows into the Okanagan River between Okanagan-Skaha lakes, broke its channel in many places. It reportedly did much damage to orchards in the semi-rural section. On May 25-26, Okanagan Lake rose 4 in. (10 cm) in past 24 hours, to far past the normal high water mark. The Ellis Creek dam broke in an area that had been repaired after the previous year's collapse. It was reported to be about a quarter of the repaired part that had been sandbagged and temporarily filled. Only on May 22, members of the Penticton Council had inspected the dam and found it quite safe. It was not the Ellis Creek break which caused the trouble, rather the necessity of opening the spill gates on the Penticton River dam.

Penticton Creek flooded in 12 different locations, inundating "nearly every residence and place of business, doing not far from half a million dollars in damage." Damage in Penticton was estimated as upwards of \$250,000. Utility services in Penticton were kept open but schools closed on May 26. The whole of the low-lying residential and industrial area fronting Okanagan Lake was inundated extending more than 1 mi. (1.6 km) south to South Penticton. Industrial fruit houses were flooded. Water poured over a spur track of the CNR and cars stalled everywhere in thick mud. Part of the CPR track washed out interrupting train traffic to Penticton. Trains were rerouted via the Windermere subdivision. Volunteers cut hundreds of trees on the bench lands 1.5 mi. (2.4 km) east of the town for use in blocking overflows from Penticton Creek. The sudden force of the water pouring down the creek, combined with the formation of a debris jam caused the river to back up. The CNR bridge crossing the creek as it flow into Okanagan Lake and the debris jam were dynamited. Other bridges acting as debris catchers along the river were also dynamited.

Some residents of Oliver were forced to abandon their homes. Following an 18-in. (45 cm) rise in the Okanagan River, more homes were threatened. The rise from the normal high water mark started on the afternoon of May 25 flooding a large part of the lowlands. McIntyre Creek, 8 mi. (12.8 km) north of Oliver, washed out the main highway bridge. Though the bridge 6 mi. (9.6 km) north across the Main River (?) was damaged, it was still open. Traffic had to be rerouted over the old Penticton road through the hills to the west. Roads were washed out and bridges swept from their moorings. A gang of men using a tractor kept the bridge in Oliver clear of debris.

Areas of Kelowna were flooded. Overnight May 27-28, Mill Creek threatened more homes in the residential section of Kelowna. In Kelowna, a crew of 50 men worked all night dyking the banks of

Mission Creek to prevent it from overflowing into a dry creek bed which would have carried a large volume of water through the centre of the city.

Grand Forks faced its “worst isolation in 30 years.” On May 26, this boundary district centre was almost cut off from the outside world. At least “two score” homes in the city could only be reached by boat. Dozens of people were evacuated and the city park was completely inundated. In the southern part of the town, motor traffic was cut off, except for a 5-mi. (8 km) detour. On May 27, the Kettle River continued to rise flooding its bank in a dozen places within Grand Forks city limits. Several valuable farms at Grand Forks were washed away. Floodwaters washed out bridges and cribbing in the Rock Creek Canyon. Washouts in the Myncaster Road cut motor traffic between the Kootenays-Okanagan and the coast. Between Grand Forks-Penticton, bridges on the Kettle Valley railway were swept away at many points. On May 25, the Vancouver Express had to return to Grand Forks and passengers were rerouted via Calgary. At Fife, a derailment blocked traffic to the east. Bus service was tied up because the Sheep Creek bridge on the Cascade to Rossland highway was threatened. It would be several days before rail traffic could be restored and possibly a fortnight before highway connections with the Okanagan would be re-established.

On May 26, T.A. Love, MLA, applied for permission to divert motor traffic via Danville and Oroville, Wash. Westward traffic would be routed through Washington State without passports. At nearby Christina Lake, summer homes and hotels were evacuated. Japanese families living in the area were isolated. The highway between Midway and the Kettle Valley Railway was under water. West of Midway, service on the Kettle Valley line was interrupted. Passengers were routed via Nelson, Golden and the main line.

The Okanagan-Mission section suffered severe damage from erosion. In Cranbrook, creeks were running “higher than for years,” flooding roads. Fields and two farms on the flats north of Cranbrook were submerged.

Following the widespread floods in May, the Okanagan Lake water level continued to rise on June 6, “causing apprehension.” The Okanagan River, the only outlet of Okanagan Lake, was so badly clogged that it only discharged 300 sec/ft. (8.5 m³/s) into Skaha Lake. Earlier in the week, a Sowerman dragline started dredging operations and on June 5 the Dominion government started working with an excavator.

On June 1, at the request of Kelowna authorities the increased flow over the lake control dams was about 600 sec/ft. (17 m³/s) The amount, twice as much as the river could handle, resulted in flood conditions in west Penticton. Consequently, the Penticton Sawmills Co. was forced to stop production of apple box material required for the upcoming fruit harvest. It would take at least a week to repair the flood damage in Penticton, Kelowna (Rock Creek) and Grand Forks riding roads that washed away in the canyon. The preliminary estimate of \$100,000 required for immediate repairs of the recent flood damage did not include the damage to government roads, nor took into account the municipal expenditures in organised districts.

On June 15, Penticton Creek flooded its banks in several places within the business and residential areas of Penticton. Work crews kept the creek, which brought a devastating flood to Penticton the previous Empire Day, in check. Later that day, the water receded. On June 16, the level in Okanagan Lake continued to rise, increasing flood threats to Penticton and Kelowna.

March 28-April 3, 1943

Discharge (m³/s): Max. daily; March 28: Sooke: 22.6; April 3: Cowich.: 121; max. instant.: April 3: Cowich.: 123.

Source: *Nanaimo Daily Free Press*, April 1, 1943; Environment Canada 1991.

Details: On April 1, spring thaws upset bus and railroad timetables in the West Kootenay district. Despite the slide and mud conditions, traffic continued. In the Nelson-Kaslo area, public works crews cleared two slides from the highway. GN railway crews had to blast a huge boulder off the track above Nelson.

April 19-22, 1943

(Spring runoff/flooding?).

Discharge (m³/s): Max. daily: April 19: Stamp A.: 303; April 21: Sproat: 110; April 22: CR/CL: 235; max. instant.: N/A.

Source: *The Chilliwack Progress*, April 21, 1943; Environment 1992.

In April, the Fraser River rose almost 10 ft. (3 m) in three weeks. It swept over several feet of the first completed dam across Ballam Slough. To protect the dike and to “toughen up the slough bed and

prevent it from being lowered," two new dams were being built. During the high water both dams were submerged. In spite of the sudden high water pile driving on the second dam continued. Two rows of piling, 4 ft. (1.2 m) apart were driven to be filled with rock.

November 13, 1943

Source: *The Omineca Herald and Terrace News*, November 17, 1943.

Details: On the morning of November 13, a westbound CNR train hit a large rock in a cut about 60 mi. (96 km) (west?) of Kamloops, instantly killing the train's fireman. The size of the rock and impact caused to jack-knife the engine. The accident involved nine cars, two or three of which were badly damaged. Traffic was delayed for 24 hours.

January 15-16, 1944

(Rain-on-snow).

Discharge (m³/s): Max daily: January 16: Capil.: 259; January 18: Sooke: 25.5; January 19: Cowich.: 152; Sproat: 191; Stamp A.: 524; January 20: CR/CL: 629; max. instant.: January 19: Cowich.: 255

Source: *The Chilliwack Progress*, January 19, 1944; *The Vancouver Sun*, January 21, 22 and 24, 1944; Environment Canada 1991.

Details: Warm weather, Chinook winds and warm rain melted snow in Yale and Hope and the area bordering Laidlaw. On the surrounding mountains, the snow vanished up to the 3,000-ft. (900 m) levels. At Coquitlam, where the snowfall reached the 100-in. (2.5 m) mark on January 15, the snow settled rapidly.

Up to January 21 following two weeks of constant rain, the Campbell River was running more than 3.5 ft. (1.05 m) higher than normal. At Campbellton, parts of the highway and more than a dozen houses were flooded. Floodwaters carried away considerable portions of riverbank. Residents feared that the river would be forced to seek its old channel, which ran through the business centre of Campbellton. This would turn a large part of the settlement into an island and perhaps more than a dozen houses, already threatened by continual erosion of the riverbank, to fall into the stream. *1)

The recurrent floods directly menaced 17 families, whose homes were perched along the south bank. If the river would find its old channel to the south, at least 40 more houses, a hotel, garage, sawmill, restaurants and stores would be jeopardised. The provincial and the Dominion governments disputed responsibility for the situation. On January 21, the Campbell River swept away a boom of sawlogs. It forced the closure of the Campbellton sawmill, putting 15 men out of work. On January 22, the river started to recede. According to *The Vancouver Sun*, the remedy to solve the flooding problem would be to deepen and straighten the river channel. Dredging out the several shoals would only require a few days work by a bulldozer.

Around January 17-18, a rockslide on the CNR line just west of the Hope town limits held up traffic for several hours.

*1) Campbellton residents blamed the construction of the highway bridge at that point for most of their flood troubles. They claimed that bank erosion had been noticeable since the bridge was built in 1928. During the intervening years, several river lots normally 100 ft. (30 m) deep, had been eroded to a depth of 30 ft. (9 m), despite all attempts by residents to put in cribbing. Most of the cribs had been swept away by recurrent floods, worst of which occurred in February 1936, December 1939, and the spring of 1940 (*The Vancouver Sun*).

May 27, 1944

(Dam burst/flooding).

Source: *The Vancouver News-Herald*, May 29, 1944.

Details: On May 27, a \$6,500-dam collapsed 15 mi. (24 km) east of the Okanagan Falls townsite. *1) Floodwaters coming down Shuttleworth Creek caused extensive damage to orchards near Okanagan Falls. Two small bridges in the townsite washed away and 300 ft. (90 m) of CPR track washed out. It was expected to have the rail line repaired before the regular scheduled train on May 30.

*1) This was the third flood in the history of the settlement (*The Vancouver News-Herald*, May 29, 1944).

October 21-23, 1944

Source: *The British Columbian*, October 23, 1944.

Details: Between the evening of October 21-October 23 at 8 a.m., New Westminster recorded 2.69 in. (68.3 mm) of rain, with a considerable amount falling after that time.

January 5-11, 1945

Discharge (m³/s): Max. daily: January 15: CR/CL: 286; max. instant.: N/A.

Source: *The Vancouver Daily Province*, January 8, 1945; *The British Columbian*, January 15, 1945; Environment Canada 1991.

Details: On January 5-6, heavy rain caused high freshets and leaks in dikes along the Serpentine River. Dikes gave way flooding several thousand acres in lower Surrey. Floodwaters were up to 4 ft. (1.2 m) deep at the base of the houses at Fry's Corner where 400 ac. (160 ha) were flooded. Clover Valley Road was inundated by at least 1 ft. (30 cm) of water, which came within inches of the top of Harvey Road. A break on Hall's Prairie Road caused 700 ac. (280 ha) to flood. About 800 ac. (320 ha) of land were flooded 1.5 mi. (2.4 km) southwest of Cloverdale to beyond Mud Bay Road. In the Bear Creek area, a large area was under water near Bose Road. On January 8, rail traffic was delayed for between four and seven hours due to minor mudslides.

On January 7 and 11, New Westminster recorded 24-hour rainfalls of 1.17 in. (29.7 mm) and 1.16 in. (29.5 mm), respectively. Between January 1-January 15 at 8 a.m., New Westminster received a total of 6.78 in. (172.2 mm) of rain.

February 6-7, 1945

Discharge (m³/s): Max. daily: February 7: Capil.: 242; February 8: Sooke: 53.8; Stamp A.: 365; February 9: Cowich.: 159; max. instant.: February 9: Cowich.: 161.

Source: *The British Columbian*, February 6 and 7, 1945; *Victoria Daily Times*, February 8 and 9, 1945; *The Vancouver Sun*, February 5 and 7, 1945; *The Daily Colonist*, February 8, 1945; *The Chilliwack Progress*, February 7 and 14, 1945; Eisbacher and Clague 1981; Environment Canada 1991.

Details: Between 4 p.m. on January 6-1 p.m. on January 7, New Westminster reported 3.20 in. (81.3 mm) of rain in 17 hours or about 4 in. (100 mm) in 21 hours. Vancouver recorded rainfalls for the 29 hours up to 1 p.m. on February 7 was 3.85 in. (97.8 mm) or 2.23 in. (56.6 mm) in 12 hours. The total rainfall for 24 hours on February 6-7 was 2.85 in. (72.4 mm). Between February 6-8, Chilliwack reported 3.21 in. (81.5 mm) of rain in 72 hours. *1) The two-day rain and windstorm with a maximum daily precipitation of 72 mm, or 109 mm for the storm total in the downtown Vancouver area, caused landslides in the Vancouver region (Eisbacher and Clague 1981). Gale warnings along the coast ranged from 36-60 mph (56.3-96.6 km/h). Overnight February 6-7, hurricane-force winds of more than 75 mph (120.7 km/h) were reported at coastal points. Victoria recorded winds of 50 mph (80.5 km/h).

"The Great Storm of February 7, 1945" caused the "worst flood in 10 years," completely submerging an estimated 23,000 ac. (9,200 ha) of farmlands in the Cloverdale district. Nearly all sections over a 21-mi. (33.6 km) area were reported flooded. On February 7, schoolchildren at some sections of the district were removed by boat after the fast rising water left them stranded in classrooms. Sections of Arbutus Street were reported to be worst hit. One Vancouver school was closed and a number of families on nearby Sea Island were stranded. Water, 2 ft. (60 cm) deep and about 4 ft. (1.2 m) wide, was reported flowing down 11th Street in West Vancouver, washing debris onto Marine Drive and undermining 27th Street there. Water was reported covering Marine Drive to a depth of 12 in. (30 cm) near 27th Street. Lougheed Highway was flooded near Maillardville. Sand and gravel carried down by floodwaters plugged all culverts.

In Surrey, several roads, including Clover Valley Road were flooded. The Serpentine and Nicomekl rivers were unable to handle the water. The new McLellan Road between Cloverdale-McLellan station was blocked. In the Port Kells district, several highways were flooded. Overnight February 6-7, the Coquitlam River rose 5 ft. (1.5 m) but was still several feet below the traffic bridge on the Lougheed Highway. Streetcar tracks on the Fraser Avenue line were flooded near the Fraser River. The BCER was operating a shuttle car from 49th (Street) to Marine (Drive) in order to maintain schedules. Several sections of the Marpole-New Westminster interurban were flooded due to poor drainage.

Following 20 hours of torrential rain and gale-like weather, hundreds of basements flooded in Vancouver, Burnaby, Richmond and New Westminster. According to engineers of the provincial Department of Public Works, it was one of the worst floods in recent years in the Burnaby-New Westminster section. Flooding was general with scores of side roads inundated in the Burnaby and New Westminster districts. Water was pouring over the bridge on the road between Langley Prairie-Maillardville. Several sections of the Trans-Canada Highway were under water. The corner of Columbia and 8th (Street) flooded with water flowing over

the sidewalk in front of the Pacific Café and T. Eaton Co. The area worst affected by flooding was between 6th-Twilight streets, especially around Moody Park. *2) On Front Street opposite Westminster Cannery, the embankment caved in. In the upper reaches of New Westminster the situation was aggravated by heavy flow of surface water from east Burnaby where the ground had been saturated from previous rains. All creeks and streams rose 6-8 ft. (1.8-2.4 m) in 12 hours, nearly to the level of the bridges.

In the Still Creek area of Burnaby, flood problems were reported exceptionally bad. Outlets running into Burnaby Lake were unable to cope and Kingsway flooded in several places. In Surrey, several thousand acres of low-lying land were under water. Fry's Corner near Cloverdale Lake was flooded, not an uncommon occurrence this time of the year. Cattle and horses were marooned on the higher spots. South New Westminster reported other problems. The warehouse of Kelly-Douglas on 10th Street flooded. The stock of canned goods stored there was subject to salvage and insurance adjustment. A CPR locomotive derailed in the CPR yards west of 12th and Columbia streets when the rails were undermined. The unattended engine rolled 15 ft. (4.5 m) along the tracks, jumped the rail and plowed into an earth embankment. On 4th Street between Queens-Royal Avenue, debris on the western boulevard clogged the storm sewer causing a manhole to overflow. On February 8, some roads in Surrey and Langley were still impassable even to car traffic and the Pacific Highway near Fry's Corner was still flooded.

High winds and slashing rain swept over Lower Vancouver Island. A wide area of the island was covered by water 6 in.-2 ft. (15-60 cm) deep (*The Victoria Times*). In Greater Victoria (?), many roads were gouged out by raging torrents to a depth of 4 ft. (1.2 m).

*1) For New Westminster it was the heaviest downpour since 1935. Vancouver's 24-hour rainfall was the heaviest since December 1943, when 2.71 in. (68.8 mm) fell. The all-time record 24-hour rainfall for Vancouver was set in November 1909 with 4.37 in. (111.0 mm) (*The Vancouver Sun*).

*2) There were no storm sewers in this district. Many residents had connected their down pipes to the sanitary sewer in violation to the plumbing bylaw. The combination of both surface water and sewer resulted in flooded basements (*The British Columbian*).

March 11, 1945

Source: St. Claire 1986 (p. 99).

Details: On March 11, a 100-ft. (30 m) snowslide came down at Mile 35 near Jessica Bridge on the Coquihalla Pass, killing a Kettle Valley Railway track inspector. A rescue team managed to dig out and save the inspector's dog. As they kept digging they found the inspector's body and his derailed velocipede on the side of the track. *1)

*1) Similar problems led to the closure of the Coquihalla Pass in favour of the route to the coast via Spences Bridge. The subdivision closed on average nearly one-fifth of a year. In 1916, its first year in service, it was closed for a total of 76 days. The winter of 1932 recorded the worst snowfall with some 720 in. (18 m). Between 1949-1986, the average snowfall totaled 579 in. (14.475 m) (St. Claire 1986).

May 31-June 4, 1945

(Spring runoff/flooding).

Source: *The Vancouver Daily Province*, May 31, 1945; Environment Canada 1991.

Details: On May 31 at Hope, the official Fraser River gauge reached 25.42 ft. (7.6 m), an increase of 4.6 in. (11.7 cm) in 24 hours. Flooding was reported on the upper Fraser River. Cloudy weather was expected to bring about a drop in water levels of tributary streams. On June 4, the Fraser River at Hope recorded a maximum daily discharge of 7,820 m³/s (Environment Canada 1991).

June 22, 1945

(Spring runoff/flooding).

Source: *The Vancouver Daily Province*, June 22, 1945.

Details: On June 22, warm weather and melting snow caused the Lillooet River to go on a new rampage. It overflowed highways and isolating farms and areas in the foothills. In some sections, roads were under 3 ft. (90 cm) of water.

October 23-26, 1945

Source: *The Vancouver Daily Province*, October 25 and 26, 1945; *The British Columbian*, October 25 and 26, 1945; *The Chilliwack Progress*, October 31; November 7, 1945; *The Province*, October 21, 1999; Ewert 1986 (p. 241).

Details: Three days of rain in the Fraser Valley caused mudslides and the diversion of a stream east of Abbotsford, which disrupted electric railway service. In 48 hours, New Westminster recorded almost three-quarters of the total rainfall for October. In the 48 hours ending at noon on October 25, 2.99 in. (75.9 mm) of rain fell of a total of 4.36 in. (110.7 mm) to date.

Between October 24-26, two slides of mud and rock, precipitated by an extraordinary fall of rain and the diversion of a mountain stream, played havoc with the operation of BCER's Chilliwack line. Late on October 24, a small slide on Vedder Mountain blocked the tracks. The October 24 evening trains from Vancouver and Chilliwack, blocked by a slide 3-4 ft. (0.9-1.2 m) deep and 100 ft. (30 m) long along Vedder Mountain near Reclaim, had to transfer passengers and return to their respective pints of departure. Fifteen section men of the company's Abbotsford, Vedder Mountain and Chilliwack gangs cleared the slide, only to see an equally large slide cover the right-of-way on the following night. The heavy rainfall caused farmhouses at Yarrow to flood. In Sumas Prairie, floodwaters surrounded buildings and flooded barns. In some places, livestock had to be moved to higher ground. A washout on Mountain Road near the old schoolhouse "held up the milktruck hauling west from that point."

The Vedder River was reported to have risen 6-7 ft. (1.8-2.1 m). On October 25, following a "veritable 60-hour cloudburst," rain-swollen Vedder River endangered the BCER bridge. Outfit cars at Huntingdon were rushed to Woodroffe, just east of the bridge. A skeleton track was cribbed up to allow trains to cross over the soggy area. The first train over was the 6:25 p.m. interurban train out of New Westminster on October 26 (Ewert 1986). On the morning of October 25, heavy rains in the Chilliwack area halted traffic on the BCER line. East of the Woodroffe station 10 mi. (16 km) west of Chilliwack, water was reported over the tracks. The second mudslide disrupted traffic on the BCER Fraser Valley line. The water over the track 11 mi. (17.6 km) west of Chilliwack reached almost the highest mark in the history of the line. The mudslide and the flooding were 8 mi. (12.8 km) apart. The flooding isolated repair crews, who had worked on the first slide for 40 hours. On the evening of October 25, a high-tension power line between Chilliwack-Vedder Mountain went out of service.

The Vedder River spilled over a 100-yd. (90 m) stretch of its banks flooding the intersection of Hopedale and Keith-Wilson roads. Floodwaters up to 4 ft. (1.2 m) deep rushed over Keith-Wilson road for about 200 yd. (180 m) and then over a wide section of the BCER tracks east of Woodroffe station. Floodwaters hit the dike north of this point and came flowing towards the Vedder River again. A wide section of railroad bed was ripped out interrupting interurban service early on October 25. Seven carloads of ballast were required to replace the roadbed taken out by the floodwaters. On October 26, 2,000 ft. (600 m) of track were still under 18 in. (45 cm) of water. Late on October 26, service was restored. The owner of a house south of Simpson's Store was flooded out and in danger of losing his ninth home since coming to the area in 1942. *1)

The Silver Creek and the 60-ft. (18 m) Jones Creek logging road bridges were swept away. At Jones Creek, the dam washed away putting out of commission the power plant. The Jones Creek logging operations closed down. At Emory Creek, power services were also put out of commission. At Harrison, boulders "as big as houses" came down the creeks. Bridges went out and logging roads were rendered impassable.

Heavy snow in the Coquihalla Pass brought down the BC Telephone Co.'s trans-Canada line on October 25, interrupting service to the east and the Interior. Between Chilliwack-Boston Bar, rail and bus traffic was interrupted by slides and washed out bridges. Telephone service to Kamloops was disrupted due to heavy snow in the Revelstoke area. Rockslides in the Fraser Canyon delayed a troop train carrying veterans returning from Europe.

*1) Logjams in the Chilliwack River above Vedder Crossing were claimed to have diverted the stream towards the south bank at Simpson's Store, thence towards the north bank at the military camp north of the traffic bridge. Removal would ease the situation (*The Chilliwack Progress*, November 7, 1945).

March 2, 1946

Discharge (m³/s): Max. daily: March 2: Sooke: 35.4; max. instant.: N/A.

Source: *The Daily Colonist*, March 7, 1946; Environment Canada 1991; Evans, unpublished data.

Details: On March 2, heavy rain caused a debris avalanche (?) near English Bluff, Tsawwassen that destroyed six summer cottages.

In Saanich in the Marigold district, flooding turned a small portion of Panama Flats between Interurban-Carey roads into a miniature lake. The area flooded was larger than it had been for a long time.

April 12, 1946

Source: *The Vancouver Sun*, April 12, 1946.

Details: On April 12, farmlands were flooded in the Maple Ridge, Pitt Meadows and Cloverdale districts. In Langley Prairie, the Nicomekl River flooded its banks. Fry's Corner at the junction of Clover Valley Road and Pacific Highway was reported covered with 6 in. (15 cm) of water. Though several side roads were flooded, they were still passable.

June 3, 1946

(Spring runoff/flooding).

Source: *The Vancouver Daily Province*, June 3, 1946; Environment Canada 1991.

Details: The 1946 spring runoff was the earliest and strongest spring freshet since 1936. On May 31, the Fraser River at Hope recorded a maximum daily discharge of 9,540 m³/s (Environment Canada 1991). On June 3 at 8 a.m., the Fraser River reached 19.59 ft. on the gauge at Mission, down 0.22 ft. (5.5 cm) in 24 hours. Late on June 2 on Deas Island, about 100 ac. (40 ha) of farmland flooded when the Fraser River South Arm broke through the private dike, which surrounds the Island. The break occurred at location of the old fish cannery off the Ladner ferry slip on the west side of the island. Nearly the whole island in the South Arm of the Fraser River flooded.

At Agassiz, farmers and reinforcements from the A-6 Army Engineers Camp Chilliwack were sandbagging a 1-mi. (1.6 km) long stretch of dike. Floodwaters still covered hundreds of acres of valley at various points. On June 4, with a gradual drop in the Fraser River, floodwaters throughout the Interior and Fraser Valley continued to recede. A record high tide on June 4 had no effect on the flood situation.

On June 1, the Thompson River at Spences Bridge recorded a maximum daily discharge of 3,200 m³/s (Environment Canada 1991). On June 1-2, the Thompson River at Kamloops dropped nearly 2 ft. (60 cm).

June 23, 1946

(Earthquake/subaqueous slope failure/tsunami).

Source: *Campbell River Mirror*, August 4, 2000; *The Cowichan Valley Citizen: Millennium Chronicles* p. 39; Hodgson 1946 (p. 310 and 317); Hay 1983 (p. 17); Charlwood and Atkinson 1983 (pp. 13-16); Murty 1977; Mathews 1979; Rogers 1980 (pp. 122-127); Schultz 1984 (p. 108); Evans 1989; Evans 1992 (p. 88); Whelan 1989 (p. 52); Clague, Naesgaard and Sy 1996; Evans, unpublished data.

Details: On June 23 at 10:13 a.m., an earthquake centred around Courtenay struck southwestern British Columbia. The "shallow" quake of magnitude 7.25 occurred on the continental North American plate. It was the strongest of the historical period in southern British Columbia and was felt as far south as Portland, Ore. and east to Kelowna. In the epicentral region, which followed the east coast of Vancouver Island from the southern tip of Denman Island north to Campbell River, effects were severe. Numerous submarine failures were triggered around the coast of Vancouver Island and on the adjacent mainland. There were many ground cracks and failures, landslides and seiches on most lakes, and coastal waters increased in depth by as much as 100 ft. (30 m). (Hodgson 1946).

The quake, one of the greatest on record, was felt in the communities around Cowichan Lake. No serious injuries were reported and damage was slight. As the land trembled with a roar, a towering wave swept shoreward, carrying with it logs and other floating debris. The waters then retreated with such a force that it vacuumed gravel from the beaches and momentarily exposed submerged dock pilings in view, before reversing course and regurgitating generations of household garbage from its muddy depths. Part of Sas-See-Nos Point disappeared, while float homes rocked for a week. When the waters finally settled they were brown with mud and dead fish, the real victims of the quake (*The Cowichan Valley Citizen*).

According to Black Creek resident Henry Schultz, "... we watched how the house shook and the lawn and shrubs moved, as if the ground was a sea and waves were rolling towards us... One man told me that he had been driving along the highway when the quake started and his first thought had been that his wheels were coming off. Another man told me that he had been fishing on Comox Lake when suddenly the nearby mountains started to move, and there were geysers of water shooting up in the middle of the lake up to 30 ft. (9 m) high for a short time." Waterspouts, a diagnostic feature of high pore-water pressure, were commonly

observed along the east coast of Vancouver Island from Deep Bay to Campbell River. "There were some who had rushed out during a (Sunday) church service, thinking that the world was coming to an end." In Courtenay, Schultz saw tumble down chimneys and the brick building that had housed the post office had been damaged. The chimney of the Courtenay Elementary School had crashed through the roof, the ceiling and into a classroom. "Due to the fact that it was a Sunday, no one got hurt but it generated a lot of talk in the valley." (Schultz 1984).

Overthrown chimneys caused most building damage. Some houses and industrial facilities were damaged due to sliding or slumping of the foundation soils. Hodgson (1946 p. 310) noted that at "various points near Courtenay and Comox, where houses were built on deep soil on sloping hillsides, the foundations gave way and the houses slipped off." Other damage included breakage of oil tanks and damage to equipment in a lumber mill in Alberni and a cannery in Kildonan. Minor damage was reported as far away as Victoria, Vancouver, New Westminster, Powell River, Bella Coola and Seattle, Wash. (Charlwood and Atkinson 1983). The quake caused significant damage to the Post Office and Courtenay Elementary. Slumps in road fill made the Kelsey Bay to Campbell River Highway impassable in several places (Rogers 1980; *Campbell River Mirror*).

A small tsunami was produced affecting shores along the Strait of Georgia and nearby inlets and claimed the life of one boater on Comox Lake (Murty 1977). A slightly smaller secondary wave caused the death of one person near Mapleguard Point on eastern Vancouver Island (Mathews 1979). At Sisters Rock near Texada Island, the main wave produced by this earthquake had an amplitude of about 2.4 m. It is likely that the tsunami recorded at Texada Island was a result of the wave generated by the slide rather than the tectonic displacement associated with the earthquake. The quake also caused a large submarine slide on Goose Spit near Comox, which resulted in the loss of a lighthouse on Comox spit (Hay 1983).

At Mapleguard Spit, the west and north end of the spit disappeared in a sudden submarine slide (Evans, unpublished data). Local resident Mary Bullock described the beach at Mapleguard Spit as "boiling like a pot of chocolate pudding." The quake laced the peninsula with 1.5-m deep trenches and geysers of water and sand, called sand blows, created metre-wide, 3-m deep craters. The tip of the spit fell into Deep Bay. The sloping sandy beach disappeared, turning into a sheer drop into 30 m of water. "It looked as if someone had taken a knife and just cut off the end," Bullock recalls (Whelan 1989). Hodgson (1946) also reports "disappearing beaches" due to earthquake-triggered subaqueous landslides at other lakes on Vancouver Island, including Buttle, Cameron, Nitinat, Greta Central and Sproat lakes (Evans, unpublished data).

In Comox Lake within 20 km of the epicentre, where landslides were widespread, part of the shoreline fell away during the earthquake. From Hodgson's description and photographs can be concluded that a considerable mass of sediment slumped from the front of the Cruickshank delta into the depths of the lake (Hodgson 1946). Slumping is also known to have occurred at Cameron and Cowichan lakes (Clague, Naesgaard and Sy).

The quake also caused many widely distributed landslides on Vancouver Island, large distances from the epicentral area (Mathews 1979). The largest landslide clearly associated was a rock avalanche that occurred at Mount Colonel Foster on the west coast of Vancouver Island. The earthquake triggered the rock mass to detach from the right hand peak of Mount Colonel Foster. Part of the debris descended into Landslide Lake (Evans 1989) and generated a displacement wave which destroyed forest in the Elk River Valley (Evans 1992). The mass of water displaced through its outlet and downstream for 10 km where it damaged a bridge on a logging railway (Mathews 1979).

The single greatest damage of the earthquake was to the B.C. Packers cannery at Kildonan at the head of Barkley Sound. Pilings supporting the cannery settled in liquefied sediment during 30 seconds of strong shaking, causing \$100,000 damage in 1946 dollars (Clague, Naesgaard and Sy). Hodgson (1946) suggested that the damage be due to the slumping of an alluvial fan. However, there is no lateral motion of pilings visible on photographs of the damage, suggesting that pilings settled vertically due to the loss of strength in the surrounding material (Rogers 1980).

Slumping and liquefaction occurred throughout the epicentral region. Liquefaction was especially common along the shoreline of Vancouver Island between Deep Bay-Campbell River but also occurred elsewhere up to 100 km from the epicentre (Clague, Naesgaard and Sy). Rogers (1980) lists 24 examples of liquefaction and 10 of slumps in fill or excavated areas. Liquefaction of a clay layer was observed in three locations and produced one of the most spectacular downdrops of "up to 30 feet" (9 m) and geysers of blue clay that caked trees at Reid (Read?) Island (Rogers 1980).

E.A. Hodgson, who visited the area shortly after the earthquake, reported spectacular examples of liquefaction and related landsliding: "In addition to broken chimneys, damaged goods in stores, broken

crochery and glassware, windows etc., there were marked changes in the land, particularly at Maple Guard Spit which flanks Deep Bay, at Goose Spit and at Drew Harbour at the east side of Quadra Island and also near Burdwood on the east coast of the southern promontory of Read Island. Cracks many feet in depth and up to 18 in. (45 cm) in width opened up for lengths of several hundred feet on the sand spits.... At many places along the coast from Deep Bay to above Campbell River, waterspouts were seen, which were described in some cases as 30 ft. (9 m) in height. These left permanent records on the sand spits, in the form of craters 5 ft. (1.5 m) in diameter and 3 ft. (90 cm) deep after several weeks of exposure to rain. At the time of the earthquake, some of these could not be bottomed with a 12-ft. (3.6 m) pole.” (Hodgson 1946).

July 13-15, 1946

Source: *The Vancouver Sun*, July 13-15, 1946.

Details: Around the middle of July, Fraser River floodwaters threatened Lillooet and Pemberton Meadows, a settlement west of Lillooet. Water was coming over some roads, threatening to inundate hundreds of acres of seed potatoes.

Overnight July 14-15 till 9 a.m., Vancouver reported just under 0.5 in. (12.5 mm) of rain. Between July 1-14, a total of 1.24 in. (31.5 mm) of rain fell. *1)

*1) At the time, the 40-year average for the whole month of July was 1.27 in. (32.3 mm) (*The Vancouver Sun*).

December 3-4, 1946

Discharge (m³/s): Max. daily: December 3: Capil.: 237; December 4: Stamp A.: 323; max. instant.: N/A.

Source: *The British Columbian*, December 5, 1946; Environment Canada 1991.

Details: Late on December 4, New Westminster experienced heavy rain. In a short period, 0.62 in. (15.8 mm) fell, most of which during a cloudburst which lasted about half an hour. A lake of several inches deep collected on Columbia Street near Alberta Crescent. A store on 12th Street suffered seepage from plugged drains. Water also collected on Columbia Street W.

December 10-11, 1946

(Storm surge/tidal flooding).

Discharge (m³/s): Max. daily: December 11: Cowich.: 173; Sproat: 118; max. instant.: December 11: Cowich.: 175.

Source: *Victoria Daily Times*, December 10, 1946; *The Vancouver Daily Province*, December 11, 1946; *The British Columbian*, December 11, 1946; Environment Canada 1991.

Details: On December 11, a combination of heavy rain, a high tide and high winds caused food conditions at points in Burnaby near the Fraser River and the West Shore. During the 24 hours ending 4:30 a.m., downtown Vancouver recorded 1 in. (25 mm) of rain. Victoria’s Gonzales Hill Observatory recorded 2.09 in. (53.1 mm) of rain in 48 hours, though not a record, the “heaviest felt here in years.” Estevan recorded 1.03 in. (26.2 mm), and over 2 in. (50 mm) of rain fell in Abbotsford. In Burnaby in the Byrne Road area, several houses were surrounded by water. In the Vancouver harbour, high water nearly set the Burnaby Shoals light house afloat. Overnight December 10-11, the highest wind recorded at Vancouver was 24 mph (38.6 km/h) with gusts. The winds were the strongest on the south end of Vancouver Island.

Heavy rain caused a suspension of the operations at the B.C. Power Commission dam at Moose Falls after the flow in the Campbell River quadrupled. With floodwaters lapping over the cofferdam, construction to divert the river from the main channel, it was impossible for the crews to work at the deepest part of the riverbed. Nearly 500 men were working at the Head Dam powerhouse and pipeline, 116 of whom were clearing the Head Pond area. The river was reported to be running between 6,000-7,000 cfs (169.9-198.2 m³/s) *1)

During “one of the highest tides of the year,” Victoria suffered some flooding. Flooded basements were as a result of plugged connections or no connections with storm drains. On December 10, the curb of Humbolt Street overflowed, flooding the sidewalk in front of St. Joseph Hospital. B.C. Provincial Police reported “minor landslides” along the Island Highway. On the Malahat, several boulders came down onto the road, while a washout caused a large tree to block the road. The Cowichan River was reported to be very high. In Nanaimo, basements of several dwellings were flooded. The water came from wells that flooded.

Continued heavy rains caused some flooding in low-lying areas at Zeballos and Estevan Point. On December 10, the CP Air flight to Zeballos was held for nearly 24 hours due to heavy rains over Vancouver Island.

A snowslide near Revelstoke held up rail traffic for 29 hours. BC Telephone's trans-Canada line was cut by a snowslide east of Hope.

*1) Normally the river runs at 1,500 cfs (42.5 m³/s) (*Victoria Daily Times*, December 10, 1946).

1947

Source: Evans 1992 (p. 77 and 83, table 1).

Details: In 1947, a landslide occurred at Devastation Creek (Evans 1992). Aerial photographs taken in 1947 show fresh landslide debris on the surface of Devastation Glacier, which has its source on the west side of the valley directly opposite the 1975 rockslide site. The landslide is assumed to have taken place in 1947 because the debris does not show any distortion due to glacier movement. The volume of the 1947 slide is estimated to be in the order of 2-4 million m³. It traveled a distance of about 1,500 m on Devastation Glacier but did not extend beyond its toe (Evans 1992).

January 17-24, 1947

Discharge (m³/s): Max. daily: January 26: Sooke: 46.7; max. instant.: N/A.

Source: *Victoria Daily Times*, January 24, 1947; Environment Canada 1991.

Details: On January 24, a 48-mi. (77.2 km/h) southwest gale and more heavy rain hit Victoria. The gale, which started shortly after midnight, reached its peak at 9:30 a.m. It caused relatively little damage but the ninth day of consecutive rain caused flooding. During the last 24 hours, 0.75 in. (18.75 mm) of rain fell. *1) The ground frozen in the recent cold snap slowed down the drainage of water. In Fairfield and other sections of the city, basements flooded. Some low-lying sections of Saanich were inundated. In some sections, water was covering roads with Marigold particularly hard hit. Farmers' fields turned into "miniature lakes" with fence posts showing a few inches above the surface. Three farms, including the St. Joseph Hospital farm at Heal's Range, West Saanich, had large sections under water. Sgt. Eric Ewell stated: "It's the worst I've ever seen."

Up-island, sections were also flooded due to the heavy rain and many rivers were reaching the flood stage. The Koksilah and Cowichan rivers were running 4 ft. (1.2 m) higher than normal. Some roads were almost impassable. Cowichan Lake Road was in bad condition and the road to Honeymoon Bay was "particularly bad."

*1) This was no record rainfall compared to January 1935 and January 1937 when 13.28 in. (337.3 mm) and 7.27 in. (184.7 mm) of rain fell, respectively. In January 1946, 4.06 in. (103.1 mm) were recorded (*Victoria Daily Times*).

February 12-15, 1947

(Rain-on-snow).

Discharge (m³/s): Max. daily: February 13: Capil.: 273; February 14: Sproat: 163; Stamp A.: 379; February 15: CR/CL: 289; Cowich.: 181; max. instant.: February 14: Cowich.: 184.

Source: *The Vancouver News-Herald*, February 13 and 17, 1947; Environment Canada 1991.

Details: Late on February 12, the Capilano River started rising again after a 1-ft. (30 cm) drop from the peak at noon. According to old-timers, the river reached the "highest peak in 25 years." The water level at the intake was down to about 7 ft. (2.1 m) from a near-record 10 ft. 6 in. (3.15 m) at midnight February 11.

*1) The heavy rain and melting snow brought down sand and silt into the water intake and muddied the water supply.

On February 17, the flood conditions in the Comox district were subsiding. Though side roads had been flooded with up to 2 ft. (60 cm) of water in some spots, there was no extensive damage.

*1) The river's normal winter level is about 3 ft. 6 in. (1.05 m) (*The Vancouver News-Herald*).

September 27, 1947

Source: *Ashcroft Journal and Lillooet News*, October 2, 1947; *The Hope Standard*, February 17, 1971.

Details: On September 27, a 59-car westbound CNR freight train struck a slide in Thompson gorge at Anglesey about 12 mi. (19.2 km) east of Ashcroft. Two crewman and three boys from the Kamloops Indian residential school were killed instantly. One engine and 11 boxcars were wrecked. The engine was half buried in the ground on the inside track under a perpendicular clay bank about 100 ft. (30 m) in height. On September 28 at 5 p.m., the first westbound freight train passed over the cleared track.

October 16-20, 1947

Source: *The British Columbian*, October 16, 17, 18 and 20, 1947.

Details: On October 17, New Westminster recorded 2.65 in. (67.3 mm) of rain in 24 hours, bringing the total for October to date to 7 in. (177.8 mm).

A large rockslide at China Bar on the Cariboo Highway 8 mi. (12.8 km) south of Boston Bar blocked traffic to Big Bend. The Cariboo Highway is very narrow at the slide location above the railway tracks. Trucks and a steam shovel had to be used rather than merely pushing the slide material over the bank. Greyhound bus service to Big Bend was temporarily cancelled.

On October 20, the Vedder River was running high, flooding many fields in the Sumas area.

December 14-16, 1947

(Dam burst/flooding).

Source: *The Vancouver News-Herald*, December 17, 1947.

Details: Late on December 14, heavy floodwaters started pouring from a 15-ft. (4.5 m) break in the dam at Cannell Lake water project, 9 mi. (14.4 km) east of Mission. The dam, constructed out of wood and barked by wooden timbers was about 100 ft. (30 m) wide and 12 ft. (3.6 m) high. Over a distance of 500 ft. (150 m), the creek bed drops about 300 ft. (90 m). On its way down, the water uprooted trees, which formed a jam at the bottom of the creek. Water diverted by the jam saved one mill in the area from severe damage. Water inside the dam was then still one-third above the normal level and a steady stream was flowing out over the entire area. One family in the area had to evacuate and another family on the other side of the dam was completely marooned. On December 16, waters started to recede. Raging waters washed out or damaged several bridges in the area.

In Victoria, damage to roads estimated as high as \$5,000 was extensive. Heavy rains on December 16 hampered attempts to clear the roads into two lumber mills shut down by the floodwaters.

December 22-23, 1947

Source: *Victoria Daily Times*, December 23, 1947.

Details: Overnight December 22-23, heavy rains caused the Chemainus River to overflow its banks. Near Crofton, the highway was flooded. A short section of highway near the Chemainus River bridge was covered with 10 in. (25 cm) of water.

January 2, 1948

(Storm surge/tidal flooding).

Discharge (m³/s): Max. daily: January 2: Sproat: 114; max. instant.: N/A.

Source: *The Daily Colonist*, January 3, 1948; Environment Canada 1991.

Details: On December 2, the rain-swollen Fraser River burst through the Twigg Island dike. Extreme high tides and southeast wind aggravated the situation. Winter crops were ruined and furniture in the lower rooms of some houses damaged. On Lulu Island, several houses were flooded above floor level.

May 17-18, 1948

(Spring runoff flooding).

Source: *The Vancouver Daily Province*, May 18, 1948

Details: On May 17-18, flooding conditions and mudslides continued to disrupt rail traffic in the Interior. On May 17, rain in the Revelstoke district brought down a mudslide and caused a derailment at Twin Butte. Just as CPR crew had it cleared, more mud came down. That night two westbound trains were rerouted over the Crowsnest Pass line. Two eastbound transcontinental trains were returned to Kamloops for rerouting over CNR lines. A crew of 175 men was working to clear the line.

Overnight May 17-18, the Fraser River rose nearly 1 ft. (30 cm) to 24.1 ft. while Mission was reading 13.64 ft., up a little more than 0.5 ft. (15 cm).

On May 17 at 8 p.m., a washout occurred between Northport-Paterson on the highway between Trail-Spokane. Traffic was rerouted through Cascade and Waneta. The fissure, about the length of two cars formed in the road was blamed on subterranean springs.

May 23-June 15, 1948

(Spring runoff flooding and dam burst).

Source: *The Penticton Herald*, May 29, 1948; *The Daily News*, May 29 and 31; June 1, 2 and 5, 1948; February 12, 1951; *Kamloops Sentinel*, June 2, 9 and 16, 1948; *The Chilliwack Progress*, June 16, 1948; *The Daily Colonist*, July 6 and 8, 1948; April 22; May 28, 1967; *The Vancouver News-Herald*, July 24, 1948; *Nanaimo Free Press*, December 1, 1948; *The Province*, May 17, 1974; May 31, 1981; *The Columbian*, June 8, 1970; *The Vancouver Sun*, June 21, 1974; *Times*, March 13, 1951; *Fernie Free Press*, June?, 1995; *Canadian Geographic/Emergency Preparedness Canada* 1996; Hutchison 1950; Clark 1965; Barlee 1970 (p. 110); Ewert 1986 (pp. 256-258); Church 1988 (p. 222); Andrews 1993 (p. 47); Wilson and Wilson 1998 (116); Environment Canada 1988; Environment Canada 1991; Fraser Basin Management Board 1994 (p. vi, viii, 8 and 13).

Details: On May 25, the Fraser Valley was hit by what was called the "most devastating flood since 1894." The 1948 spring runoff flood was caused by an above normal snowpack, combined with a cold late spring. It came after a cool April and a cool first 20 days of May followed by 10 hot days with the freezing level over 10,000 ft. (3,000 m), allowing for 24-hour snowmelt (*The Province*, May 17, 1974). The event may be regarded as a snowmelt plus rainfall induced flood. A sudden warming that occurred at the beginning of May was accompanied by above normal precipitation during that month (Church 1988). The Fraser River flooded more than 50,000 ac. (12,500 ha) of low-lying land. It collapsed dikes, destroyed buildings and rose above its banks from May 25 to June 15 (Wilson and Wilson 1998). *Canadian Geographic/Emergency Preparedness Canada* (1996) puts the area flooded by the Fraser River, which rose to within 1 ft. (30 cm) of the 1894 level, to more than 22,000 ha.

Though the 1894 Fraser River flood had the highest peak discharge, the 1948 flood sustained the greatest damage due to the development on the floodplain in the intervening years. Compared to the largest Fraser River flood of 1894, with the river running at an estimated maximum of 16,990 m³/s, during the second largest flood, in 1948 the river was measured running at a maximum of 15,180 m³/s (Fraser Basin Management Board 1994). The Fraser River peaked on May 30 at 24 ft. 5 in., dropping to 21 ft. 6 in. on June 14 (*Chilliwack Progress*, June 16, 1948). At the peak of the flood, the Fraser River flow at Hope was 536,000 cfs (15,178 m³/s), compared with 459,000 cfs (12,998 m³/s) in 1972 and an estimated 600,00 cfs (16,990 m³) during the "Great Flood of 1894" (*The Province*, May 17, 1974). In the 1948 flood, a different situation existed to that of 1894. With the exception of limited inundation near Cannor, the Chilliwack dykes withstood the floodwaters and restricted the river to a more limited channel (Clark 1965). Though the peak of the flood of 1894 was slightly higher, it was of only 10 days duration, compared with more than a month of high water in 1948.

The Fraser River remained at its winter low of 5-7 ft. (1.5-2.1 m) until May 10. In the following 18 days, it rose on the average of 1 ft. (30 cm) a day and crested at 24.78 ft. (7.4 m) on June 10. On the same day, it reached a peak elevation of 7.6 m at Mission (Andrews 1993). It was this long period of high water that caused most of the flooding (*The Columbian*, June 8, 1970). The maximum flow on the Fraser River occurred on May 31. On that day, the Fraser River at Hope recorded a maximum daily discharge of 536,000 cfs (15,200 m³/s), setting an all-time high for the period of record. On that same day, the Fraser River at Hope recorded a maximum daily water level of 10.973 m, which was an all-time high for the period of record (Environment Canada 1988).

On May 31, Premier Byron Johnson declared a state of emergency in British Columbia. An order under the Militia Act gave the military authorities the power to conscript citizens and requisition transport. Four thousand Canadian soldiers were involved in the rescue operations. Navy vessels, under code name "Operation Overflow" and flood rescue trains picked up hundreds of stranded persons in the Fraser Valley, dubbed the "80-mile-long Valley of Misery." Some 7,500 Red Cross volunteers helped to feed dike workers, manned hostels, field kitchens, and three emergency hospitals and distributed food to evacuee centres. Radio station CHWK was turned over to an Emergency Flood Control Committee, as was CKNW in New Westminster, with the army setting up headquarters in the studio. By June 2, some 9,000 people in British Columbia were homeless due to flooding.

Authorities estimated that 32,000 civilians and 1,500 service personnel took part in flood control and evacuation efforts. (*The Daily Colonist*, April 22, 1967). The "Battle of Fraser" was described as the greatest peacetime effort by Canada's active and reserve navy, army and air forces. In all, nearly 3,000 officers and men of Canada's army were called to duty; 50 assorted naval craft manned by more than 500 naval officers and ratings battled the flood disaster. Squadrons of air force Dakotas, Lancasters, North Stars and others flew 757 flights, totaling more than 1,000 hours in the air. The naval headquarters ship *HMCS Antigonish* berthed in the Fraser River at New Westminster, overseeing the evacuation of flood victims.

In his book "The Fraser," Bruce Hutchison describes some of the severe flooding in the Fraser Valley. "The river level passed the 1894 mark by just over 12 in. (30 cm). More than 50,000 ac. (20,000 ha) were inundated, causing at least \$20 million damage. Modern Canada had never seen a flood like this" (Hutchison 1950). *1) Before the flood waters receded, more than a dozen dike systems were breached flooding more than 22,000 ha, nearly a third of the entire lower Fraser Valley floodplain area (Andrews 1993).

Flood waters severed the two trans-continental railway lines, inundated the Trans-Canada Highway, flooded urban centres, such as Agassiz, Rosedale and parts of Mission. Many industries were forced to close or reduce production (Andrews 1993). Sixteen saw and shingle mills were closed down by the rising water, putting some 3,000 men out of work. Heavy silting halted all shipping, leaving 500 longshoremen out of work. Most of the unemployed volunteered for dike duty.

On May 23, when the Elk River threatened to overflow its banks, local residents contacted the assistant highway engineer to help in stemming the rising water. He replied that, since it was Sunday, he could not force his men to work. Early on May 24, the Elk River was running wild. At the north end of the city, three houses close to the new highway were flooded because highway construction had allowed overflow from the river to back up some 5 mi. (8 km). Residents decided to cut a ditch, evidently across the new highway right-of-way, to allow the backed up water to flow into Fairy Creek. When the residents refused to obey the order of the highway engineer that the ditch be closed, police were called in. Provincial works department crews hauled in fill and sandbags to dam the dug channel. After the Elk River finished cresting, Fernie was isolated. Railway and road bridges were gone; parts of West Fernie, the Annex and the Airport were flooded. The Elk River threatened the highway bridge near the old Hosmer coke ovens. Some of the ovens were torn apart as riprap at the bridge approaches. The efforts were to no avail as the bridge eventually washed out. The Elko CPR bridge had buckled enough to prohibit train traffic. In Kimberley, Mark Creek ran wild washing away homes and leaving hundreds homeless. (*Fernie Free Press*). Around May 23, a washout between Westwold-Monte Lake caused a disruption on the Kamloops to Kelowna rail line.

After Kamloops' airport Fulton Field was flooded, this left the Penticton airport as the lone transportation hub in the interior and passenger and express link with eastern Canada. The Royal Canadian Air Force were called on to airdrop blood plasma into isolated Merritt and bundles of sandbags into Keremeos (*Vancouver News Herald*). On May 26, a "break" occurred on the creek below Okanagan Falls after floodwaters weakened the bridge over this creek. McIntyre Creek rose "extremel rapidly" that day and went on a rampage, leavin a Greyhound bus stuck there. At Summerland, Trout Creek went "on a tear." The lower area at Trout Creek Point had to be sandbagged. Ensas Creek was also running high at Summerland and flooding in some places. On the night of May 23, Trepannier Creek cut off Peachland. On May 24, Noble Creek burst its banks, damaging the Jamieson Creek (irrigation) ditch. Near Penticton, Green Mountain Road closed earlier when Shingle and Sheep creeks overflowed it in several places. The closure was "as a precautionary measure" to prevent a recurrence of the 1942 accident when six Native Indians were killed in a flood accident on this road.

By May 25, the Okanagan, Kootenay, and Kettle valleys were under water, and hundreds of homes were isolated. Kootenay Lake rose to more than 28 ft. (8.4 m) above low water level and destroyed more than six dozen of Kaslo's dwellings and businesses (Barlee 1970). On the Fraser River the gauge at Mission showed a rise of nearly 13 ft. (3.9 m) since May 1. On May 25 in Kimberley, Mark Creek went on a rampage. Two houses were swept away and others were dynamited out of the flood's path. The damage in Kimberley was estimated at \$1 million and \$70,000 at Grand Forks.

On May 25 at 2:51 a.m., a dam in Devick Lake burst, sending a 30-ft. (9 m) wall of water down Heffley Creek, a 14 mi. (22.4 km) tributary of the North Thompson River. The roar of the onrushing wall of water could be heard for miles away, giving Heffley Creek valley residents a chance to flee. The freshet killed a 76-year old prospector who had been camped along the creek about 7 mi. (11.2 km) upstream from the Heffley Creek Store. Late on May 31, the body of Easter Young "Tom" Hicks was found in a tangled mass of logs and trees just below the Edwards Creek. The flood also disrupted telephone and power lines in the Heffley Creek area and damaged the bridge across Edwards Creek.

Flooding threatened the residents of the Barriere and Chinook Cove districts. The Barriere River threatened to change its course when it broke through a low spot in the road in the central part of the community. Only quick action of sandbagging and later lining the break with rocks and putting in a foot bridge kept the road open. Fields were flooded and some houses surrounded by water. Some 300 ft. (90 m) of the large irrigation ditch of the Barriere Irrigation District washed out. The rising North Thompson River flooded some farms at Chinook Cove. At least two families were temporarily forced from their homes. On the night of May 27, Peterson Creek began "running with vigour." It was feared that the dam some miles up the creek at Allan Lake might fail. Four families living along the creek were forced to evacuate and move their stock for a number of days. The dam was saved only by much hard work by some employees of the BC Power Commission. *2)

According to *Vancouver News Herald* at its peak, the usually 6-ft. (1.8 m) wide and 18 in. (45 cm) deep creek was 40 ft. (12 m) deep and 600 ft. (180 m) wide. During the flood, it gouged out a new channel along what was Heffley Road. This new bed was about 100 ft. (30 m) wide and between 6-8 ft. (1.8-2.4 m) deep. The topsoil was swept clean, exposing bedrock. The floodwaters wiped out a great section of the creek bank at the Heffley Creek road bridge, causing the structure to collapse. Two canyons were cut in the CNR right-of-way after a culvert designed to handle the normal spring flow failed. The main channel cut a chasm 200 ft. (60 m) wide in the rail line, while a short distance away an overflow channel washed away the foundations (railbed) for another 100 ft. (30 m), leaving the rails and ties suspended in the air.

The water undermined and eventually swept away the home of Robert Marriott, a mile (1.6 km) up the valley from Heffley Creek Store. Edward J. Case's barn was smashed from its foundations and twisted against a concrete silo beyond. Case's garage and car stored inside disappeared in the raging waters. David Corbould's new one-ton truck was reported also swept away. The Case family was trapped in the house. It was three hours before the waters subsided enough for them to risk escaping to higher ground. Their cow and calf, most of their 100 chickens and much of the farm's machinery were also swept away. It would be several days before the rail line could be repaired. Meanwhile CNR passenger trains were rerouted via CPR lines between Kamloops -Calgary. On May 27, a temporary traffic bridge was strung across Heffley Creek.

On May 27, the dikes at Agassiz broke. This made the water flow into Harrison Lake and probably prevented more serious flooding further downstream. Downtown Agassiz was under water and the Fraser River was "a mile wide." Evacuation started with 185 people moving to higher ground, which was the Mount View Cemetery. Food and medical supplies were dropped from airplanes and 750 head of cattle were grazing among the tombstones. Rescue trains brought women and children to Vancouver from Agassiz following the flooding on May 26 (Fraser Basin Management Board 1994). Then the Dewdney dikes at Nicomen Island went. The Lougheed Highway between Mission-Agassiz closed due to flooding.

On May 28, the gauge at Mission was at 23.09 ft., well above the danger point. *3) The dikes at Fort Langley collapsed on May 28. The town of Princeton was reported to be practically isolated. By May 29, Barnston Island was almost completely inundated. Carcasses of milk cows, horses, pigs and sheep started washing up on the Gulf Islands and the beaches around Victoria. The two trans-continental railway grades were submerged. At the height of the flood, Vancouver was isolated from the rest of Canada except by air. The interurban line to Chilliwack had been the only railway running through the valley during the flood's early stages. Both the CNR and CPR lines were completely submerged.

On May 31, dikes at Matsqui and Rosedale, just outside Chilliwack broke. The Fraser River smashed through the dyke north of Gifford and the water raged over the Matsqui Prairie. BCE roadster Ed Miller and his crew saved the Chilliwack River and McLure Slough bridges from washing away by weighing them down with extra steel rails. The BCER interurban station building at Glover was lifted and flipped over (Wilson and Wilson 1998) Pitt Meadows was evacuated. The gauge at Mission reached 24.2 ft. The hundred Native Indian residents of Harrison Lake were evacuated.

By May 29, the main highway between Penticton-Oliver was out. On June 1, with the rail line out, the road to Spences Bridge cut by a washout and the road to Kamloops under 20 in. (50 cm) of water at Quilchena, Merritt was practically isolated. On June 1, another 8,000 ac. (3,200 ha) flooded on the Kootenay River and homes and farms near Kamloops were abandoned.

Dikes broke at Lulu Island, 1 mi. (1.6 km) east of Woodward Landing and at the foot of Trapp Road at Burnaby. On June 2, the dikes broke at Sumas Prairie, forcing a thousand residents to leave their homes. Lillooet and Bridge River were isolated and Okanagan Lake continued to rise. The Great Northern rail line near Westminster washed out, cutting Vancouver's last rail link with Washington State. On June 3, Hatzic residents had to leave their homes when the dikes gave way. At 9:30 a.m., the railway dike crumbled, cutting Vancouver off from eastern Canada. Hatzic Lake increased 10 mi.² (25.9 km²). At the time, the CPR embankment was

part of the dyking system protecting the area to the north. A 4.5-m high wall of water burst through the dike, ripping out 91 m of CPR line and telegraph lines (Fraser Basin Management Board).

Army engineers prepared to blow up the Rosedale ferry bridge threatened by a logjam. On June 4, the Fraser River broke its dikes at Barnston, 20 mi. (32 km) east of Vancouver, and Hatzic Islands. The 800-ft. (240 m) break at Hatzic Lake caused the washout of the CPR double track, telegraph line and BC Electric power station. Dewdney was isolated and another 6,000 ac. (2,400 ha) were flooded. The Canadian Navy evacuated 360 people to nearby Port Kells. The rising Columbia River flooded the downtown streets at Trail.

On June 7, a record high tide coincided with the hottest day of the year. On that same day, the 75-ft. (22.5 m) south span of the Fraser River bridge at Mission was ripped out. On June 8, the dikes at Creston broke, inundating 16,000 ac. (6,400 ha). At Lulu Island, some 20,000 residents were threatened.

The Columbia and Kootenay rivers reached record levels. On June 9, the Columbia River at Revelstoke reached an all-time high maximum daily discharge of 5,040 m³/s (Environment Canada 1991). On June 11, torrential rains caused the Columbia River to rise 12 in. (30 cm) in 24 hours. Some 4,000 residents of Sumas Prairie were evacuated on June 11 as the dikes along Vedder Canal, 60 mi. (96 km) east of Vancouver, were endangered.

On May 28, The Thompson River at Kamloops started flooding in the McKenzie Road area, affecting about 100 residents. Despite the erection of an emergency dyke, some homes were inundated. In an effort to save the area between the two rivers, similar dykes were built on the other side of the North Kamloops promontory. On May 29 and 30, a number of residents were evacuated from this North Kamloops area. In Kamloops, the Oak Hills area experienced fairly heavy flooding throughout the lower business area. Flooding of North Kamloops village was only prevented after a number of dykes were hastily put up. A boil-water order was issued and children were told not to swim in Riverside Park or play along the river's edge. Between June 2-5, restrictions on the sale of gasoline and sugar were imposed. The rationing of gasoline was reimposed on June 8.

On the late afternoon of May 31, the evacuation of 60 families in the low westerly Brocklehurst district was contemplated. Twelve families did evacuate. North and east of the Brocklehurst school, a temporary dyke erected prevented flooding here. Floodwaters cut off the Happy Vale area, forcing some families to leave their homes, as did some residents from the area encompassed by the Happy Vale and Brocklehurst roads. Some sections of Tranquille Road west of Ord Hop Gardens were under water. At the other side of the North Kamloops peninsula, four smaller dykes were erected to stop the flooding by the North Thompson River.

The Thompson River peaked at the Overlanders Bridge gauge, used by the water rights branch at 1,131.8 ft. On May 31, the rate of rise began slowing down. On that day, the Thompson River took out the middle span of the massive concrete CNR bridge 2 mi. (3.2 km) east of Walachin. On June 1, the level held fairly constant at 20.2 ft. Kamloops Lake rose to a level "higher than had been ever seen before by the pioneer residents of the district." Savona's water supply, supplied by the CPR was cut off because the pumphouse was under water and the equipment had to be moved to higher ground. A large number of homes were flooded, forcing its residents to evacuate. On June 3, the Thompson River at Spences Bridge set an all-time record with a daily discharge of 4,130 m³/s. The food shortage at Castlegar was critical. All schools in the Municipal School District No. 24 closed because of the flooding reopened by June 2.

Eight miles (12.8 km) north of Little Fort, several families evacuated their homes. The rising North Thompson River forced the evacuation of residents of Roundup near Little Fort. By May 26, Little Fort itself was surrounded by water. Fields stretching for 0.5 mi. (800 m) south of Little Fort formed a lake. Lemieux Creek overflowed its banks, cutting channels through fields, damaging bridges and cutting off traffic. A logjam upstream had to be blasted to save to main bridges on the creek and a barn that was threatened from being washed away. Like all other North Thompson communities, Little Fort went without mail for nearly a week. At Louis Creek, roads were impassable, cutting off getting supplies from Kamloops for a number of days. On May 29, a bus made it through to Louis Creek by using the railway right-of-way. The busdriver reported 8 ft. (2.4 m) of water on the road at McLure. Flooding creeks destroyed a number of bridges in the Upper Louis district. J.K. Kipling's bridge washed away and his barn had several feet of water in it. To keep the water from flooding his land, P. Pawloff had to dynamite the bridge at his place. "Pioneers of the district" reported that the creek at the old Blucher Hall school site was "higher than it had been for more than 25 years."

Adams River was reported in flood with all the watersheds feeding it being snow-covered. At Sorrento, Shuswap Lake rose 7-9 in. (17.5-21.5 cm) daily until May 31, when the rate dropped to 3-4 in. (7.5-10 cm). Some of the beach homes at Sorrento were flooded. Around May 29-30, Chase was left without power

and water after floodwaters of Chase creek washed out the system's intake. Water supply was restored on May 31, but it was uncertain when power would be back on. On the North Shuswap Road floodwater was 18 in. (45 cm) deep for a distance of 150 yd. (135 m) near Celista.

Ross Creek overflowed its bank east of the Ross Creek bridge, flooding the road at Magna Bay for 200 yd. (180 m). The creek, which went on a rampage, "the worst in years," crossed the road and cut a new channel through Tom Brown's farm. A bridge will have to be constructed where the creek cut a new channel across the road. Ross Creek also gouged out a deep channel alongside the road for about 300 ft. (90 m). The residents of Anglemont were isolated, except by boat. On May 29, Magna Bay was also hit a windstorm described as "one of the worst in the history of the district." The driving gale from the southwest, which lasted for about an hour, threw up immense waves that caused damage to low-lying sections.

Between the base of Mount Lehman and south of St. Nicholas, the 5 mi. (8 km) of interurban line were under 4-11 ft. (1.2-3.3 m) of water. The stations at Gifford, Glover and Clayburn floated away off their foundations and roadbed washed out in many places. Though freight service could not be maintained, passenger and mail were kept up by the expedient of running a bus link over high ground between Mount Lehman-Abbotsford; another between Sardis-Chilliwack.

At the Vedder River crossing, and electric locomotive with boxcars stood watch from June 7, should a dyke breakthrough necessitate the speedy evacuation of residents. In New Westminster, the company's trains kept moving despite the deep cover of water all across the area where 12th Street meets Columbia Street.

On July 12, after a service disruption of six weeks, BCER's Chilliwack line was back to normal. Between Gifford-St. Nicholas, a speed restriction of 10 mph (16 km/h) was imposed. Since the CPR's line from Mission to Abbotsford and Huntingdon was still not ready for service, the BCER line was handling the CPR's freight loads. For the next few weeks, a work train would be hauling gravel from Huntingdon to ballast the rebuilt Gifford-St. Nicholas stretch (Ewert 1986).

On June 11, the Thompson River at Kamloops reached its second-highest crest of 1948 at 19.8 ft. By the morning of June 15, the level had dropped to 17.25 ft. The First Avenue entrance to Riverside Park was now practically clear of water. The park's pavilion was still surrounded by water the road along the riverbank was still flooded. The Canadian National tennis courts east of the CN station were also still under water.

The high level of Shuswap Lake divided the community of Blind Bay in two. In places the water was 3 ft. (90 cm) deep on the road. Several cabins were flooded and the Scotch Creek to Sorrento ferry was using the dock at Catherwoods instead of the Sorrento wharf. The Trail hospital and three families and 60 flood workers were evacuated from an island near Creston. On June 13, the water levels in all major rivers started to drop.

A preliminary estimate showed that floodwaters had damaged 1,973 homes in the Fraser Valley: Chilliwack (340); Lytton (30); Matsqui (355); Langley (130); Surrey (15); Agassiz (375); Harrison Hot Springs (125); Maple Ridge (48); Pitt Meadows (2); Coquitlam (3); Port Coquitlam (5) and Burnaby (45). At a conservative estimate of \$500 each, this would give a total expenditure of nearly \$1 million for repairs. No report had yet been submitted on the number of damaged barns and other farm outbuildings or business premises or the extent of crop damage. (*The Daily Colonist*, July 6, 1948). It was expected that half of the Fraser River flood victims would be back in their homes by the end of July. Approximately 1,000 Fraser Valley homes out of 2,300 damaged throughout British Columbia would be occupied by then. The situation as of the third week of July was as follows:

In the Chilliwack area for 170 assessed buildings the estimated repair cost was \$53,935 or an average of \$317. A total of 3,300 ac. (1,320 ha) had been reploughed. In Langley, the Glen Valley was rapidly uncovered. Residents of Barnston Island were back in their homes. Ploughing and reseeding was being carried out. In Surrey, the damage was relatively small. The flood affected about 20-25 homes in Ladner, 10 with minor damage. Between 300-500 ac. (120-200 ha) of land suffered from seepage. Most of this had been reploughed and replanted. It was not expected the total for rehabilitating homes in Coquitlam would not exceed \$600. With appraisals nearly completed, in Port Coquitlam the cost was estimated between \$620-700. The approximate cost of rehabilitating 62 homes in Maple Ridge was about \$5,000. In Pitt Meadows, work of reploughing was proceeding. In Mission, 85 homes had been appraised with work started on 30 of them. On Nicomen Island, ploughing and reseeding had commenced. The majority of people in Agassiz had returned home. Most herds were back on their own farms. Reploughing and reseeding was progressing well. Hammersley Prairie and Harrison Mills were hardest hit. Appraisal work in the Lytton-Popkum area had not been started yet. (*The Vancouver News-Herald*, July 24, 1948).

Retired Maj. Gen. B.M. Hoffmeister, who was the federal co-ordinator in the 1948 flood in the Fraser Valley, considered trees growing in some of the dikes a great hazard. He noted these are liable to be

loosened when prolonged high water saturates the dikes. When the trees blow over they leave holes in the dikes (*The Vancouver Sun*, June 21, 1974).

At the opening of the special flood session of the Legislature, Premier Byron I. Johnson said it was the "worst flood in the known history of the Province" and represented the "worst flood disaster ever recorded in Canada." Due to great skill and untiring efforts of all those who worked on the dykes, Johnson said the floodwater was confined to 51,000 ac. (20,400 ha) (*The Daily Colonist*, July 8, 1948).

Early July, Lands and Forests Minister E.T. Kenney, who was appointed by the Cabinet to survey flood damage outside the Fraser Valley, gave a tentative analysis of flood costs outside the Fraser Valley for which the Province would bear the entire costs: combating floods and protecting dykes: \$231,536; estimated cost of restoring dykes: \$162,000; immediate relief and restoration of municipal and private property: \$467,066 and replanting crops and seed: \$152,606.

Totals for each district included: Kimberley: \$164,950; Trail: \$362,890; North Kamloops: \$6,255; North Thompson River: \$42,200; Creston area: \$185,000; Kelowna (outside city): \$7,809; Merritt and Ashcroft: \$33,953; Cawston, Christian Valley, Grand Forks, Hedley, Keremeos, Oliver, Osoyoos, Princeton, and Westbridge: \$177,209; South Okanagan Land Project: \$6,817 and Arrow Lake: \$2,500. In addition, Kenney reported that Hedley required \$22,000 for river protection and that riverbank work was necessary at Natal. Areas he was not able to cover personally, but for which he received reports, brought his total recommended relief to \$1,500,000. (*The Daily Colonist*, July 8, 1948).

Final damage figures vary widely. According to Finance Minister Herbert Anscomb in his budget speech to the Legislature on March 13, 1951, the total cost of the 1948 floods amounted to \$12,481,746. The Dominion Government paid \$9,500,000 of this (*Times*, March 13, 1951). Andrews (1993) puts the total damage at \$20 million, or an estimated \$133.3 million in 1991 dollars. This number corresponds with the nearly \$20 million figure reported in *The Sun* of February 28, 1950. According to another source, the Fraser River caused a total of \$30 million damage (*The Daily News*, February 12, 1951). According to *Canadian Geographic*/Emergency Preparedness Canada (1996) the total damage (in 1996 dollars?) amounted to \$146 million.

The total cost of relief and rehabilitation in British Columbia amounted to an estimated \$20 million in 1948 dollars. Using the Consumer Price Index, this would amount to about \$142 million in 1994 dollars (Fraser Basin Management Board 1994). The Dominion Government would make an outright grant of \$5 million toward emergency relief costs and rehabilitation. The Province would assume full responsibility for immediate relief and assisting in the general rehabilitation of homes, farm buildings and provincial and municipal property. Cost of reconstruction dykes, removing water and debris would be shared 75% by the Dominion and 25% by the Province. (*The Daily Colonist*, July 8, 1948). By December 1, the final settlement had been made of 480 cases out of 969 relief cases for the government to deal with as a result of the 1948 flood. Farmers whose properties were damaged by floods were being assisted in purchasing hay for winter feed and nursery stock for the next spring (*Nanaimo Free Press*).

*1) Following the 1948 flood, some 200 km of dikes along the Fraser River have been completely rebuilt (*The Columbian*, June 8, 1970).

*2) This dam supplies irrigation water to a number of farms and ranches on the west side of the North Thomson River.

*3) The Fraser dyking system was designed to handle water up to the 22 ft. level.

August 29-31, 1948

Source: *The Vancouver Sun*, August 30 and 31, 1948.

Details: Following heavy rain, Hatzic Prairie flooded the third time in 1948. Ten families were evacuated from the flooded Hatzic Prairie area. The Red Cross made arrangements for accommodation of some of the evacuees. Water, which rose 15 ft. (4.5 m), began to recede on the evening of August 30 and was a fraction lower at the Hatzic break on August 31. Since the night of August 29, the Lougheed Highway had been closed to smaller cars. During the previous few days, the road had sunk visibly as the Fraser River poured again through the break it made at Hatzic in June. Public Works Department crews estimated that they had 1.5 ft. (45 cm) leeway in their fight to save the rebuilt roadway from total immersion. On August 30, dump trucks worked all day raising the level. It was expected that the Lougheed Highway might reopen to traffic in the area that evening.

From Abbotsford, on the south side of the Fraser River, it was reported that sloughs at Matsqui had been filled again by backing river waters. Because of the heavy rain, new crops sustained some damage.

November 27-December 2, 1948

(Storm surge).

Discharge (m³/s): Max. daily: December 2: Cowich.: 151A; Sooke: 39.6; max. instant.: N/A.

Source: *Nanaimo Free Press*, November 29 and 30, December 1 and 2, 1948; Environment Canada 1991.

Details: In November-early December, for three weeks winds lashed the coast with gales off and on. Between November 29-December 2, rain fell almost steady for four days. Overnight November 29-30, the Lower Mainland was hit by gales up to 54 mph (86.4 km/h). Power- and communication lines were disrupted. Overnight November 30-December 1, more than 250 ft. (75 m) of the Dallas Road seawall and adjoining walk just east of the breakwater caved in. Heavy seas caused the sand to erode so low that the walk just inside the wall dropped 12 ft. (3.6 m) below the road level.

On November 27-28, hundreds of passengers and dozens of motorists were stranded in the Fraser Valley for more than 24 hours. Some 400 bus passengers were stalled at Boston Bar. A rockslide and a freak snowstorm blocked the valley 125 mi. (200 km) east of Vancouver. Traffic resumed late on November 28.

On December 1, a landslide came down from a 50-ft. (15 m) cliff in New Westminster. It occurred behind the Great Northern Railway depot, which was located in a cut. About 7 tons of mud and small rocks crumbled one wall, filling in the depot's waiting room and baggage room. The building partially caved in.

On December 1, heavy snow and high winds near Hope disrupted the CPR and CNR telegraph systems for three hours. On Vancouver Island, the Muir Creek bridge washed out. Logs and debris crashing against the bridge caused a 90-ft. (30 m) section to collapse.

On December 2, high winds and heavy rains for the fourth time in as many days battered the British Columbia coast. In the Lower Mainland, basements flooded. The 20-mph (32 km/h) wind battered the log booming grounds, scattering logs. It toppled two CPR freight cars loaded with lumber into Burrard Inlet.

February 15-23, 1949

(Rain-on-snow).

Source: *The Hope Standard*, February 25, 1949; *The British Columbian*, February 16 and 17, 1949; *The Daily News*, February 19, 22, 23 and 24, 1949; *Chilliwack Progress*, February 16 and 23, 1949; Stethem and Schaerer 1980. (p. 5).

Details: On February 15, New Westminster reported 4 in. (10 cm) of snow followed by 0.83 in. (21.1 mm) of long-awaited rain overnight February 15-16 for a total precipitation of 1.23 in. (31.2 mm). On February 15-16, Chilliwack recorded 4.39 in. (111.5 mm) of rain in two days. While not a record, Hope reported 3.49 in. (88.6 mm) of precipitation. During the 12 hours ending 7 a.m. on February 16, the Gonzales weather station recorded 1.08 in. (27.4 mm) of rain accompanied by winds of 35-40 mph (56.3-64.4 km/h). *1)

On February 16 at 2 a.m., snow caved in a 600-ft. (180 m) building at Leeder's Pacific, Pitt Road. The structure, said to contain the longest assembly line in Canada, was completely destroyed. According to an eyewitness, the collapse "with the roar of an elevated train" took 30 seconds. Besides materials along the assembly line, 205 pieces of machinery were damaged. The 26-ft. (7.8 m) wide frame building had been fatally weakened by the previous year's flood when it stood in 12 ft. (3.6 m) of water being pounded by drifting logs.

Soaring temperatures and rain caused a series of slides in the Fraser Canyon. Trans-continental train traffic was delayed for more than eight hours by slides in the mountains while telephone communications were reported to be "shaky." In the Chilliwack area, a bad slide was reported, which might have affected the CNR line. Overnight February 15-16, two slides between Chilliwack-Hope blocked the Trans-Canada Highway, possibly trapping a car just west of Hope between the two slides. By February 18, the two slides were cleared. A snow and rockslide at Flood later blocked the CN right-of-way and the highway. It came down from the rock bluff 2 mi. (3.2 km) east of Restmore Lodge. The slide was one of the many in the vicinity that came down following rain and warmer weather.

A "deluge of rain," following 2 in. (5 cm) of heavy wet snow caused flooding in Chilliwack and district. The heavy snow caused 50-60 local telephone lines and the long-distance lines to Hope out of order. On February 16, slides at Yarrow and Hope blocked the traffic and cut telephone lines. On February 17, the Reeves and Kitchen roads were flooded and closed. The Strathcona Fairfield and Rosedale elementary schools were closed due to flooding.

On February 16, Greater Victoria and lower part of Vancouver Island experienced “the worst floods since 1935.” Thousands of dollars worth of damage was done to homes, businesses, roads and highways. The toll might have exceeded that of 1935 when low-lying areas were devastated. The mild spell caused an estimated \$200,000 flood damage at Victoria and the south end of Vancouver Island. Though all areas were hard hit, Saanich was faced with the worst damage. In the Saanich area and the Lowlands of the Fraser Valley, surface flooding was reported. Roads were blocked and 200 reports received from marooned residents.

On Vancouver Island, snow followed the heavy rain. Mesachie Lake, Youbou, Honeymoon Bay, Meade Creek and Lake Cowichan all received a heavy snowfall. Heavy snowfalls in the Lake Cowichan area dashed hopes for loggers to go back to work. On February 17 and 18, roads at Mesachie Lake were closed.

On February 22, floodwaters cut rail and telegraph lines. On February 23, more slides occurred east of Hope. Fresh slides closed the Yale to Boston Bar highway in the afternoon, leaving dozens of motorists stranded at Boston Bar. The Hope to Princeton highway was blocked at several points between Hope-Mile 23.

On February 23, an avalanche at the Hoodoo curve stopped a truck convoy, which left Boston Bar for Vancouver through the Fraser Canyon. The small avalanche had been partially cleared. A larger avalanche hit one of the truck drivers, who was mounting tire chains. Only the roof of the truck remained visible while the driver had disappeared. Another avalanche struck some of the other drivers in the convoy that started a search. Five of the searchers were swept well down the slope towards the river. The remaining rescuers were struck by a third avalanche that buried several men to their knees. With the exception of the first buried driver, all other persons were found alive. The body of the victim was located at the rear of his truck the following day (Stethem and Schaerer 1980).

On February 24, the Trans-Canada Highway in the Fraser Canyon was still blocked. It could not be cleared rapidly because of avalanche danger. Most of the telegraph wires were down, interrupting communications between Vancouver-Prince George and Prince Rupert. The main line trains were all running behind schedule. Due to a washout 2 mi. (3.6 km) east of Lytton CNR trains were rerouted over CPR tracks again (*The Daily News*, February 24, 1949).

*1) Victoria reported its largest precipitation in 63 years ever since records were kept. In 24 hours ending 7:30 a.m. on February 17, 3.18 in. (80.8 mm) of rain fell. Also Abbotsford and Princeton broke all previous February records with 2.47 in. (62.7 mm) and 2.56 in. (65.0 mm), respectively.

May 10-16, 1949

(Spring runoff/flooding).

Source: *The Daily Colonist*, May 13 and 15, 1949; Environment Canada 1991.

Details: For 12 days, abnormal high temperatures were recorded in the valley districts. On May 12 and 13, the mercury reached 112° and 89° F (44.4° and 31.7° C), respectively. The mountain runoff was the biggest in years with high peaks having more snow than any year since 1910. A heat wave with temperatures of 87° F (30.6° C) in Kelowna caused Mission Creek to overflow its banks south of the city flooding some farmland. Between May 10-12, the Fraser River at Hope rose from 19.98 ft. (6.0 m) to 24.10 ft. (7.23 m). Mission reported a rise of 4-5 ft. (1.2-1.5 m). On May 14, the climb in the Fraser River levels started to slow. With a rise of 1.49 ft. (45 cm) at Mission, the river showed signs of leveling off. The minimum flood levels at Mission were expected to be exceeded by at least 1 ft. (30 cm) on May 15. On the upper reaches of the Vedder River, one family on the Brown Road was evacuated. On May 16, The Fraser River at Hope recorded a maximum daily discharge of 9,000 m³/s (Environment Canada 1991).

For the second successive year, dikes in the Similkameen and Tulameen districts weakened. In two days, the Similkameen and Tulameen rivers rose more than 3 ft. (90 cm), threatening breakthroughs. Creeks pouring into the two rivers had never been so high. Flashfloods cut telephone communications with the Similkameen Valley. Some rural residents were forced to abandon their homes and live in tents. In Princeton and throughout the valley, low-lying areas flooded. *1) On May 14, a washout along the Tulameen River near Manning, 20 mi. (32 km) west of Princeton, disrupted local and southern transcontinental rail traffic. Late on May 13, two eastbound passenger trains were held up.

Near Keremeos, the waters came to within inches of the tops of the head gate of Cawston Irrigation district. Another break was threatened at 20-Mile Creek, which joins the Similkameen River near Hedley. Midway Hedley-Princeton, Sterling Creek flooded fields. The main Hedley highway link of the southern trans-provincial route was flooded in places. The worst threat was at Normans, 6 mi. (9.6 km) below Princeton. Work crews were throwing up temporary dikes. The highway linking northern trans-provincial traffic to the southern route went out. On May 11, both the trans-provincial and Merritt highways were blocked by washouts at

several points. On May 12 west of Blue River, train traffic was interrupted by a heavy rockslide on the CNR main line. The slide was reported 100 ft. (30 m) long.

*1) Following the previous year's flooding, improvements had been made to avoid a reoccurrence. Dyking now controlled 20 Mile Creek, which the previous year had swamped a large section of Hedley, giving some protection to the low valley. At West Princeton, where the Similkameen threatens the main town, heavy dikes had been built (*The Daily Colonist*).

November 26-December 3, 1949

Discharge (m³/s): Max. daily: December 2: Cowich.: 255; Sproat: 214; December 3: CR/CR: 507; max. instant.: December 2: Cowich.: 258.

Source: *Alberni Valley Times*, November 26, 1949; *The Daily News*, November 28, 1949; *The British Columbian*, November 26, 28, 29 and 30; December 1, 2 and 3, 1949; January 30, 1950; *Kamloops Sentinel*, November 28, 1949; *The Vancouver Sun*, November 29 and 30, 1949; *Nanaimo Daily Free Press*, December 1, 2 and 3, 1949; *West Coast Advocate*, December 1, 1949; *The Daily Colonist*, December 29, 1949; *The Victoria Daily Times*, March 13, 1951; Rogers 1992 (pp. 178-179); Eisbacher and Clague 1981; Environment Canada 1991.

Details: The year 1949 saw a whole series of violent winter storms that took a heavy toll of property and lives on the British Columbia coast. One of the worst storms to lash the North Pacific began on November 26. On the North Shore where 9.2 in. (233.7 mm) of rain fell, shattered a 20 year-old rain record. The *West Coast Advocate* described the storm as "one of the heaviest rainstorms known to have been suffered here." Province-wide, 10 bridges washed out, 11 rivers overflowed their banks, nine major highways were blocked and "scores" of secondary roads cut off.

On November 26, a storm with heavy rain struck the North Pacific seaboard. It left a trail of destruction and millions of dollars of destruction in its wake (Rogers 1992). The storm also left at least 24 dead in British Columbia. Twenty people died by drowning and four were killed in storm-caused traffic accidents. Six men drowned when their Victoria Tug Company's tugboat *George MacGregor* foundered off Trial Island off Victoria on November 26.

A rainstorm with a maximum daily precipitation of 65 mm, a two-day maximum of 81 mm or 213 mm for the storm total in the downtown Vancouver area, caused landslides in the Vancouver region (Eisbacher and Clague 1981). On November 26-27 on the North Shore, Homer on Woodside Drive was hit hard by flashfloods from Seymour Creek. Damage in low-lying areas flooded by Seymour Creek was estimated at least \$50,000. Twenty-two "aged" patients of Swedish Rest Home were evacuated and taken to the North Vancouver General Hospital when water from Seymour Creek flooded the basement of the home.

On the night of November 27, a logjam at the Port Alberni city dam on the China Creek Road gave way. For three days and nights, city waterworks department crews had tried to keep the screens at the city dam and reservoir on China Creek Road clear of debris so continued water supply could be maintained. The subsequent 6-ft. (1.8 m) wall of water sweeping down from the upper reaches nearly two people who were on the dam at the time. Tons of gravel was swept down by the water released above the dam, filling the screens to the point where no water came over the service main to the reservoir. Logs brought down damaged the spillway equipment and nearly swept away the dam equipment. The heavy rains also took out parts of the roadway serving the dam. Constant work by a bulldozer kept water flowing.

The floodwaters damaged two bridges in Port Alberni. On the late afternoon of November 27, the Dry Creek bridge on 4th Avenue was closed to traffic as the structure was weakened on the south end. Here a huge gap appeared and the abutments were dislocated. At the 3rd Avenue South bridge, leading to the plywood plant, damage was more extensive. Several of the footings were weakened as supports were washed away.

On the afternoon of November 27, high winds caused a short circuit temporarily cutting power to the pulp and lumber mill. A burst of wind caught a large display window in Redman Motors Ltd. on Kingsway. Some yards and basements were flooded. At the *West Coast Avocate* newsprint stock estimated at \$500 was ruined by seepage in their basement.

On the night of November 26, floodwaters of Cameron River rose over the West Coast Highway (Highway 4) temporarily halting traffic at Cameron Lake. Other sections along the lake also flooded. According to old-timers, this was supposed to be a "record high for Cameron Lake." Smaller slides took place and rocks came down the hillside.

High winds toppled a number of trees in Cathedral Grove, temporarily impeding travel. At the height of the hurricane on November 26, a supply float at Nettle Island in Barclay Sound was lost. The owners battled

for four hours against the wind and tide before losing the float. The loss was estimated at several hundred dollars. A small float used as a tool shed by the Port Boat House was torn away from its moorings.

On November 25-26, there was not enough room at the Port Alberni fishing boat floats to accommodate all the seiners and trollers taking refuge from the gale. Many had to take dockage at the Assembly wharf, Tahsis Lumber Co and oil docks on the waterfront. A tanker at the Imperial Oil dock after anchoring in the stream had to be moved again as the force of the wind tore the anchor loose.

The provincial highways department reported all roads going east from Vancouver blocked "indefinitely." Both the Trans-Canada Highway through the Fraser Canyon and the Hope to Princeton highway were closed for at least three days. The 83-mi. (132.8 km) Hope to Princeton highway was blocked by a number of mud and log slides. A major washout occurred on the Hope to Princeton Highway near Allison Summit, 120 ft. (36 m) long and 20 ft. (6 m) deep, where most of the highway tumbled into an adjacent creek. After constructing a bypass, the highway reopened on November 29. Tons of debris from a mud and rock slide, which covered the highway 3 mi. (4.8 km) east of Hope, was cleared by crews working from both ends. The highway was reopened for traffic on November 30.

A big rock- and mudslide blocked the highway at Floods, west of Hope. The Trans-Canada Highway was severed by a serious washout just west of Alexandria bridge at Spuzzum. Gordon Creek bridge, between Yale-Hope, washed out. A temporary bridge was put in place. Several slides were reported east of Alexandria bridge. In many cases it would be at least a week before the slides could be cleared. An "extensive" mudslide blocked the Trans-Canada Highway at Gladwin, 3 mi. (4.8 km) east of Lytton. On November 30, the Trans-Canada Highway was still closed "till further notice." Repairs were being made to the deck of the Alexandria bridge near Spuzzum. The work of widening the steel bridge crossing the Fraser River from Hope and Haig would take considerable time. Through traffic was not expected to be resumed until the middle of December.

Both national railways were hard hit by flood damage in the Fraser Canyon, bringing all trains west of Alberta to a standstill. CPR reported heaviest damage near North Bend where nearly 30 mi. (48 km) of track were damaged or partly washed out. A bridge at Yale was also washed out. CPR trains were temporarily rerouted over CNR lines as soon as these opened. CNR reported nine slides between Spences Bridge-Lytton, and five slides between Boston Bar-Hope. Two trestle bridges, including one 6 mi. (9.6 km) east of Hope washed out. According to railway officials, the flash flood damage in the canyon might amount to more total damage than was suffered during the Fraser River floods of 1948. *1) Canadian Pacific Airlines and Trans-Canada Airlines flew 483 CPR and CNR passengers, stranded for a day and a half by mountain slides at Kamloops and Penticton (Kettle Valley line), to Vancouver.

Worst flooding occurred at Squamish, then terminus of the PGE. In the vicinity of the PGE railway shops 2 mi. (3.2 km) north of the main community, 10-12 families had to be evacuated. At one stage the water was within 2 in. (5 cm) of the top of the dykes ringing the settlement. In Squamish itself, lower level homes were surrounded by water and basements flooded in the school area. The overflowing log-jammed Squamish and Mamquam rivers wiped out three bridges, including a 500-ft. (150 m) PGE railway bridge. The Mamquam River took out the centre span of the about 70 ft. (21 m) long highway bridge. About 500 yd. (450 m) downstream the river took out about 80 ft. (24 m) of the PGE bridge. The heavy tracks across the PGE Mamquam River bridge 3.5 mi. (5.6 km) north of Squamish wrecked on November 26 were twisted at right angles by the torrent. Some 300 homes were temporarily isolated by 7 ft. (2.1 m) of water, which flooded the valley. With two bridges out on the PGE railway, temporary ferry service was in effect. The Cariboo was virtually cut off from the Lower Mainland, except by air from Quesnel, where the airport could accommodate planes of CP Air.

BCER power officials had 26 separate line crews making repairs throughout the Fraser Valley. The break in the Hope transmission line from Chilliwack was restored shortly after midnight November 27. This 12,000-V line was damaged in an exposed spot east of Rosedale and many poles, some with transformers attached went down. *2) Crews of BC Telephone were working over the weekend repairing circuits and lines damaged by mudslides, or poles brought down by the wind. Logging camps throughout British Columbia temporarily closed their operations, putting some 45,000 loggers out of work.

New Westminster recorded 1.14 in. (29 mm) of rain overnight November 25-26 and continued to fall heavily all morning. The Fraser River level at Mission rose to 12 ft. At the North Shore mountains, near-record snowfalls occurred. Unofficial estimates from the weather bureau ranged from 7 in. (17.8 cm) to 9.2 in. (23.4 cm) at Seymour Creek. Damage also occurred on the flats in Matsqui, Sumas and in the Delta.

High winds and heavy rain continued to batter the British Columbia mainland. The rain front extended from Alaska to Oregon. Overnight November 30-December 1, the weather office at Vancouver reported gales

up to 50 mph (80 km/h). At least three deaths were attributed to the second storm. Basements flooded in Vancouver and other Lower Mainland districts.

On December 1, the Coquitlam River flooded two sections of Port Coquitlam up to 3 ft. (90 cm). About 40,000 sandbags totaling 2,000 tons of sand were used to dike the overflowing Capilano and Seymour Rivers. In North Vancouver some homes were isolated. Water flowed down the block-long Villa Vista Street. The Red Cross reported that 50 people were evacuated from their homes along Seymour Creek. A 24-year old man was swept to his death by the flooded Capilano River as he laid sandbags. A Sayward resident drowned in a raging creek up island.

The Church of Our Lady of Lourdes on Laval Square, Maillardville in the district of Coquitlam, lost 80 ft. (24 m) of its cement retaining wall on December 1. The wall separated the church and the schoolyard of the parish school about 10 ft. (3 m) above. The torrent of water that poured around the church did not damage the building, but flooded the corner market store across from the church.

On December 1, in New Westminster the Columbia Street retaining wall collapsed, as thousands of tons of earth, concrete and pavement plunged 80 ft. (24 m) onto Front Street. *3) Alice Everall, an eyewitness to the event, described it as, “‘like an earthquake.’ There was an awful roar and big flashes as the trees hit the electric wires.” The spectacular crash left a 200-ft. (60 m) gap along Columbia Street at Merrivale. Though engineers had warned that the wall might collapse at any time, it is believed heavy rains of the previous week weakened the structure. In anticipation of further cave-ins, all traffic on Columbia and Front streets was diverted. The debris pushed up the CNR tracks over those of the BCER.

On November 26 at 2:20 p.m., the “last thin thread of pavement” fell into the Capilano River. The 110-ft. (33 m) Bailey bridge across the Capilano River was swept away on December 1. The river dividing the suburban communities of North and West Vancouver threatened to isolate North Vancouver by road. Throughout the night of November 30-December 1, workmen piled ballast at the Capilano bridge, sole motor vehicle link between North-West Vancouver and scene of the washout on November 27. The banks of the Capilano River were sandbagged. The Capilano River had risen 10 ft. (3 m) overnight. Army engineers, 82 sappers of the 23rd Field Sqn. Royal Canadian engineers, constructed two Bailey bridges. A gravel road to connect them was built in the now widened riverbed. The army engineers had erected the Bailey bridge on November 27, replacing the other bridge across the Capilano River, which washed away. For the second time in five days, about 14,000 residents of West Vancouver were isolated by land from Vancouver city. *4)

On December 3, southeast gales continued accompanied by heavy rain. Freezing levels remained low, turning the rain into snow at higher elevations. At the headwaters of Capilano River and Seymour Creek, floodwaters caused heavy damage. Householders in North Vancouver suffered and estimated \$200,000 damage. An additional \$500,000 would be needed to repair roads and prevent a recurrence of future floods. With the colder weather, the Capilano River dropped 10 ft. (3 m) overnight December 1-2 while Seymour Creek also started dropping.

Food and fuel supplies were received by emergency ferry service. Four ferries carried residents across Burrard Inlet to work in Vancouver. On December 3, 50 army engineers and 100 tons of bridge building equipment arrived from Chilliwack. The army planned to span the Capilano River with a 300-ft. (90 m) double span Bailey bridge. The second bridge was completed on December 4.

On December 1, the water supply to some 25,000 residents of Pitt Meadows, Haney and Hammond was cut when the temporary water pipes on the bed of the Coquitlam River at the construction site of the new Lougheed Highway bridge went out. *5) The bridge was carrying the two new 18-in. (45.7 cm) pipes. Because of the break, a valve just west of Port Coquitlam, and on the pipeline that feeds Queens Park reservoir from Lake Coquitlam, had to be shut off. To provide water for the Maillardville, Fraser Mills, Essondale and Port Coquitlam areas, the system was reversed and water pumped from the Queens Park storage back out to Port Coquitlam. Service was restored on December 3, when a temporary pipe was slung across the Coquitlam River. A 50-men work gang from the Greater Vancouver Water Board worked around the clock to install the 0.5-mi. (800 m) long emergency steel pipe line.

During the water shortage, milk companies in the area reported a tripling of their normal business. As a result of flooded schools and roads in the east-end of the district at Coquitlam, hundreds of school children were home on December 2. In Port Coquitlam, the James Park High School and the school in the Agricultural Hall were closed. The front of the Essondale mental hospital was flooded with 10 in. (25 cm) of water, threatening the Red Bridge. On December 2, the Coquitlam River started to drop.

Overnight December 1-2, the west coast was cut off by land from the rest of Canada for several hours for the second time within a week. Heavy rain caused slides in the mountains. Slides and a bridge washout blocked the Trans-Canada Highway between Chilliwack-Hope over Gordon Creek. On December 1, slides and

flooding water east of Hope cut CNR tracks. Almost all telephone lines to the interior of British Columbia and the majority of lines to the mid-west and eastern Canada were out overnight December 1-2. On December 2, the Fraser River level at Mission reached 12 ft., for the second time in a week. The river rose to twice its normal height within eight hours, reaching 10.4 ft. overnight.

On December 3, traffic was banned on the Keith Street bridge over a branch of the Capilano River at West Vancouver. It was feared that the flood-weakened artery might collapse. Floodwaters interfered with the dyking board operations in the Pitt River zone. Two suction dredges had to cease pumping fill inside the dikes due to the floods in the fields. Both dredges continued work outside the dikes.

Victoria reported heavy rain with no day free of rain since November 21. In less than two weeks, 5.78 in. (146.8 mm) fell. On both November 26 and December 1, 1.48 in. (37.6 mm) of rain was recorded in 24 hours.

On December 2 at Cowichan Lake, floodwaters endangered the homes of at least eight families. Several of the families were evacuated. The heavy rain and swollen rivers damaged roads and highways. On December 2, the Honeymoon Bay across the Robson (Robertson) River washed away (*The Daily Colonist*, December 29, 1949). Late on December 2, waters started to recede.

The Nanaimo River went on the rampage for several days. Farmers along the riverbank and near its mouth suffered severe damage. The river, which had risen abnormally during the afternoon of December 2, started to drop in the evening. With cooler weather, the serious threat of more flood damage in the Cedar district was averted. In Nanaimo, floodwaters were worse than on November 27-28. The additional rain that fell in 24 hours on November 30-December 1, caused the Nanaimo River to go on the rampage again. Nanaimo Lake rose to 18 ft. (5.4 m) above normal level. The ramp at the log dump, usually 14 ft. (4.2 m) above water level, was covered with 4 ft. (1.2 m) of water. Howard Avenue was flooded adjacent to the cemetery. Terminal Avenue, formerly the Ravine, was inundated both sides of the roadway. Main Road was described as "a succession of water-filled potholes." The road to the pulp mill was flooded in some spots. When San Salvador autocourt at the Nanaimo River main bridge, Cedar district was threatened, residents prepared to evacuate. Near Parksville, Englishman River flooded its bank, isolating three homes at the mouth. The river would flood twice more during the coming month. (*The Daily Colonist*, December 29, 1949).

On December 2, torrential rains for 24 hours caused havoc to communication and transportation links east of Vancouver. Rockslides blocked highways and telephone and telegraph lines were swept away. CPR and CNR trains were running late, using each others lines to get around blocked tracks east of Hope. A slide at Flood blocked the southern Trans-Canada Highway. A few miles east of Hope, the Fraser Canyon highway was closed after a bridge over Gordon Creek went out.

*1) In the 1948 flood the tie-up was longer, but was confined to limited areas in the lower Fraser Valley. According to Finance Minister Herbert Anscomb in his budget speech to the Legislature on March 13, 1951, the total flood damage for 1949 amounted to \$7,355,759. The Dominion Government paid \$4,024,185 of this. In contrast, flood damage in 1950 amounted to \$253,543 (*Times*, March 13, 1951).

*2) BCER had installed this line only a few months previous when the company took over from the B.C. Power Commission which had operated a diesel plant and was planning a hydro station on Silver Creek (*The British Columbian*, November 28, 1949).

*3) During the original construction the wall slipped outward a few inches but held steady for nearly 20 years. The settling movement increased in later years. In 1947, it was estimated the wall at the worst part had tilted a total of 2 ft. (60 cm) or more from its original position. In 1948, the wall moved another foot (30 cm). Holes dug near the foot revealed that an old ravine and watercourse and a stratum of quick sand contributed to the outward movement (*The British Columbian*, December 1, 1949).

*4) On December 22 at 8:45 a.m., after 25 days, 18 hours and 25 minutes, a new 180-ft. (54 m) span Capilano bridge opened.

*5) The construction of grades to the new bridge crossing the river on the Lougheed Highway aggravated the flood danger. Continued representation by Mayor C.S. Davies to the department of works, the dyking commission and the federal government culminated in an agreement by the provincial government department of works to deepen the channel of the Coquitlam River as soon as conditions permitted (*The British Columbian*, January 30, 1950).

December 25-29, 1949

(Rain-on-snow and tidal flooding).

Discharge (m³/s): Max. daily: December 29: Sooke: 58.0; max. instant.: N/A.

Source: *The Daily News*, December 28, 29 and 30, 1949; *Victoria Daily Times*, December 29, 1949; *The Daily Colonist*, December 28, 29 and 30, 1949; September 16, 1952; Environment Canada 1991.

Details: On December 25, heavy rain and warm temperatures caused floods, power failures, cave-ins and slides. British Columbia reeled from the “most freakish weather experienced in 20 years.” Vancouver and coastal areas “were pounded” by a 15-hour rainfall. At Sumas Prairie, floodwaters covered acres of farmland and surrounded buildings. Because of shallow frost in the ground, complete washouts were feared. Rains caused power failures in Chilliwack and the Fraser Valley. Agassiz and Hope were blacked out for hours. Regular CPA flights to and from Vancouver were cancelled on December 28 due to “inclement” weather along the southern British Columbia coast. Winds hit 51 mph (81.6 km/h) in Vancouver and snapped the city’s 65-ft. (19.5 m) Christmas tree in Victory Square.

Rain brought a flood threat to Vancouver Island and hundreds of basements were flooded in Victoria. Between 2 a.m. on December 26-4:30 a.m. on December 29, the Gonzales Meteorological Observatory recorded 3.38 in. (85.9 mm) of rain. On December 27, Victoria and Vancouver recorded 1.96 in. (49.8 mm) and 1.04 in. (26.4 mm), respectively. Bowker Creek flooded its banks adjacent to Doncaster Street. *1) Floodwater virtually isolated Sooke. On December 28, floodwaters inundated Dewdney Flats on the Sooke highway. A debris-clogged culvert tied up traffic on Kangaroo Road. On December 28, the Sooke Road was closed due to flooding. Though it reopened to traffic the next day, the highway would have to be built up at Dewdney Flats, as it appeared to be sinking in the soft water-soaked ground.

Saanich was the hardest hit of Victoria’s suburbs. On the afternoon of December 28, Marigold Road was flooded for 200-300 ft. (60-90 m) and washouts made Blenkinsop Road impassable. Houses, including No. 4039 on Blenkinsop Road were surrounded by water. A 0.5-mi. (800 m) section of Interurban Road was flooded. In Saanich, the intersection of Quadra/McKenzie Ave. was flooded. Near Saanich, roads being reconstructed had to be closed due to washouts and deep water. In preparation of being surfaced next spring, they had been built up and graveled. Now considerable work would have to be done on them before surfacing could be carried out. Bilston Creek floodwaters threatened homes on Happy Valley Road 3 mi. (4.8 km) past Luxton in low-lying areas of Happy Valley.

Areas hardest hit with flooding and washouts were Westholme, 10 mi. (16 km) north of Duncan and Lake Cowichan. A Duncan taxi was completely submerged by floodwaters on the Cowichan Bay Road. The driver waded chest-deep for help. The three passengers were rescued of the roof of the cab by boat.

At midnight, the Cowichan River had backed up in high tides. The river rose to 5 ft. (1.5 m) near the Tall Timber Service Station at Koksilah. The Island Highway near Westholme was under water for over a mile (1.6 km) after Chemainus River overflowed its banks. In the Westholme district, dozens of homes were surrounded by water. Flooding and washouts damaged sections of the Island Highway under construction. Freezing temperatures could do additional damage. At Westholme, huge cracks were reported in the highway and sides of the road were breaking away in places late on December 29. Approaches to small bridges in the area were also reported to be undermined.

Between Victoria-Chemainus, hundreds of acres of low-lying pasture land were inundated. In some sections, five-foot (1.5 m) fence posts were nearly submerged. Between Duncan-Chemainus, a car plunged into deep water off the side of the Island Highway where the road had broken away by floodwaters. Early on December 29, the Koksilah River spread approximately 4 ft. (1.2 m) of water over the lower areas around Duncan. By late afternoon, it was down to “a wading depth.” Near Parksville, three homes were still reported isolated late on December 29 as the Englishman River started to drop slowly due to colder temperatures. The river had risen more than 5 ft. (1.5 m) since December 28.

At the entrance of Goldstream Park, the Island Highway water was flooded over a wide area. The south side of the Malahat Drive, where construction crews were widening and straightening the road, was in bad condition. On the Island Highway, a sudden flood undermined and washed out the Holland Creek culvert 1 mi. (1.6 km) south of Ladysmith. One side of the road collapsed over a distance of 30 ft. (9 m), allowing for one lane traffic only. Early on December 29, a logjam threatened the Bush Creek bridge, 2 mi. (3.2 km) north of Ladysmith. Floodwaters covered the highway with 4 in. (10 cm) of water.

In some stretches of the Lake Cowichan Road, water was reported to be 5 ft. (1.5 m) deep. Floodwaters threatened the Honeymoon Bay bridge on the South Shore Road, linking Cowichan Village with Honeymoon Bay. This new bridge across the Robson (Robertson) River was built after the original span was

washed out in the disastrous December 2 floods. On the road to Youbou, another bridge was almost under water.

In Qualicum Beach, where 2 in. (50 mm) of rain fell, a cave-in of an embankment sent down tons of earth and rock. The debris crashed down on an unoccupied summer cottage, which was pushed more than 40 ft. (12 m). It ended up a few feet from the Island Highway with earth and rock piled high around it. Near the cave-in, another cottage was threatened. North of Duncan, the Island Highway was flooded with 3 ft. (90 cm) of water.

The Alberni highway was blocked at Cameron Lake by a rock- and debris slide that came down onto the road overnight December 28-29.

Overnight December 25-26 at Summerland on Okanagan Lake, the snow level dropped 1.5 ft. (45 cm) in 10 hours. In Kelowna, streets were flooded as 3-ft. (90 cm) snowdrifts melted.

On December 26-27, a heavy snowfall hit southern British Columbia, averaging 1.5-2 ft. (45-60 cm) in the southern Interior and a maximum depth of 3-ft. (90 cm) in Princeton and Kelowna. On December 28, all roads and railways leading into Vancouver were blocked by heavy snow. Telephone and telegraph communications were also seriously hampered. A damaging "silver thaw" was feared as hundreds of poles came down by ice-heavy wires or frost-snapped tress coming down on the lines. Chilliwack was without power and lines were also down at Agassiz and Harrison.

The record snowfall sealed the mountain passes in the Interior. An estimated 2,800 Christmas train travelers of 14 passenger trains of both railways were either stalled or delayed. Some passengers were delayed up to 40 hours. Slides left Hope isolated and also blocked the "\$12-million Hope to Princeton Highway." Between Hope-Princeton, "scores" of motorists of seven buses and 150 cars were reported marooned. Princeton, which recorded 30 in. (75 cm) of snow in 24 hours, was "packed with travelers." West of Hope, the Trans-Canada Highway was impassable. A slide blocking the Trans-Canada Highway between Chilliwack-Hope was cleared on December 28. A slide blocking the CPR line at Revelstoke was cleared later.

With colder temperatures early on December 29, the flood conditions on the southern end of Vancouver Island and the Lower Mainland abated.

*1) On September 15, 1952, members of the Greater Victoria School Board agreed to ask the Corporation of the District of Oak Bay to enclose the "troubled waters" of Bowker Creek where it passes the Oak Bay Junior and Oak Bay Senior High School grounds. The board members said that a whole new playing ground behind the schools would be available if Bowker Creek was run through piping along the area in question. Eventually the whole creek would have to be enclosed in a major project in which Saanich, Victoria and Oak Bay would be involved. (*The Daily Colonist*, September 16, 1952).