

January 11-14, 1950

Source: *The Daily News*, January 12 and 14, 1950; *National Post*, January 6, 2005; Stethem and Schaerer 1980.

Details: Early January, a combination of an “Arctic Express,” a mass of unusually cold air from Alaska and a “Pineapple Express,” a series of warm, extremely wet storms hit the Pacific coast from British Columbia to California. That month, 53 cm of snow hit Seattle, killing 13 people in an extended freeze (*National Post*, January 6, 2005).

Overnight January 11-12, 2.5-8 in. (6.3-20 cm) of snow that fell in the Lower Mainland snarled transportation and communication along the southern coast of British Columbia. Heavy drifts delayed railway traffic. During a three-week period in January, severe storms caused three highway closures in the Fraser Canyon.

Overnight January 11-12, the lower Mainland was hit by another snowstorm. Along the extreme southern coast, a series of minor disturbances forming on the south coast of Vancouver Island brought considerable snowfall. During the night, the Vancouver International Airport recorded 5.5 in. (13.8 cm) and North and West Vancouver 14 in. (36.4 cm) of snow. Transportation and communication along the southern coast of British Columbia were threatened, while heavy drifts were delaying train traffic (*The Daily News*, January 12, 1950).

Between January 1-13, Hope recorded 25 in. (100 cm) of snow. For the winter 1949-50 till January 11 at 10 p.m., a total of 81.5 in. (203.75 cm) had fallen here. Students from Spuzzum were unable to attend classes in Hope for several days until the road to Spuzzum was cleared.

On January 14, snowdrifts up to 15 ft. (4.5 m) deep blocked roads in the Fraser Valley and as much as 6,000 ft. (1,800 m) long. In Camp Chilliwack, 500 members of the Royal Canadian Engineers were marooned and had only food for one day left. The Royal Canadian Air Force planned airlifts to replenish their supplies (*The Daily News*, January 14, 1950).

On January 14, a rock and snow avalanche 13 km south of Boston Bar struck a Canadian National Railway (CNR) snowplow. The crew had parked the plow and returned north with the engine to pick up some other equipment, leaving the foreman with the plow. The plow was carried part way down the embankment towards the river. The foreman, whose body was never found, was presumably swept into the river. The cause of the avalanche was attributed to rain, which weakened the snow at the canyon walls (Stethem and Schaerer 1980).

January 23, 1950

Source: *The Daily News*, January 26, 1950; *The Cariboo Observer*, January 26, 1950.

Details: On January 23 at about 4:30 a.m., a northbound PGE freight train derailed after hitting a rock slide about 0.5 mi. (800 m) south of Craig Lodge, on the outskirts of Lillooet. The locomotive plunged into Seton Lake, carrying engineer Alex Munro and fireman Harry Seymour to their death. The water at the point below where they left the right-of-way was so deep, that no trace of the locomotive, or its occupants was found. A freight car containing a shipment of fuel oil also fell into the lake. Regular traffic on the line was suspended for two days.

February 5-8, 1950

Source: *Bridge River-Lillooet News*, February 6, 9, 16 and 23, 1950; *The Cariboo Observer*, February 23, 1950.

Details: On February 5, the snowfall was general over Vancouver Island. Duncan recorded 18 in. (45 cm) of snow. At the appeal of Duncan's mayor, the citizens worked from 9 a.m.-6 p.m. clearing sidewalks and streets.

Heavy rain and wet snow caused snowslides in the Fraser Valley interrupting traffic on both rail lines. Near Yale, a snowslide engulfed a CPR passenger train. Seven rail cars were buried. The 37 passengers escaped unharmed. Snow slides near Yale stopped CNR mainline railway traffic for two weeks.

Around the second week of February, snowslides closed the PGE rail line. Service was interrupted for little over one week. The slides also cut the communication lines in several places. The tie-ups forced cancellation of most of the PGE service during the first three weeks in February. Most of the slides came down near Lillooet, with “particularly bad ones” at Seton and Anderson lakes.

February 27, 1950

Source: *The Daily News*, February 27; March 3, 1950.

Details: On February 27, tons of rain-loosened mud and rock killed a 42-year old Native Indian woman of American Bar. The slide narrowly missed three other members of her family. It ripped out nearly 400 ft. (120 m) of CNR track, delaying railway traffic in and out of Vancouver. *1)

*1) Till February 27, Vancouver reported a record 8.07 in. (205 mm) of rain breaking the previous record of 7.28 in. (184.9 mm) set in February 1948.

June 16-21, 1950

(Spring runoff/flooding).

Source: *The Chilliwack Progress*, June 21 and 28, November 20, December 6, 1950; *The Vancouver Sun*, June 16, 1972; Environment Canada 1991.

Details: On June 20, the Fraser River at Hope recorded maximum instantaneous and daily discharges of 12,600 and 12,500 m³/s, respectively (Environment Canada 1991). On June 20, the river crested at the Mission gauge at 24.19 ft. This is the third highest reading in recorded history. Next morning, it was down slightly to 24.12 ft. and on June 22 it dropped further to 23.98 ft. On June 21, the Fraser River crested at the Minto Landing gauge at 21.95 ft. *1)

On June 16, the Agassiz ferry was tied up due to high water in the Fraser River. At Rosedale, debris was building up against the bridge near the ferry approach. In the morning of June 17, Herrling Island in the Cheam View district was evacuated. Eighteen people with their cattle and livestock were moved to higher ground on the south bank. On June 17-18, crews cleared a debris jam from centre span of the Vedder River bridge. Seepage occurred at several points along the dike on the east bank of Vedder Canal. On June 17 around noon, nine families and their cattle were evacuated from outside the Agassiz dike. Army engineers did a major repair job on the bridge crossing the Hope River north of the junction of the Big Ditch and the Trans-Canada Highway. On the morning of June 18 at the rear of the new Vedder Canal bridge, loose sand that had been moved to the rear of the concrete pier gave way. A dike patrolman who was pinned against the wire escaped without injury. Overnight June 18-19, Bowman Mill’s private road dike cracked north and west of the mill. Greendale and Atchelitz residents worked on repairing the dike till 3 a.m. on June 19. Later that day, the mill closed down. The privately owned dike, sweeping out in an extended “U” from the Cannor dyke at Cannor Road, was built following the 1948 flood to protect the O. Bowman & Sons mill. It was not expected to hold beyond the river reaching the 22 ft.- (6.6 m) level.

On June 20, mill workers and volunteers were still holding the dike when the river was well above 24 ft. (7.2 m). On June 20 on the Moulina farm at Harrison Mills, the floodgate burst under pressure, cutting a hole in the base of the Fraser River dike. In an eight-hour battle, the hole was plugged with tons of earth and rocks. On the afternoon of June 20, workmen started digging a ditch through the Sharon Mennonite Collegiate Institute grounds to drain seepage and some Vedder River overflow into Stewart Creek, which provides natural drainage to the Yarrow area. The CNR was strengthening its roadbed with tons of rock. The water between the dike and the roadbed was higher than outside the roadbed causing seepage to occur at two points.

Overnight June 20-21, floodwaters on the Fraser River caused seepage along the Chilliwack dike near the Hope Slough. Some 25 men working in three shifts kept boils along the Greendale dike under control. The Bowman Sawmill dike was softening continually under the pressure of the water. The CNR line along the Cannor dyke was patrolled constantly. Overnight, water levels in the Vedder

River reached 24.35 ft. In the Chilliwack area, most undyked land was under water and extensive seepage took place behind the levees. After flooding occurred at the foot of DeWolfe Ave., poultry and cattle had to be moved. Outside the Young Road dike, homes and the abattoir were flooded with several feet of water. Though the Fraser River was only inches below the 1948 peak, water alongside local dikes was still about 1-1.5 ft. (30-45 cm) below levels established in 1948. All homes and properties outside the dike flooded in 1948, flooded again after water came in through the Jones' property at the north end of Jespersen Road. At the foot of Young Road, water spilled into Hope River. The Vedder River overflowed its banks, covering close to 100 ac. (40 ha) of farm- and bushland and forcing six families from their homes. On Brown and Wilson roads, two arteries leading north from Vedder Crossing to Yarrow Highway, 200 yd. (180 m) were impassable by fast running water spreading over adjacent land.

On June 21 in the Chilliwack and Kent municipalities, flood emergency bylaws became effective, giving the city and township authorities wide powers to commandeer men and equipment in the event of a crisis. On the urging of local authorities, the Cannor dyke 0.25 mi. (400 m) west of the 1948 break was strengthened. The Dyking Commission lengthened the toe of the dike and raised it by 2 ft. (60 cm) to enclose water seeping through the dike. The secondary levee was constructed to counter the pressure inside the big Cannor dyke. Three-foot (90 cm) high sandbag rings around the boils were constructed to build up counter pressure of water, which eventually eliminates the boil. *2)

On June 21, pumps used during the Red River flood near Winnipeg, Man., were rushed to Agassiz-Harrison. At Harrison Bay, a collapsed culvert threatened to cut Agassiz's rail and road communications with other north-shore communities. The secondary dike near Frank Appel's farm was extended and raised. Sappers of the 123rd Sqn. RCE from RCSME, recently returned from the Red River flood, worked on the trouble spot on the straight east-west section of the dike at the Appel farm. Harrison Lake logging camps were closed due to flooding of the unloading and workshop facilities. Residents unprotected from the high waters of Harrison Lake were evacuated. The old Chehalis River trestle bridge on Morris Valley Road on the Harrison Bay area, which washed out, was later replaced by a truss span erected on concrete piers and abutments. At Harrison Hot Springs, parts of the town were under 3 ft. (90 cm) of water. The Post Office was flooded and abandoned. The bridge into town was sandbagged and weighted down with rocks. Lakefront cabins sat in 3 ft. (90 cm) of water. Fairfield Island road flooded and was impassable. Wells Road bridge and McSween Road at the old golf course were under water. Kitchen Road from Fairfield School and part of Hope River Road was flooded from the second bridge to the third bridge and at Fairfield Hall. Ballam Road was completely under water and Ferry Road at Rosedale was out. Dayton Bridge at the end of Camp Slough Road was under 3 ft. (90 cm) of water and Williams Road bridge was closed to foot traffic. On Ferry Road, a secondary dike was built in an adjacent field in an effort to contain seepage water. The dike at Ferry Road, which was flooded, was raised. On June 19, a big hole carved in the road cut off milk trucks. The Hope Slough backed up causing damage for 7-8 mi. (11.2-12.8 km) east of Chilliwack.

During the 1950 Fraser River flood, some 100-150 homes in undyked land were damaged by water, including half a dozen on lands in the Chilliwack district. The cost of fighting the flood was estimated at \$12,000/day for men and equipment. On June 26, the flood emergency bylaw was repealed in Chilliwack. *3)

*1) The danger level is considered reached when the Fraser River reaches 18 and 20 ft. at the gauges at Minto Landing and Mission, respectively.

*2) Boils are characterised by water bubbling up behind a dike, indicating dangerous undercutting. A "dirty" boil, with cloudy and muddy water, indicates rapid erosion. "Clean" boils with clear water are considered less dangerous (*The Vancouver Sun*, June 16, 1972).

*3) Local residents lobbied for the construction of a wingdam from Young Road north to Barritt Island. This would shut off one slough mouth and lower the Hope River's entry to the Fraser River to a level 30 in. (75 cm) below the Fraser River level at Minto Landing. According to spokesman Arthur D. Rundle who suffered damage during the previous 10 days, it would not be costly and would also protect property, which was now open, including Indian Land. Another possible solution would be to install a gate and pumps at the Hope River mouth. The Vedder River should be diverted at the bridge to stave off the danger of washing out the rock abutment and consequent flooding. At the municipal ratepayer's meeting member of the Cultus Lake park board A.E.J. Farrow, said that the Vedder River should be channeled so that it would flow parallel to the rock abutment. At the time, the river, which had not had a real freshet in years, had its current running directly towards it. To contain the Vedder River between Vedder Crossing and the end of the dike near Yarrow, where two farms were lost to the river since 1948, a plan would have to be developed. It was feared that others might go if no action was taken in the form of dyking and riverbank protection.

October 7-8, 1950

Source: *The British Columbian*, October 10, 1950; *The Daily News*, October 10, 1950; *The Vancouver Sun*, October 11, 1950; *The Squamish Advance*, October 12, 1950.

Details: On October 7, heavy rain raised the Squamish River level by 1 ft. (30 cm) an hour. By 5:30 p.m., the gauge at Nunley's reached 31 ft. By 8:30 p.m. the river had risen to 33.2 ft. and was starting to flood the road above Meehan's and rising steadily. By 10:30 p.m., floodwaters were pouring into Carl Leski's and the Squamish River was "well over its banks." At the peak of the flood, the water reached 35.7 ft., almost 1 ft. (30 cm) higher than the previous year's 34.8 ft. The Leski's evacuated as the water rose to over the fence posts in front of their place. Approximately 50 ft. (15 m) of bank at the J.P. Meehan's place fell into the river, including the barn.

Late on October 7, flash floods hit the Shop area of the Squamish Valley. Road and railway crews worked all night clearing logs and debris away from the bridges. On October 8 by 8 a.m., the Mamquam River crested and started to recede. At that time, the Squamish River was still rising and areas around the PGE shop were covered with about 10 ft. (3 m) of water. Although both bridges were still holding, the Mamquam bridge had a "decided curve" and floating logs had torn the decking and railings. Near the little bridge at Meehan's, an approximately 1-ft. deep had been cut in the side of the road. The approach to the bridge at Meehan's washed out. On October 9, several families were evacuated from homes near Squamish after torrential rains swelled the Mamquam River. Early on October 8, water came in around Dentville, forcing residents of several houses to evacuate. Only one house in the area was flooded with a few inches of water. A tree falling across the wires cut power and phone service to Brackendale.

The high tide at 3:30 p.m. backed up the water from the swollen river of several of the outlying areas but did not affect the town itself. As the tide receded, the rivers gradually went down and by early next day they were well inside their banks.

On October 8, a slide blocked PGE rail tracks at Mile 18 in the Cheakamus Canyon. After "tunneling" through the 25-ft. (7.5 m) deep slide, new slides came down at Mile 19. Though rail service was scheduled to resume on the afternoon of October 10, the rail line was still blocked by additional slides in the Cheakamus Canyon.

In the 24 hours ending 8 a.m. on October 10, Vancouver set an all-time rainfall record of 2.51 in. (62.8 mm). In the first nine days of October, a total of 6.71 in. (170.4 mm) was recorded. Several homes had flooded basements and some flooding occurred at the B.C. Penitentiary.

Overnight October 9-10, cars had to be detoured after floodwaters threatened a small bridge over Mosquito Creek. On October 10, Seymour Creek was subsiding after going on a rampage overnight. The RCMP reported "a little damage" to roads and some property. The heavy rain in early October prevented the harvest of Fraser Valley potatoes with 75% of the crop still in the ground.

December 1950

Source: *The Chilliwack Progress*, February 14, 1951.

Details: In December, the Vedder River caused damage after it rose in a flash flood. George Peter Derksen was forced from his home just east of the BCER when floodwaters from the Vedder River swept over the bank and quickly surrounded his house and outbuildings.

January 20-25, 1951

(Rain-on-snow and tidal flooding).

Discharge (m³/s): Max. daily: January 25: Nan.: 481E; Sooke: 35.4; max. instant.: N/A.

Source: *The Nanaimo Free Press*, January 25, 26 and 27, 1951; *The British Columbian*, January 20, 25 and 26, 1951; Sanford 1978 (p. 233); Environment Canada 1991; Eisbacher and Clague 1981.

Details: A rainstorm with a maximum daily precipitation of 41 mm, a two-day maximum of 64 mm or 128 mm for the storm total in the downtown Vancouver area, caused landslides in the Vancouver region (Eisbacher and Clague 1981). A flow of unusually warm air from the south and southwest caused the abnormal high rainfall. The heavy rain melted snow at the higher mountain levels. On the west coast of Vancouver Island more than 3 in (75 mm) fell. Almost 3 in. (76.2 mm) fell over a 24-hour period. Hope reported 2.75 in. (69.9 mm) of rain in 24 hours. Snowfall at Revelstoke totaled 31.5 in. (80 cm) in 24 hours up to 6 a.m. on January 25.

At Hatzic Prairie, flooding creeks carried away three bridges. Damage was estimated at \$20,000. In Haney, 12 families were marooned by the flooding of the North Alouette River. Roads leading into the Yannadon district, about 30 mi. (48 km) east of Vancouver, were under 6 ft. (1.8 m) of water. The water came through the holes caused by the previous spring's Fraser River flood.

On the afternoon of January 25, the Alberni highway was temporarily closed due to a rockslide and washout. The slide was at Angel Rock near Cameron Lake and the washout at the east side of Dog Creek. Later another slide closed the highway for two hours.

A combination of continuous heavy rain for four days, melting snow and high water tides, backed up water in the Chemainus, Koksilah and Cowichan rivers. Low-lying areas at their mouths were flooded, peaking late on January 25. At the Tyup terminal, southeast of Duncan CNR crews were kept busy moving their locomotives and cabooses in the yard every time the tide rose. On January 25, Native Indian settlements at Cowichan Bay, Chemainus, Crofton, Westholme and Somenos were seriously threatened. On the Duncan to Cowichan highway, Tall Timber Service Station suffered severe damage when the Koksilah River flooded. This highway was closed to traffic when it was covered with some 3 ft. (90 cm) of water. On January 25 at Chemainus, one of the seven bridges was temporarily afloat. Near Ladysmith, Holland Creek threatened to flood. At Shawnigan Lake, Shawnaire Resort sustained flood damage and other properties were flooded. The bridge over Shawnigan Creek slowed down the water flow. According to Alan Cameron, the lake was about 2 ft. (60 cm) higher than he had ever seen it.

Heavy rain on January 25 caused three mudslides on the Great Northern Railway tracks near Crescent (Beach) and White Rock, tying up the rail service for 24 hours. At some points mudslides were more than 4 ft. (1.2 m) deep. In Surrey at Halls Prairie and at Fry's Corner, low fields were flooded. Near Flood, a rockslide blocked the Trans-Canada Highway. It was expected to take 24 hours to clear the thousands of tons of rock and mud across the road. The slide at Flood also took out most of the B.C. Telephone and CNR telegraph lines. On January 26, the Trans-Canada Highway to Hope was re-opened but the Fraser Canyon highway was still closed. According to CNR officials, the track had been cleared at that point but on January 26 CNR gangs were still busy clearing the tracks at Flood. CNR trains were re-routed over CPR tracks and were running four hours late. Trains were arriving into Vancouver about six hours late. The Lougheed Highway between Deroche-Harrison Mills was closed due to a bridge washout.

About 10 mi. (16 km) south of Hell's Gate, floodwaters smashed a flume across the track, taking out some 40 ft. (12 m) of steel. A CPR official reported several minor slides in the Fraser Canyon. Another slide near Yale was cleared by 7 a.m. A slide in the Coquihalla Pass cut the CPR

Kettle Valley line. Trains were rerouted through the Fraser Valley and then south through Merritt. On January 25, the Fraser River washed out 40 ft. (12 m) of the CNR line, 19 mi. (30.4 km) west of Boston Bar. Work crews, using pile drivers to fill the 30 ft. (9 m) deep hole, were hampered by small slides coming down the Fraser Canyon. CPR, which was handling double its normal number of trains, was having snow troubles at Coquihalla between Hope-Princeton. Trains were switched to an alternate route to by-pass the snow slide area. On January 25, a massive snowslide destroyed the centre section of a snowshed near Iago. (Sanford 1978).

When the four days of rain were followed by cold weather, the problems changed to snow slides, blizzards and icy highways. Revelstoke reported 4 ft. (1.2 m) of snow in 48 hours. The telegraph line along the PGE was knocked out at Lillooet. On January 27, the PGE rail line from Squamish to Quesnel was blocked by slides and drifting snow. Snow slides blocked the line in a number of places. Traffic was not expected to be resumed until January 29.

January 29-31, 1951

(Ice jam/flooding).

Source: *Nanaimo Free Press*, January 29, 30 and 31, 1951.

Details: Early January 29, an ice jam backed up the Tulameen River near Princeton, 183 mi. (292.8 km) east of Vancouver. In two days of sudden sub-zero degree F weather, the shallow water of the Tulameen River froze solid. In the low-lying area at the confluence with the Similkameen River water backed up, flooding some houses with up to 4 ft. (1.2 m) of water. Some 40 families were evacuated from their flooded homes in -27° F (-32.8° C) weather.

On January 30, more flooding occurred at the Allison townsite upstream from where 200 residents had been evacuated earlier. As the 15-ft. (4.5 m) high jam was holding, temperatures dropped to -20° F (-28.9° C) at midnight for the fourth consecutive night. The flooding upstream relieved some of the flooding in the downtown “V” district where the Tulameen joins the Similkameen.

On the evening of January 29, floodwaters dropped 13 in. (32.5 cm) in 1.5 hours. Following a natural breakthrough of the ice jam, the water finally receded on January 31. The extensive damage caused by the “worst flood in years” was much higher than the earlier estimate of \$10,000.

February 7-11, 1951

(“The Great Flood of February 1951”).

Discharge (m³): Max. daily: February 11: Cowich.: 179; max. instant.: February 11; Cowich.: 182.

Source: *The British Columbian*, February 10, 1951; *The Daily News*, February 10 and 12, 1951; *The Vancouver Sun*, February 12, 1951; *The Chilliwack Progress*, February 14 and 21, 1951; Environment Canada 1991; Phillips 2005.

Details: Between February 7-11, an unprecedented four-day downpour, 12 in. (over 300 mm) of rain in places, followed by 15 cm of snow, inundated parts of the Fraser Valley, forcing hundreds to flee. Freezing weather late on February 10 saved the damage toll from becoming greater. Chilliwack was hardest hit with a metre of water threatening the water supply. Schools closed and mudslides and washouts severed roads and rail lines (Phillips 2005).

According to *The Chilliwack Progress*, the storm produced the “heaviest rains ever recorded in the district.” Chilliwack recorded an all time record of 6.07 in. (154.2 mm) of rain in three days. During the same period, Abbotsford and Hope recorded 7.49 in. (190.2 mm) and 7 in. (177.8 mm, respectively of which 3.99 in. (101.3 mm) and 4.6 in. (116.8 mm) fell on February 9 alone. Vancouver received 3.06 in. (77.7 mm). In the 15-hour period ending 7:30 a.m. on February 10, Chilliwack recorded 3.22 in. (81.8 mm) of rain, or 4.55 in. (115.6 mm) in 24 hours. The rain was not only heavy but also of long duration: in the five-day period ending on the morning of February 11, a total of 12.89 in. (327.4 mm) had fallen, 11.29 in. (286.8 mm) of which in a 72-hour period alone (*The Chilliwack Progress*, February 14, 1951).

Gangs of men and machines battled their way up the ice-locked Fraser Valley, cleaning up after the wild weekend flood that caused four deaths, drove hundreds from their homes and cut rail connections and the Trans-Canada Highway. CNR airlifted passengers from Kamloops and Edmonton, and CP Air flew passengers between Kamloops, Penticton and Vancouver. Three trainloads of passengers were marooned at Hope. Because the Trans-Canada Highway was blocked by slides, they could not be brought out by bus. With more evacuees expected, 54 residents were temporarily housed in RCAF buildings at the Abbotsford airport. Schools were closed in Agassiz, Chilliwack and four of Abbotsford's districts. Slides cut all road communications with Agassiz.

The general consensus was that a far greater area was covered than in the disastrous flood of 1948. In Greendale, the same houses flooded in 1948 were again standing in several feet of water, though the water was not as deep. On February 10, parts of east Chilliwack and Sumas looked like a huge lake. Flooding became so general that well over a foot of water covered sewer manholes. On February 9 and 10, parts of the sewage system were inoperative with sewage backing up into some homes.

By February 11, approximately 40% of the Fraser Valley was inundated. Evan S. Jones, Deputy Minister of Public Works stated that the flood conditions were "nearly as bad as in 1948." But as the flooding was shallow, compared to the great river's flooding two and a half years earlier, this surface flooding was considered more a bother than dangerous. Though the water covered almost as much ground, it would quickly drain and the Fraser River was not pushing against the dikes. The Fraser River itself was high but did not threaten the dikes. However, Chilliwack and Sumas Prairie areas, which escaped flooding completely in 1948, were hit this time. Frozen ground was a major contributor to the flooding. Main highways in the upper Fraser Valley were blocked and bridges damaged as a result of two days of the torrential rains.

The Vedder River rose to its most dangerous level since 1948. Dike patrols started and cattle was moved to higher ground. For the second time in two months, George Peter Derksen was forced from his home just east of the BCER when floodwaters from the Vedder River swept over the bank and quickly surrounded his house and outbuildings to a depth of 7 ft. (2.1 m). Cribbing on the Vedder Road immediately west of the Vedder Crossing went out. At the foot of the big hill, "a great deal of water" covered the road. A stream near the hatchery undermined a large section of the highway. A torrent that carried logs and boulders into Sweitzer Creek, the outlet of Cultus Lake, tore away at the foundations of the traffic bridge and cut the approach on the north end. On the late afternoon on February 11, the road link was cut. The rampaging tributary to Sweitzer Creek also washed out the road to cottages on the northwest side of the lake. The Park Boathouse was flooded and it was impossible to cross the footbridge connecting the two sides of the lake. On the morning of February 10, a large rockslide occurred at first point. The slide caused a "tidal wave" that swept down the lake to the cottages. The deluge swept the beach clean.

In some parts of the valley the torrential rains were followed by a 6-in. (15 cm) snowfall. Chilliwack, a city of 7,000, was inundated to a depth of 5 ft. (1.5 m). On Victoria Avenue, floodwaters inundated a number of houses. Farmers in western Chilliwack moved livestock to higher ground. In the Greendale area of Chilliwack homes were flooded. On the night of February 9, the water came up suddenly after the pumps at McGillivray Creek were shut down to prevent their motors from flooding. Lyal Blow and family had to vacate their home at 783 Trans-Canada Highway west, only a few hundred yards from the Vedder Canal bridge, in one of the lowest parts of the municipality. Within a matter of hours, the water level rose over an area of between 250-300 ac. (100-120 ha). The water level of the Vedder Canal rose above the gates, stopping the gravity outflow. Behind the dyke, the water built up at a greater rate than it could be poured into the canal by the pumps.

Greendale's 1948 flood evacuation committee rescued 24 families totaling 125 people and 230 head of livestock from the flooded areas of Keith-Wilson, South Sumas and Chadsey roads. Because of the swift rise of the floodwaters, some livestock had to be left behind. An estimated 50-

60 left their homes in Chilliwack and the area east of Young Road south. On February 10, rising waters forced the evacuation of 11 homes in the Henderson and College Street area. At least families were evacuated at the south end of McNaught Road. *1)

At Abbotsford, an estimated 400-500 head of cattle were moved to higher ground. An elderly woman drowned in her home near Chilliwack. According to Chilliwack Telephone officials, about 30 lines affecting roughly 100 subscribers were out. Slides crushed barns and houses at the base of Vedder Mountain. On Vedder Mountain Road, floodwaters demolished C.D. Penner's barn, moved his house 5 ft. (1.5 m) filling it with debris, and killed five of his cows. Mountain streams damaged his new residence after hurling mud and logging debris against it. Along the Vedder Mountain Road, fields fronting on the mountain were covered in mud and debris in half a dozen places. Shale and gravel cascaded down the Ryder Lake hill, half-filling the barn on Ed Dumvill's Lindell farm. The basement of the Dumvill house, which was in the path of the raging stream, sustained damage after filling with water and silt in 15 minutes. On McElwee Road, several farms had fields covered by shale and gravel and deep channels cut by the floodwaters. On Ford Road, Raymond Annis had 4 ac. (1.6 ha) of hay land covered with gravel. Carl Brannich, his neighbour, had a large grass acreage covered with silt. Ford Creek, "normally a trickle" and often completely dry in summer, went on a rampage. It silted ditches, which had recently been dredged. The farm of Wes Bailey on Bailey Road was also badly damaged by gravel, which covered several acres. At the head of Big Ditch Road, a farm owned by Dave Scott received similar damage. *2)

On February 11, Cultus Lake rose 3.5 ft. (1.1 m). Houses across the lake were isolated for two days when the road went out. The reached back to the main road serving the resort. Slides and washouts damaged the Columbia Valley Road serving the area. During the peak of the flood, many appeals were received in finding accommodation for and removing livestock from flooded dairy barns and poultry houses. In the vicinity of Lindell Beach, a bulldozer pushed Frosst Creek back into its normal course on February 12. The rise in Cultus Lake along with stiff northwest winds piled tons of debris on the beach at the south end, leaving some summer cottages sitting in 2-3 ft. (60-90 cm) of logs and "bric a brac." Boats drawn up on the beach were swept to the southwest end of the lake. Water and wind had swept the beaches clear at the north end, piling the whole accumulation into Lindell Beach and Maple Bay. Rampaging Frosst Creek cut one small cottage off its foundations and poured into and through another one. Several roads were washed out and a number of cottage yards were filled with 2 ft. (60 cm) of silt and gravel. Half a dozen cottages had as much as a foot of water in them. Johnny Belgrove, whose pasture land was covered with shale and gravel swept down by the creek, suffered the worst loss in the area south of the lake. At Maple Bay, the road washed out for 200 yd. (180 m) and a bridge was carried away. Columbia Valley Road also suffered damage.

In Sumas Prairie, thousands of acres of land reverted to the lake conditions of 30 years earlier. It looked much like it did in 1948 when the Cannor dyke broke. Communications were knocked out in "scores" of places by water, which washed out roads. A torrent blocked the grade west of Yarrow. At Sumas in the old Sumas Lake area near Yarrow, a dozen families evacuated their homes. On February 11, Sumas Prairie was flooded after a small divisionary dike south of the border broke. All through the night of February 11, crews were sandbagging the Sumas River to prevent a tide of water 10 ft. (3 m) high from sweeping into the centre of Sumas Prairie. Earlier, engineers had dynamited the BCER interurban rail embankment north of Yarrow to get the Vedder River closer to its proper course and save this Mennonite community of 1,200. South of Yarrow, residents living on Boundary Road were cut off from the village by a washed out bridge at Stewart Creek.

The district 33 schools, including Atchelitz, Sardis, Greendale and Vedder elementary schools closed. The Yarrow public school was closed after a flooded basement cut out the heating plant. Many other Yarrow basements were also flooded. Homes along the Boundary Road, west of Yarrow were amongst the worst hit by the high water in the Yarrow district. Livestock evacuated from Boundary Road were moved into town. Twice within recent weeks Yarrow and former Sumas Lake bottom lands had been seriously threatened. At the peak of the flood, not far from the river channel a hole was dynamited in the BC Electric railway embankment near Lumsden Road to relieve

pressure on the grade, which endangered the village of Yarrow on February 11. The BC Electric embankment, which runs north and south at the river crossing helps to back up the current, causing it to pile it up against the embankment. The latter had protected Yarrow on two occasions within the previous six weeks. *3) In an effort to keep the Vedder River within its channel, a big logjam near the BC Electric Railway bridge and two or three further upstream had to be removed. A number of people reported "record" flooding. "I think the river was as high Saturday (February 10) as it has ever been," Simpson observed. On that day the flood level reached within inches of the embankment. It was feared the embankment would wash out, allowing a torrent to sweep over the village. West of the embankment, floodwater covered many acres of village land as it rushed to join Stewart Creek south of Yarrow. Fast moving water covered farms of Mrs. A. Klassen, W. Schellenberg, John Kliewer, cutting across Yarrow Central Road and fanning out to inundate more than 100 ac. (40 ha) of farmland before joining swollen Stewart Creek. In Yarrow, Stewart Creek washed out every road south of Yarrow Central. Chilliwack and Prairie Central were both impassable; Hope River Road was cut away; the Reeves Road bridge went out and washouts cut Gillander Road.

The Mount Baker Trail on the north side of the Vedder River was almost completely washed out or under slides. The biggest was where the bridge used to be. The structure along with both approaches washed away, leaving a 200-ft. (60 m) gap. Elsewhere along the road near the old school, there was hole about 25 ft. (7.5 m) deep and 200 ft. across. At least two homes were damaged. A slide oozed into the home of Tony and Dave Way, forcing their automobile against the ceiling and badly damaging it. Another slide went into the basement of the Midgely home and mud covered many fields. On the night of February 9, the Ryder Lake Road went out, the largest section at the half-hairpin turn up the hill, sliding into Ed Dumvill's barn. It was estimated it would take six to eight weeks to repair the road.

All traffic east of Rosedale was blocked by slides. At Mile 80, between Rosedale and Hope, the highway was blocked by a 300-ft. (90 m) snowslide. It was expected to be three or four days before the road would be passable again. There was no heavy traffic beyond the Vedder. Overnight February 9-10, flood current and driftwood wrecked two piling clusters or bents of the main Vedder bridge on the Trans-Canada Highway, weakening supports of the old structure. Considerable re-piling was necessary to strengthen the Vedder Canal bridge after huge quantities of driftwood piled against it.

The RCMP reported miles of side roads flooded and soft. East of Chilliwack, three slides hit the Trans-Canada Highway. One of these at Little Mountain west of Rosedale was cleared overnight February 9-10. Heavy slides were reported at Popkum and Twin Bridges or Mile 82, closing the highway between Popkum-Hope. Though described as "treacherous," the Fraser Canyon Road was open.

In Maple Ridge, the Alouette River overflowed its banks and isolated a number of families. Fifteen veterans were marooned in Alice Hospital and Maple Ridge Park was also flooded. A new slide was reported at Mile 26 on the Hope to Princeton highway. In Langley and Surrey flats, many square miles of fields were flooded and municipal roads were under water in many places. At Albion, a second slide occurred where work crews were trying to fill a previous washout, but one-way traffic was getting through. Residents at Pitt Meadows reported more water in the flats than they had "ever seen before." Side roads were staked to mark their locations under the floodwaters. On February 10, the highway to Essondale flooded and the south Westminster flats were a vast lake.

Elk Creek floodwaters washed out two pipes of the Elk Creek Waterworks, leaving the Upper Dumvill Creek the city's only water source. When Elk Creek and Lower Dumvill creek went on the rampage on February 10, the main part of the Elk intake was washed out and the Lower Dumvill plugged with debris. A boil water warning was issued. The Lower Dumvill intake would be closed for about 2-3 weeks. Efforts were concentrated on getting the Elk and Upper Dumvill back to normal operation before starting to clear the debris, boulders, dirt and broken trees lodged against the dam. A break on Stewart Road left one section of the community of Yarrow without water. Flash floods did considerable damage with the worst washout on Banford Road, just north of Chilliwack

Central Road. Nearly every north-south road between the Prest and Ford roads was washed out or badly damaged.

On February 10, landslides demolished the hydro construction camp, a mile east of Cheam View. Tons of mud ruined much of the work done at the BC Electric Jones Lake hydro project. An eyewitness described the scene "as if a huge hand had thrown junk on it." Slide deposits on the road were almost continuous. Northern Construction Company's camp was demolished and all the pole work and four transformers erected by Hume and Rumble were washed out. A bridge recently built for work on the hydro project washed away. A new bunkhouse was "reduced to kindling wood." All lumber and building materials were swept away and the entire gas and oil supply was swept over a bank. One bulldozer was turned over and another buried. According to the BCE engineering department, the loss of the bridge would cause a big delay in the work.

The next day, there were five streams pouring over the nearby Trans-Canada Highway, where normally there were only two running under the road.

On February 10 at 4:30 a.m., a slide came down 16 mi. (25.6 km) east of Chilliwack and 0.25 mi. (400 m) west of Jones Hill, only 100 yd. (90 m) from the Herrling residence. Together with another Cheam View couple, the Herrlings sought refuge on Herrling Island. *4) Water coming down the mountainside, described as "a steady roar," struck the Herrling home. It rose swiftly to flow into the house, flooding it to a height of a foot. At first the Herrlings did not hear the slide above the roar of the water. Suddenly a bright flash seemed to light up the whole sky as wires shortened. Flashes of fire, "like a succession of giant fire crackers exploding" descended at a fast speed as the power lines were carried downhill. A small creek turned into a "raging cataract" caused the 200-ft (60 m) slide of dirt, gravel and boulders. Together with saplings and trees, the accumulation washed onto the highway. The creek rushed across the highway in a 15-ft. (4.5 m) width, tumbling down to the CNR lines to wash out that portion of the track.

A washout at Peters' Road cut the highway. In the early morning of February 10, Jones Hill was turned into a "raging river." Culverts on top of the hill overflowed and were swept through the driveway of Cheam View Service Station as water on the road reached 2.5 ft. (75 cm) in places. B.C. Figurines factory floor was covered with 2 in. (5 cm) of water. Old-time residents claimed that they had "never seen the hill in such destructive condition," as portions of it were washed down to bedrock and deeply undermined in other spots. They could not recall when the water had gushed down the hill in such a manner.

At about 8:30 a.m., a similar slide came down to cover the eastern foot of the hill. It was only to this point that the Pacific Stage Coach bus from Hope could make it. Near the Cheam-Bridal Falls divide, 3 mi. (4.8 km) west, a 300-ft. (90 m) slide did extensive damage to the B.C. Telephone line with six poles torn out. Between these two slides, an 8-ft. (2.4 m) wide stretch of road was completely washed away.

On February 11, preceded by a "grumble and roar," a giant mudslide came down onto the Trans-Canada Highway 2.5 mi. (4 km) east of Bridal Falls. A little earlier, a small slide had come down at the same location. The highway was closed and power and phone lines were cut. Hundreds of tons of mud roared over nearly 300 yd. (270 m) of nearly flat land before hitting the road. While it was being cleared, more mud was coming down. The slide was one of many, the number was variously estimated at between 15 and 25, which hit the highway between Bridal Falls and the east side of Jones Hill.

On February 14, the Trans-Canada Highway to the east reopened after a four-day closure. The slide kept between 200-300 people "slide-bound" in Hope. Approximately 25 big vehicles, including trucks, vans, tankers and buses as well as private cars had their journey west interrupted. On February 11 and 12, milk, bread and passengers were taken up river to Hope aboard two tugs from the Rosedale ferry landing. Fraser Valley Milk Producers Association shipped 1,800 quarts of milk in two shipments and McGavins bread deliveries were made in the same way. Encountering a rough bypass at Bridal Falls traffic resumed on February 14. However, heavy traffic had to detour via Yarrow, not being allowed to cross the weakened Vedder Canal bridge.

On February 14, eight township roads were still closed as a result of washouts and flood conditions. Four of the closed roads were in the East Chilliwack area where Elk Creek burst its banks and washed over the road. Still not passable were Ford, Gibson and Banford roads, while First Avenue was still under water from the McNaught to Prest roads. Both water and a lifted bridge kept Chadsey Road closed. Slides still closed the road up to Chilliwack Mountains as well as Ryder Lake Road. The Mount Baker Trail was still out but workmen were busy carving a new road along the hillside. Reopened roads included Prest, Knight and Vedder Mountain. One-way traffic was possible on Hope River and Chilliwack River roads. Motorists were warned to take caution when crossing Prairie Central Road near the hop yards.

Two CNR passenger trains were also stranded at Hope. As a result of slides and washouts a full mile (1.6 km) of CNR track between milepost 58 and 59 would have to be replaced.

There were also numerous washouts. At the crest in the road just east of the Blue Ridge turn-off water was pouring over the road and rapidly undermining the highway. The water carried with it rocks weighing up to hundreds of pounds. On the night of February 11, the roaring stream forced the evacuation of the residents of a home that was being threatened. The stream changed course several times, first eating away at the back porch of the house, then cutting a huge channel through a driveway. It uprooted a tree, pinning two men to the ground.

In Princeton, more than 100 families were moved into emergency quarters. In order to relieve the flood situation, bulldozers cut a 50-ft. (15 m) channel at the junction of the Tulameen and Similkameen rivers. Throughout the valley, bridges were washed out or lifted off their foundations and roadbeds washed out.

*1) Many of the affected residents felt that CNR was at least partially responsible for the flooding in their area, pressing the railway company for a better drainage system. Near Calvin Short's home on the north side of the railway track there was 17 in. (42.5 cm) more water than on the south side. The 36-in. (90 cm) culvert was considered inadequate. The CNR had been approached before but this was the first time real damage had been done.

*2) Much of this devastation was blamed on logging practices, which had left a legacy of debris on mountainsides to be washed into the valley or dam watercourses in periods of heavy rain. "The government is definitely responsible for at least part of this, since the logging was done on Crown Land," commented Reeve W.G. Simpson. "Natural watercourses have been dammed with logging waste and when these dams give way, they send torrents down on the valley." (*The Chilliwack Progress*, February 21, 1951). The seriousness of the flooding in town was believed to have been caused by the pressure of post war building that allowed many low-lying lots to be used for residential purposes. These low lots, where water used to accumulate, were now filled in, leaving water nowhere to go than into the homes' basements (*The Chilliwack Progress*, February 14, 1951).

*3) According to Reeve W.G. Simpson, if the dyke would be extended at that point, it would hold the river in the channel. To better protect Yarrow, dyking commissioner Bruce Dixon proposed the extension of a dyke on the south side of the Vedder River between the BC Electric grade and Lumsden Road. Construction of this 0.25-mi. (400 m) extension of the Vedder dyke was approved and placed under authority of the Sumas Reclamation Board and chargeable against Sumas reclamation area (*The Chilliwack Progress*, February 14 and 21, 1951).

*4) During the flood of 1948, Clarence Herrling and family had evacuated from the same Herrling Island. The other couple, Mr. and Mrs. Charles Nelson Sr., were also former residents of Herrling Island, having evacuated the island in the floods of 1894 and 1948 as well as the ice jam of the previous winter (*The Chilliwack Progress*, February 14, 1951).

July 20, 1951

(Tsunami).

Source: *The Penticton Herald*, July 26, 1951; Evans 1986 (pp. 164-166); Evans, unpublished data.

Details: On July 20 at 6:45 p.m., a landslide caused a wave in Okanagan Lake near Penticton. The slide in glaciolacustrine silt destroyed a house. An immense wall of water rapidly bore down on the house. The water receded as quickly as it had come. A baby was rescued from the ruins of the house. Fifteen boats were also lost (Evans and Clague 1999). A family of four narrowly escaped the tons of clay that slid into the lake. A woman was wedged beneath a chaise lounge on the veranda, which railing had kept her from being swept away. Water had entirely filled the house, slightly south of the Three-Mile Beach on the east side of Okanagan Lake, when the wave crashed over it. An insurance adjuster found silt imbedded on top of a shelf of a floor to ceiling cupboard. Also dead fish were found on the roof.

One acre (0.4 ha) of orchard with 33 fruit-bearing trees was gouged out of the cliff. With a “terrific rumbling” a solid wall of water hit the cottage. A concrete 9-in. (22.5 cm) wall cracked “as though it had been a piece of 2 x 4.” The thousands of tons of earth engulfed the lakeside home at Three Mile point and created a 12-ft. (3.6 m) wave. The wave devastated the shore for over 0.5 mi. (800 m). A car was hurled 200 ft. (60 m) onto the beach. The 2-ton sailboat *Marion* was bodily lifted and deposited high and dry 100 ft. (30 m) from where she had been moored. A cabin cruiser, moored short an unable to ride the crest, was submerged. A four-cylinder marine engine was found 50 ft. (15 m) from its stand.

November 27-December 4, 1951

(Storm surge/tidal flooding).

Discharge (m³/s): Max. daily: November 27: Capil.: 199; November 30: Stamp A.: 207E; December 1: Sproat: 147; max. instant.: N/A.

Source: *Vancouver Daily Province*, December 1 and 4, 1951; *The British Columbian*, November 29; December 1, 1951; *The Vancouver Sun*, December 3 and 5, 1951; November 21, 1972; *The Squamish Advance*, December 6, 1951; Environment Canada 1991.

Details: Overnight November 28-29, near-hurricane southeast winds that struck the south coast of British Columbia caused power outages. Gusts reaching 55 mph (88 km/h) downed trees and huge billboards. Widespread areas of North Vancouver were without power. BC Electric reported wires down as far inland as Lytton. Sections of Surrey, southern part of Delta, Langley, Mission and Chilliwack were left without telephone service. Trees were uprooted in Semiahmoo Park. The Tara Supper Club on King George Highway had part of its roof torn off.

On November 30 and December 1, high tides, lashed by westerly wind and rain, caused flooding in some low-lying areas in Vancouver. Buildings that were flooded included Crystal Pool on Beach Avenue, the Immigration Building on the Coal Harbour shore, and Dola Tug Boat Co. plant at the foot of Broughton. Lumberyards on the banks of the Fraser River were inundated. Some of the most seriously affected areas were at the foot of Main and on Mitchell Island, where private homes, market gardens and sawmills were flooded to depths of a few inches to several feet. Basements of several houses on Mitchell Island road were inundated with 4 -5 ft. (1.2-1.5 m) of water.

Residents in the area reported the floods were the “worst in four years.” At one point at least, high water level reached on the Fraser River equaled the high water mark established during the 1948 floods. According to an official of Stradiotti Bros. Ltd., at 9 a.m., the river water crept to within 10 in. (25 cm) of the top of the Stradiotti tug dock at the foot of Clarendon. Floodtide Fraser River waters reached the roadway on South Main Street. At the Dola plant, workmen reported the adjacent railway tracks flooded. The floor of the machine shop was covered with 18 in. (45 cm) of water and the crest had even reached the axles of parked cars. Lumber yards on the banks of the Fraser in the Main Street area, were under 1 ft. (30 cm) of water. Stacks of dried lumber were soaking and some were starting to float around. The tracks of the BCER were flooded. At Richmond, River Road

between Lulu Island and Sea Island was under 6 in. (15 cm) of water. Workers at Lulu Island Canning Co. were packing dikes with sandbags. Many houses in the low-lying area were completely surrounded by water, up to 10 in. (25 cm) deep. On December 1, houses in Ambleside Park had water over the floor.

The combination of high tide and stiff winds overnight, carried river waters over a low outer dike at No. 2 Road, Steveston. The main, higher dike inside did retain the water. At Steveston, the tide showed 16.2 ft. (4.86 m), breaking the previous record of 16.10 ft. (4.84 m). The high water swept right over the wall of the swimming pool at Kitsilano Beach and even up to the beach house. A portion of the Mud Flats area below Panorama Ridge in Surrey flooded, following a 70-ft. (21 m) break in the dike along the Serpentine River on December 1. Some 1,200 ac. (480 ha) of farmland of about a dozen of small farms, flooded between the Serpentine River and the Nicomekl River. The break was about 0.5 mi. (800 m) north of Wade Road. The farmers, who lost most of their stored winter feed, started to slaughter their cattle. Wade Road washed out and cattle were removed. Farmers salvaging equipment and furniture had to wade through hip-deep water in places. An estimated \$2,000 damage was done to Colebrook dike. On December 1, Capilano Creek (River) flooded the 950-ft. (285 m) diversion tunnel on the Cleveland Dam project, forcing a work stoppage.

Owners of flooded property along the banks of the Fraser River at Southwest Marine Drive would not get any help from City Council in pumping the remaining water away. According to City Engineer John Oliver, people who built homes there were aware of the dangers of flooding and “must expect” flooding every December and January when abnormally high tides back up the river.

On December 1, high water flooded the ballpark at White Rock. The storm smashed a hole in the dike on Westham Island, flooding about 50 ac. (20 ha) of farmland and roads. Parts of the Clarke farm and the Viner station of the cannery on the island were under water. On December 2, the auxiliary forward dike broke. The large gap allowed waters to flood approximately 100 ac. (40 ha).

On December 3, dike breaks were reported from Ladner, Westham Island and East Delta. Some 3 ft. (90 cm) of water surged over the land between the Serpentine and Nicomekl rivers, from the King George Highway to the Great Northern rail embankment by the shore. At Ladner, the Westham Road dike broke at the top in two places. Homes were flooded and Ladner Meat Market slaughterhouse was closed because of flooded floors. The tide also caused flooding in the Canoe Pass area bordering on Westham Road. Municipal work crews patrolled a 3-mi. (4.8 km) section to guard against weak spots. About 9 mi. (14.4 km) east of Ladner, 50 volunteers tried to plug a break on the Embree Road dike in East Delta. Two feet (60 cm) of water roared across the road at the east tip of Westham Island, inundating about 80 ac. (32 ha). Residents of Westham Island were delayed for three hours when a 0.25-mi. (400 m) stretch of road flooded during the high tide on the morning of December 3.

On December 4, a new storm threatened the stricken farmlands behind weakened dikes. Dikes were still breached, but floodwaters fell with the tide. The freezing level was down to about 2,500 ft. (750 m). On December 5, the Fraser River ferry services at Woodward’s Landing and Agassiz were out of service. The Woodward’s Landing-Ladner ferry was put out of service on December 4, when a gale caused a ferry slip pontoon at the Lulu Island side to sink. The Agassiz to Rosedale ferry was crippled when heavy wind damaged its rudder. Floodwaters of the Serpentine River pushed back by the high tide in Mud Bay, again threatened to flood thousands of acres in the area bounded by the Serpentine, King George Highway, Nicomekl River and Mud Bay. According to Mud Bay Dyking Commissioner W. A. Dinsmore, the estimated cost to repair the 70-ft. (21 m) break in the dike ranged from \$10,000-\$35,000. Three dragline shovels were sent from Surrey Dyking Board for the work. *1)

Overnight December 1, high tides, lashed by wind and rain, caused flooding in some low-lying areas of Squamish. On the morning of December 1, the dyke behind the PGE tracks near the Western Plywoods dump was breached in two places by the wind-backed tides. Water poured into the area on the east side of Cleveland Avenue. Within a short time, water was running over the sidewalks and the main street of Squamish was flooded with 2 ft. (60 cm) of water. All the

basements in the centre of the town were inundated. Work crews sandbagged the dyke and the low spot on the Pemberton Road dyke. Part of River Road near the Red Bridge washed out and several houses in that area were completely surrounded with some of them several inches of water on the floors.

In Squamish itself, there was water in the Shell garage and some of the buildings on Cleveland Avenue that had water on the floors. The tide water also poured over the low-lying portions of the dyke in the lower part of town. Houses at the lower end of Victoria Street were surrounded by water. The floodgate at the end of Victoria Street washed out and would have to be replaced. Just outside Squamish, the Squamish to Britannia highway also washed out.

On the morning of December 3, high tides again sent water over River Road near the Red Bridge, washing out a portion of the road. Water also covered the road almost 1 ft. (30 cm) deep above Cowdell's corner and was spilling over a 60-ft. (18 m) length of low dyke behind Henry Smith's, completely surrounding the houses in that area.

Vancouver Island points had winds up to 56 mph (89.6 km/h) and rainfall up to 2 in. (50 mm) in the 24-hour period ending on December 1 (?) at 4:30 a.m. Vancouver City recorded more than 0.25 in. (6.5 mm) in the same period. In Victoria, gale-whipped tide waters crashed through an emergency breakwater on the central Saanich beachland and flooded 600 ac. (240 ha).

On November 31, heavy rains and high tides caused the Somass River and Kitsucksus Creek to overflow their banks and to flood hundreds of Alberni homes. A small bridge on Beaver Creek, 0.5 mi. (800 m) from Alberni was in danger of collapse. At Campbell River at the height of the storm, a 40-ft. (12 m) pleasure boat valued at \$7,000 sank. Huge waves lashed by 50 mph (80 km/h) winds threw logs and debris over the Island Highway. The Elk Falls pulp mill reported a high tide of 17 ft. (5.1 m); the highest ever recorded there.

*1) The flood on Serpentine River, which cuts into Mud Bay north of the Nicomekl River, inundated the area for three months. According to local farmers, it took five years before the land was completely back to normal. The cost to the dyking commission in repair attempts was \$30,000 (*The Vancouver Sun*, November 21, 1972).

1952

Source: Allan 1957; Armstrong 1984; Evans, unpublished data.

Details: In 1952, a major catastrophic seepage erosion event in a natural slope occurred in the Coquitlam River valley. Seepage at the base of a 100-m section of pervious sands and silts at its contact with impervious, partly compacted glaciofluvial gravel initiated it. Within 24 hours, approximately 300,000 m³ of material was washed out into the Coquitlam River blocking it for several days and forming an amphitheatre-shaped gully complex up to 300 m long in the source slope (Allan 1957; Armstrong 1984; Evans, unpublished data).

January 30-February 1, 1952

(Rain-on-snow).

Discharge (m³/s): Max. daily: January 30: Capil.: 153; January 31: Nan.: 269; Sooke: 20.5; February 1: Rainy: 61.4; max. instant.: N/A.

Source: *The British Columbian*, January 30, 1952; Environment Canada 1991.

Details: Heavy rain and melting snow caused flooding in Surrey. During the morning of January 30, Old Yale Road west of Scott Road flooded. Several fields in the area were covered with up to 10 in. (25 cm) of water.

Spring 1952?

(Spring runoff/flooding?).

Source: *Penticton Herald*, January 20, 1954.

Details: During the spring?, with less than half the runoff which the new channel was designed to carry, 25% of the wire mesh and concrete improvements on Penticton Creek were either destroyed or damaged to such an extent as to necessitate major repair work and a further 50% were damaged to a point which required substantial maintenance work (*Penticton Herald*, January 20, 1954). *1)

*1) Following the 1942 Penticton Creek flooding, wire mesh and concrete improvements were built in 1949.

December 27-28, 1952

(Storm surge/tidal flooding).

Source: *The Campbell River Courier*, December 31, 1952; January 7, 1953; *The Vancouver Province*, January 13, 1953.

Details: On December 27-28, a storm caused flood- and wind damage to a number of homes and businesses in Campbell River. Very heavy rains, high tides and storms caused damage on Quadra Island. On the morning of December 30, many slides closed the road along the waterfront at the Cove. High tides threatened to come onto the floor of the store and caused Mr. & Mrs. Jackson to move their family. The swell and driftwood damaged a portion of the Ryall and Lewis building. Slides also closed part of the road at Drew Harbour.

Just before midnight on December 27, a combination of dangerous rip tide, strong southeast wind and heavy seas off Cape Mudge caused the veteran Vancouver tug *S.S. Petrel* to sink. The vessel, en route from Vancouver to Gowland Harbour on Quadra Island, was lost with all seven hands. It sank so fast that there was no time for a radiotelephone distress call or time to lower lifeboats. Soundings made by electronic depth recorder showed what was presumed to be the wreck lying on a ledge in 70 fathoms or 420 ft. (126 m) of water near the Cape Mudge lighthouse.

The year-end storms caused serious erosion on Campbell River's waterfront back of the Beehive, Laver's Store and other shops in the vicinity. Comox-Alberni MP J.L. Gibson requested immediate action from commissioners Wilson and Thulin.

1953

Source: Evans, unpublished data.

Details: In 1953, excessive seepage occurred in a pit at Mary Hill in the Vancouver area. Sand and gravel was being mined in the pit from beneath an impervious cap of till. A mechanical shovel cutting through a silty bed of gravel tapped into a groundwater reservoir. Within 15 hours, some 70,000 m³ of material flowed from the face.

Early January 1953

(Storm surge/tidal flooding).

Source: *The Squamish Advance*, January 8, 1953.

Details: Early in January, high tides backed by a strong south wind drove water over River Road near the Red Bridge and flooded low-lying areas near Squamish. On the morning of January 6, the road was washed out and badly rutted for 100 yd. (90 m). One residence flooded and water came within inches of coming into several others. In the lower end of Squamish, the water was almost level with the dyke.

January 9-16, 1953

(Rain-on-snow).

Discharge (m³/s): Max. daily: January 9: Chem.: 198; January 12: Capil.: 132; Nan.: 464; January 16: Cowich.: 253 max. instant.: January 12: Nan.: 464; Sooke: 25.6; January 16: Cowich.: 257.

Source: *The British Columbian*, January 9 and 10, 1953; *The Vancouver Province*, January 13, 1953; Environment Canada 1991.

Details: On January 13, freak temperature extremes 105 degrees F apart, were recorded in British Columbia. In the morning, these ranged from 47° F (8.3° C) in Vancouver to -58° F (-50° C) in Smith River, 25 mi. (40 km from the Yukon border. On January 12, Penticton recorded 56° F (13.3° C), 1 degree F short of an all-time January record. The thaw cleared all roads east of Chilliwack. On January 12, torrential rain caused the water level in Harrison Lake to rise 5 in. (12.5 cm). Seven booms of logs were scattered threatening the trestle of the CPR bridge. Some damage may have occurred to the underwater communication cables.

This winter's first storm dumped 4-5 ft. (1.2-1.5 m) of sugary snow into the Fraser Canyon and Rocky Mountain passes. Between Hope-Princeton 1 ft. (30 cm) of fresh snow fell and up to 6 ft. (1.8 m) at Lytton. Heavy avalanches between Yale-Boston Bar blocked the CNR and CPR rail lines and the Trans-Canada Highway. Avalanches were most prevalent between Yale and Lytton, scene of the "great traffic jam of 1950," which cut off the coast for a week.

Overnight January 12-13, four sections of the CPR tracks between Yale-North Bend were cut. Two trains were cancelled while others were rerouted and delayed. Two passenger trains arrived at Vancouver 12-16 hours late. In the biggest gap, near Yale, only thin ribbons of steel were left hanging suspended for a distance of 120 ft. (36 m) over a drop of 60-65 ft. (18-19.5 m). At China Creek, 6 mi. (9.6 km) west of North Bend a washout occurred 15 ft. (4.5 m) deep and 30 ft. (9 m) long. The other washouts were close to Yale.

Several slides blocked the Trans-Canada Highway, including a giant one at Jackass Mountain. In the upper reaches of the Fraser Valley, snow slides cut telephone and telegraph lines and blocked secondary roads. Snow and ice blocked the Hope to Princeton highway.

On Vancouver Island, floods closed the old Island Highway in the Westholme and Crofton districts. According to residents, the flooding was worse than the previous week after heavy snow and a thaw. Logs and debris in the Koksilah River jammed the bridge on the MacMillan & Bloedel Shawnigan Lake logging road near Cowichan Bay. The river flooded its banks with the water reaching the underside of the CPR bridge.

January 1953

Source: *British Columbian*, January 31, 1953; *Times Colonist*, January 3, 1991.

Details: During the first 27 days of January, Vancouver recorded 13.12 in. (333.2 mm) of rain, making it the rainiest January. On January 30, more than 2 in. (50 mm) of rain fell on the west coast of Vancouver Island. The heavy rainfall made January also Victoria's all-time rainiest month with a total precipitation on 358.9 mm.

February 3-4, 1953

Source: *The Vancouver Sun*, February 3 and 4, 1953; *Victoria Daily Times*, February 4, 1953; *The Chilliwack Progress*, February 6, 1952.

Details: On February 3, following torrential rains during the previous 24 hours, thousands of acres of the Fraser Valley were under water. At Langley, Surrey and in the Mud Bay region, in the delta big areas were flooded. The most serious damage occurred at Haney where a small bridge on 14th Avenue washed out and at 32nd Road a culvert washed out. The Alouette, Coquitlam and Pitt rivers were reported to have overflowed their banks. At Chilliwack, many basements flooded.

The winter 1951-52 was a costly one for Chilliwack. By early February, the city's snow removal bill stood at \$3,081, already more than twice the previous winter's of \$1,400.

August 11 and 16, 1953

Source: *Victoria Times*, August 17, 1953; Terzaghi 1962; Wilson and Wilson 1998 (pp. 88-90).

Details: On August 11 and 16, a series of rock and mudslides occurred at the BC Power Commission's Whatshan hydroelectric generating station at Needles on Lower Arrow Lake near Nakusp. The debris slides destroyed part of the newly constructed Whatshan Powerhouse and switchyard and took out a number of transmission towers. *1) On August 11, the first slide buried the switching station and a second slide on August 16, partly demolished the power house, causing about \$6 million damage in 1953 dollars (D. Moore, pers. comm. 1987). The second slide was reported to have temporarily stopped all repair work. The plant, built at the bottom of a steep mountain and supplying the North Okanagan and Kamloops areas, was out of service indefinitely. The slides were due to leakage near the portal of a pressure tunnel connecting the reservoir at Lake Whatshan to the generating station on Lower Arrow Lake (Terzaghi 1962).

Emergency power was arranged for hospitals within an hour of the first slide. A connection was made with the West Kootenay Light and Power Co. within one and a half-hours, and the Kamloops steam plant was quickly brought on-line to augment power from the Shuswap Falls hydro station. A month later, the first 1,000-kW unit of a 4,500-kW diesel plant was up and running in Kamloops. Crews worked around the clock for months to restore the first generating unit at Whatshan to service by December. The second unit was restored by June 1954.

*1) The new major power-generating in Central British Columbia to provide the North Okanagan and Kamloops areas with an initial 25,000 kW was completed in 1951. A Royal Commission, headed by the well-known lawyer J.V. Clyne, was struck to investigate the cause of the slides. To reduce construction costs the need for concrete lining in certain sections of the long tunnel and near-vertical penstock shaft, which were excavated through the mountain to carry water to the powerhouse, had been misjudged. At first, this only caused minor slides. Unaware of the amount of leakage at the site, nothing was done to correct the problem, which led to the huge slide (Wilson and Wilson 1998).

Ca. September 30-31, 1953

The British Columbian, October 1, 1953

Details: Heavy rains at the end of September caused mudslides in the Fraser Canyon. The blocked highway was reported cleared on October 1.

November 14-15, 1953

(Rain-on-snow and tidal flooding).

Discharge (m³): Max. daily: November 14: Stamp A.: 623; November 15: CR/CR: 835; Sproat: 245; max. instant.: November 15: CR/CR: 799. Both CR/CR values are extreme records.

Source: *The Daily News*, November 16, 1953; *The Campbell River Courier*, November 18, 1953; Environment Canada 1991.

Details: On November 15 at Campbellton water was almost 3 ft. (90 cm) deep in places as the dam on the Campbell River was unable to cope with high water caused by 10 days of rain. It was the worst flood to hit Campbellton since 1939. *1) Worst hit by the floodwaters were John Hancock's Rustic Auto Court adjacent to the river and the Campbell River Lodge. At the peak of the flood, both resorts were surrounded by water. Trailers at Rustic sustained considerable damage. Lumber belonging to the court was also lost. Due to preparations against the rising waters, the lodge sustained little flood damage. However, the winter's wood supply was lost. The grounds outside the lodge were under 2.5 ft. (75 cm) of water at one time. At the peak of the rise, many basements flooded.

According to B.C. Power Commission officials, the dam at head point and at Ladore Falls helped materially in lessening the flood in its early stages. Because the water stored behind the dams was quite high prior to the heavy rains, only a limited amount of flood control could be exercised.

But steps taken by the commission's employees flattened the flood peak on a day to day basis. A combination of a high tide backing water up the river, a southeast wind and the excessive rainfall caused a daily high flood peak. On November 12, 13 and 14, closing the sluice gates at the head dam cut the flow of water from 20,000 cfs (566.3 m³/s) to 6,000 cfs (169.9 m³/s) for two or three hours until the tide ebbed. On November 15, with Lower Campbell River and Irene Pool reservoirs full and a flow of 28,600 cfs (809.9 m³/s), it was not possible to exercise further control. This excessive flow continued most of the day, just as it would have had there been no hydro dams on the river. A commission official reported 7 in. (175 mm) of rain fallen in Campbell River during the previous 10 days. Since the precipitation was relatively warm, the part of which normally would have fallen as snow and stayed on the mountains, came down as rain and added to the run off. On November 16, floodwaters started to recede at Campbellton.

*1) Records kept by Roderick L. Haig-Brown show that in November 1939 the escapement water at Forbes Landing was about 30,000 cfs (849.5 m³/s). A similar flood in 1935 saw this figure reach 28,000 cfs (792.9 m³/s), about the same as on November 14-15, 1953 (*Campbell River Courier*, November 18, 1953).

1954

Nasmith 1962; Evans, unpublished data.

Details: The 1954 49th Parallel Slide in Osoyoos Lake occurred very rapidly (Nasmith 1962; Evans and Clague 1992).

May 10-18, 1954

(Spring runoff/flooding).

Source: *The Vancouver Sun*, May 11 and 20, 1954; *The Vancouver Province*, May 11, 1954; *The Vancouver News Herald*, May 13, 1954; *The Daily Colonist*, May 13 and 19, 1954.

Details: Around May 11, the Moyie River flooded a short stretch of the Southern Trans-Provincial Highway south of Cranbrook near Yakh. The Columbia, Kootenay and Thompson rivers were all rising. The Similkameen River recorded a 1 ft. (30 cm) rise. Fraser River levels on May 11 were 6.02 ft. and at Hope 16.21 ft. compared to 5.40 ft. and 15.81 ft., respectively the previous day. Overnight May 10-11, Mill Creek where it flows through the Kelowna residential section, rose several inches. At some spots, it was only 12 in. (30 cm) from overflowing its banks.

On May 12, Renata Creek went on the rampage for five hours cutting a swath of devastation through the district near the town of Renata 25 mi. (40 km) west of Revelstoke. Warm rains on May 10 and 11 caused the creek to overflow its banks "for the first time in the history of the centre on the Lower Arrow Lakes" about 30 mi. (48 km) west of Nelson. The flash flood tore out a bridge in the heart of the town. Efforts to sandbag the crumbling banks proved futile. Six orchards were seriously damaged and a barn was swept away and a house caved in. In the Grand Forks area, about 25 homes were surrounded by water

On May 13, the biggest jump was registered in the Columbia River at Trail. It rose 16 in. (40 cm) in 24 hours to 15.9 ft. The Fraser River at Mission rose 1 ft. (30 cm) during the same period. Floodwaters cut the Southern Trans-Canada Highway near Chase and Revelstoke. The Vernon to Slocan road was closed due to rampaging creeks in the Monashee Mountains. Mill Creek inundated six blocks of residential area in Kelowna, forcing several families to evacuate. Swollen by 24 hours of rain and melting snow at its headwaters, Mill Creek burst its banks, flooding roadways and topping bridges in several areas.

On May 18 with temperatures in the Okanagan in the 80s degree F (26.7-32.2° C), a small river spilled over a short stretch of road at Yakh near Creston. The continuing warm weather increased flood threats. On May 19, the Moyie River jumped its banks, forcing the evacuation of several families in Yakh. Washed out bridges closed highways between Kingsgate-Radium and

Cranbrook-Yakh. At Kimberley, dike watchers patrolled the banks of Mark Creek. The creek, which caused \$1 million damage in 1948, rose sharply on May 19. The Similkameen River was also threatening to burst its banks at a dozen points. The veterans' settlement at Cawston was also being watched. The Columbia River near Trail and Revelstoke showed a slow but steady rise.

On May 20, spring runoffs knocked out two rail lines, flooded a school and several houses near Yakh. At Manning near Princeton, a flash flood knocked out a 60-ft. (18 m) stretch of CPR's Kettle Valley line. While crews put in a temporary bridge, two trains were stalled. In the Nicola Valley, 200 ft. (60 m) CPR track washed out. Floodwaters were creeping at the outskirts of Merritt. One family had to be evacuated while others were threatened. East of Revelstoke, a mudslide delayed the eastbound CPR transcontinental trains for 10 hours. On May 20, the Kootenay River at Creston stood at 20.12 ft., up 2 ft. (60 cm) from the previous day.

Cooler weather brought temporary relief to the Nicola Valley, decreasing the serious flood threat. Freezing levels were at 9,000 ft. (2,700 m) on the coast and 12,000 ft. (3,600 m) in the interior. By the middle of May, the high level snowpacks were still above average. The snow water content of the main stream of the Columbia River was 75% above average. The same above averages for the Kootenay was 65%, for Okanagan-Similkameen 35% and 53 % for the North Thompson.

July 7-10, 1954

(Spring runoff/flooding).

Source: *The Vancouver Sun*, July 9, 1954; *News Herald*, July 10, 1954.

Details: On July 7-9, warm weather caused the Vedder River to rise. A temporary blockage provided a 5-room bungalow protection from the battering Vedder River. The river had already washed away a garage and more than half of the original 72-ac. (28.8 ha) lot. Six years previous when the Joseph Conners residence was built, it was 0.25 mi. (400 m) from the river. The constant erosion cut this distance to a mere 13 ft. (3.9 m). The lower three tiers of the Vedder Canal BEG rowing site bleachers buckled as the water rose 7 ft. (2.1 m) higher than expected.

Around July 9 at Castlegar, the Columbia River rose 5 in. (12.5 cm) and another foot (30 cm) rise would put the Southern Trans-Provincial ferry out of action. The high waters caused a break in the Castlegar water main. The river flooded the Trans-Canada Big Bend highway in four places. North of Golden, the highway was flooded over a distance of 0.5 mi. (800 m) with water 2 ft. (60 cm) deep. On the Kootenay to Columbia highway, two 500-ft. (150 m) sections were under water. The Kimberley-Wasa-Fort road closed due to flooding at Wasa. The Lardeau to Gerard washed out 9 mi. (14.4 km) north of Lardeau. On the Burton-Needles road between the Okanagan and the Kootenays, a washout occurred.

On July 10 with cooler weather, the Fraser River dropped 6 in. (15 cm) at the Mission gauge.

August 15, 1954

Precipitation: N/A.

Source: *The Squamish Advance*, August 19, 1954.

Details: On the afternoon of August 15, a mudslide above Lillooet delayed a passenger train by almost five hours.

November 4-5, 1954

(Rain-on-snow).

Precipitation: Britannia Beach, 91.7 mm/2 days, November 4-5, 1954.

Source: *The British Columbian*, November 5 and 6, 1954; *The Squamish Advance*, November 11, 1954.

Details: Overnight November 4-5, New Westminster and Pachena Point reported record 24-hour rainfalls of 2.65 in. (67.3 mm) and 5.27 in. (133.9 mm), respectively. According to weather

observer E. H. Longley, the deluge was a record for November. *1) The overnight temperature was 50° F (10° C)

The heavy rain on the night of November 4 caused flooding in Sapperton, “one of the worst in years.” Tenth Avenue and Holmes Street became a watercourse as gravel and debris flowed over the old tracks into city and side street towards Brunette Creek. Overnight floodwaters undermined and swept over the old BCER interurban tracks as far as Columbia Street and North Road. During the flood period, water on the street was 10 in. (25 cm) deep. Floodwaters were blamed on lack of proper drainage and storm sewers. New Westminster’s \$8,000 sewer was reported plugged due the fact that Burnaby failed to provide drainage and sewerage to a new subdivision across 10th Avenue. Flooded basements were reported in several parts of the city. In Vancouver, hundreds of basements were flooded and traffic was snarled. The Fraser Valley reported washouts and flooded roads.

On November 5 at about 7:43 a.m., a 20-ft. (6 m) mudslide at Albion 5 mi. (8 km) east of Haney caused the derailment a Vancouver-bound transcontinental CPR passenger train. The two diesel units a baggage car, an express car and a colonist coach were derailed. Three passengers on the Vancouver-bound train were injured. Rail traffic was back to normal on November 6.

On November 4, heavy warm rain melted snow on the mountains along Howe Sound and brought the river levels up. The Squamish River came over the road in several places and the Mamquam River was “running bank full.” Section crews dynamited logs which jammed against the railway bridge while Public Works crews kept close watch on the road bridge.

On November 5 at 5:30 p.m., a derailment occurred on the PGE rail line at Mile 91 along Anderson Lake. Six cars of a freight train went off the tracks. It caused a 24-hour delay in passenger service to Prince George.

*1) New Westminster broke to old November record of 1.65 in. (41.9 mm) set in 1948.

November 17-21, 1954

Discharge (m³/s): Max. daily: November 19: Capil.: 256; Chem.: 194; Nan.: 479; Rainy: 181; Stamp A.: 476; November 20: CR/CR: 580; November 21: Sproat: 221; max. instant.: November 18: Nan.: 654; November 20: CR/CR: 612.

Source: *The British Columbian*, November 18, 19, 22 and 23, 1954; *Daily Colonist*, November 18 and 19, 1954; *The Vancouver Sun*, November 26, 1954; *The Squamish Advance*, November 25, 1954; Environment Canada 1988; Environment Canada 1991; Eisbacher and Clague 1981; Hunter 1997 (pp. 1-4).

Details: The rainstorm with a maximum daily precipitation of 60 mm, a two-day maximum of 94 mm or 160 mm for the storm total in the Vancouver area, caused landslides in the Vancouver region (Eisbacher and Clague 1981). The Vancouver area experienced one of the heaviest, continuous rainstorms in years. The city of Vancouver recorded 2.37 in. (60.2 mm) in 24 hours ending in the morning. Sea Island registered 1.60 in. (40.6 mm) and Abbotsford 1.51 in. (38.4 mm). Overnight November 17-18, New Westminster reported heavy rain. During the 24 hours ending at 4:30 a.m., New Westminster recorded 1.78 in. (45.2 mm) of rain, bringing its November total to almost 9 in. (228.6 mm).

Several basements in the Henley and 10th Street area flooded due to the lack of storm sewer facilities. Water running down 12th Street and other main roads leading down the hill into the city threatened to overflow the sewers. Near the new city hall, the banking behind the Duke of Connaught high school caved in from the pressure of water. In Surrey, low-lying areas in the vicinity of Old Yale Road and Scott Road flooded, threatening to flood out a nearby gas station and store. In Burnaby, heavy rains caused Still Creek to swell to four times its normal width. Willingdon Road where the old wooden bridge crosses the creek was flooded and closed. Houses in the area and at Sperling and Douglas intersections, were surrounded by water. Opening the Brunette Creek control dam lowered Still Creek. In North Vancouver, Mosquito Creek flooded, damaging house

foundations. North Vancouver police ordered more than a dozen families out of their homes. In Vancouver itself, streets and hundreds of basements were under water.

Overnight November 18-19, New Westminster recorded another 1.4 in. (35.6 mm) of rain. Clean-up operations continued in North Vancouver and parts of Burnaby, Coquitlam and the Lower Fraser Valley affected by clogged ditches and flooded roads.

On November 21, a mudslide 2 mi. (3.2 km) east of Albion cut the two-lane main highway to one-lane traffic for several hours. Heavy rains were blamed for the slide, which poured 10 ft. (3 m) onto the highway. A washout at Yale Creek bridge on the Fraser Canyon Highway held up traffic for several hours on November 21. Temporary repairs were made and limited traffic was passing, subject to half-hour delays. A slide at North Bend delayed a Vancouver-bound CPR mainliner for 40 minutes during the night.

During the night November 22-23, the Vedder River washed away farm property 6 mi. (9.6 km) southeast of Chilliwack, as it reached its "highest level in recent history." On November 22, the Vedder River near Yarrow recorded a maximum daily water level of 3.691 m (Environment Canada 1988). Some farmers reported to have lost up to 5 ac. (2 ha) of their land. Municipal public work crews dumped large quantities of rockfill. The river had already washed away its banks for a distance of 700 ft. (210 m). During the morning of November 23, the river was leveling off.

Unusually heavy rain, high tides and an inadequate pumping system caused flooding. Cloverdale market gardeners faced an estimated loss of \$50,000 worth of carrots. A large-scale grower, had 8 ac. (3.2 ha.) of "bunch" carrots on one 45 ac. (18 ha) tract under water (*The Vancouver Sun*, November 26, 1954).

On November 18, exceptionally heavy rain caused a flash flood of the Sooke River. A \$5,000, 25-ft. (7.5 m) diesel launch moored above the bridge sank and two large log booms containing some 300,000 bd. ft. (1,415 m³) were wiped out at the mouth of the river. Most logging roads in the district washed out, causing temporary operation shutdowns. Water in the Jordan River and Muir Creek was so high that the log dumping ceased.

On November 17, the heavy and steady rains caused an unnamed creek in Alberni Channel to break up a floating logging camp on the north side of the Alberni Channel 7 mi. (11.4 km) from Port Alberni. Debris blocking a small creek suddenly gave way under water pressure. The water thundered down a canyon, smashing the buildings. The camp consisting of a bunkhouse and cookhouse was located at the mouth of the creek. The gushing water forced open the door of the building where all six occupants were gathered. Before they could reach the other door, the building collapsed. One man was missing, believed drowned and three others were injured. One survivor walked 0.5 mi. (800 m) to the MacMillan & Bloedel camp at Franklin River for help. An ambulance called from Port Alberni was unable to get to Franklin River due to a washed out road. The rushing of the water down the hills into Alberni Channel could be heard from the docks at Port Alberni. According to Capt. Esson Young, it was the first time in 10 years that he had been operating boat service that he had heard such a sound.

MacMillan Bloedel's Franklin River Division logging operations were severely impacted. Swollen creeks and rivers washed out culverts, cut sections of the railway grade and threatened some of the bridges. The rail grade to the huge steam Lidgerwood Skidders washed out, isolating them. On November 18, locomotive No. 1007 and one car went through the bridge across the Franklin River. The locomotive was totally submerged, killing the engineer and the head brakeman. *1) The fireman narrowly escaped, surfacing 0.25 mi. (400 m) downstream. Prior to the accident, the bridge had been severely weakened. Normally mounted 20 ft. (6 m) above the water, the bridge had only 4 ft. (1.2 m) clearance. The Franklin River had undermined one of the supporting bents. It tore away from the bridge and smashed into two more bents, ripping them out (Hunter 1997).

On November 17, engineers were forced to open the outlet valves at John Hart Dam. The heavy rain accompanied by gale force winds overnight November 16-17 caused a great increase in the water level at the head pond. Overnight November 17-18, the Pachena Point weather station recorded a southeast wind blowing at 42 mph. (67.6 km/h).

In the middle of November, heavy rains and subsequent flooding caused considerable damage to the road and bridge system in the Squamish Valley. It was the second time in 10 days that the heavy rains brought the rivers in the area to a dangerous level. Between November 1-late November 21, 18.9 in. (463.1 mm) of rain was recorded. *2)

On the night of November 17, a culvert north of Shannon Creek washed out, for some time cutting traffic on the Britannia highway. Repairs were made and the road reopened a few days later. Muddy conditions later force traffic to a standstill. On November 23, highschool students from Britannia had to be transferred from one bus to another. On the night of November 17, high water undermined a small bridge south of Shannon Creek, which required repairs. Floodwaters also took out the culvert just north of Shannon Creek.

On the morning of November 19, water was across the road above the Mamquam bridge. Due to the high water and the condition of the bridge, school children from Brackendale got an unexpected holiday. Logs and debris coming down with the high water damaged the Mamquam River bridge. Between the morning of November 19 till the evening of November 22, the structure was closed to all heavy traffic. Loaded log trucks were stranded on the north bank of the river.

From the early morning till 10 p.m. on November 18, Squamish lost its municipal water supply. Heavy rains caused the Stawamus River to rise and wash out a bent between the intake and the forebay. On November 21, water was off in some sections of the town due to two breaks in the pipe; one at the Castle's crossing and the other in front of the PGE houses. Because of low water pressure, the hospital was without water between 3 p.m. on November 21 till the afternoon the next day. Gravel and debris washed in front of the intake at the dam reduced the amount of water coming through the pipe. On the afternoon of November 22, the lack of water closed the Squamish schools.

On November 18, Wraymar Mills were forced to close their operations when part of their road washed out. After repairs were made the men returned to work on November 22.

*1) The 1929 Baldwin saddletank rod engine, a 2-8-2T, was a very powerful locomotive capable of pulling 40 loaded log cars (Hunter 1997).

*2) In November, Squamish recorded a total precipitation of 23.4 in. (594.3 mm), more than 3 in. (75 mm) more than the total for November 1953 (*The Squamish Advance*, December 2, 1954).

February 6-7, 1955

Source: *The Daily Colonist*, February 8, 1955.

Details: During the 24 hours ending 10:30 p.m. on February 7, Greater Victoria recorded a near record of rainfall of 2.66 in. (67.6 mm). Almost half of it came down between 10:30 a.m. and 4:30 p.m. *1) In the afternoon of February 7 and early February 8, a weather front brought near-freezing temperatures to Victoria. A power failure at 5:30 p.m. affected Cobble Hill, Cherry Point, Mill Bay and the west side of Shawnigan Lake. Scattered sections of Victoria reported sleet. Up to 1 in. (2.5 cm) of snow fell at the Patricia Bay Airport. On the Malahat, 6 in. (15 cm) of snow fell. Cobble Hill reported 4 in. (10 cm) of snow and Duncan 3 in. (7.5 cm). Around Duncan, logging operations on higher levels were forced to suspend. Snow also fell at Jordan River but up-island points north of Ladysmith reported rain and slush.

Flooding occurred in many areas in Greater Victoria. Snow and slush was heavy in other parts of Vancouver Island. Worst flood damage occurred in the "troublesome" Bowker Creek area where water covered everything in a dozen blocks. Severe flooding occurred in the area from Doncaster and Edgeware to Cedar Hill Crossroad and Shelbourne. Bowker Creek reached its highest point in years. Culverts built along Doncaster in 1953 took almost all the water but rowboats could be used where low banks allowed floodwater to cover streets and yards. At the Victoria Riding and Hunt Club at Cedar Hill Crossroad, after a small temporary stable flooded eight mares and foals had to be moved into the main barn. Flooded basements were reported from the Wicklow, Munro, Mewdley, Kinver, Forshaw, Colville, Cadboro Bay Road, Neil, Allenby, Linkleas, Byng, Blair,

Feltham and many other areas with water up to 3 ft. (90 cm) deep. At Saanichton Road, Douglas, Blenkinsop Road and Panama Flats, four homes were surrounded by water. In Victoria West, a house at McCaskill Street was flooded with 3-4 ft. (0.9-1.2 m) of water. Built on the site of a former swamp at the foot of a hill, it seemed near collapse. It was entirely surrounded by water with the shallowest approach 3 ft. (0.9 m) deep.

*1) The 24-hour total was almost as much as Victoria's average rainfall of 2.75 in. (69.9 mm) for the month of February. The all-time record for a one-day rainfall was on February 16, 1949 with 3.18 in. (80.8 mm).

March 27, 1955

Source: *The Vancouver Province*, March 30, 1955; Stethem and Schaerer 1980 (pp. 7-8).

Details: On March 27, a "huge avalanche" swept down a mountain slope at Seymour Inlet near Alert Bay, 350 km northwest of Vancouver. The avalanche killed a logger and injured another one. It carried the victim, Gordon Johnson, 2,000 ft. (600 m) down the mountain and tossed up a 16-year old logger 200 ft. (60 m) from where he originally stood. Four other loggers ran clear. The six men were working near the top of the steep mountain slope.

At the accident site, moderate temperatures and rain prevailed. The motion of a dislodged stump in the water-saturated snowpack triggered the avalanche. The loose snow avalanche started on a slope with an incline of about 10° at an elevation of about 600 m. For the first 30 m, it moved slowly with a width of about 8 m. After falling onto steeper terrain with a slope of about 25°, the avalanche quickly gained momentum and volume. It expanded to a maximum width of 120 m, stripping the soil and vegetation down to the granite bedrock. The avalanche swept a yarder and donkey engine into the inlet. The force of the heavy wet snow mixed with debris splintered logs with diameters larger than 1 m. Continuing debris movement at the edges of the avalanche path hampered the search.

The yarder engineer, whose body was never found, was engulfed in the moving snow and swept into the water. Deep water in the inlet made diving unfeasible. The injured signalman was flown by floatplane to a hospital at Alert Bay (Stethem and Schaerer 1980). On March 30, Johnson and his donkey engine were still missing, presumably buried under tons of dirt, rocks and trees or in the sea.

April 8, 1955

Source: *The Vancouver Sun*, April 10, 1955.

Details: On April 8, a rockslide came down near Cameron Lake onto the highway to Port Alberni, Alberni Valley's only access road. *1) The Alberni area had recorded 1.2 in. (30.5 mm) of rain in 36 hours.

*1) This was the third slide to come down since the matter was discussed between MLA John Squire and public works officials. If the road around Cameron Lake could not be made permanently safe, it should be re-routed away from the lake.

June 9-13, 1955

(Spring runoff/flooding).

Source: *The Vancouver Sun*, June 13, 1955; *The Squamish Advance*, June 16, 1955.

Details: Floodwaters of the Similkameen and Tulameen rivers inundated the highway south of Princeton. At Cawston, 35 mi. (56 km) downstream, residents were preparing to evacuate. With temperatures in the 80s degrees F (26.7-32.2° C), the Similkameen River was reported at its highest point since 1948.

At Revelstoke, the Columbia River rose 2 ft. (60 cm) while the Kootenay River at Warner rose nearly 1 ft. (30 cm). At Hope, the Fraser River rose 6 in. (15 cm) in 24 hours. According to

dyking inspector Jack MacDonald of New Westminster, the main runoff from snow packs above the 6,000-ft. (1,800 m) was still to come.

A sudden hotspell, in which temperatures climbed to 95.5° F (35.3° C) on June 9, caused the Squamish and Cheakamus rivers to rise. On June 10-11, the Squamish River crested when it was 2 ft. (60 cm) below the road at Alvie Andrews'. Cool nights and lower daytime temperatures caused the river to drop almost 3 ft. (90 cm). On the same dates, the Cheakamus River was also high, threatening B.C. Electric's bridge across the Cheakamus. Rock fills were placed around the bents but further work was required as soon as the river dropped. On June 9, the southern approach to the Mamquam River collapsed when a logging truck passed over it. The approach was filled and a breakwater built alongside it. The bridge, which since the previous fall's high water had been anchored by cables, required extensive repairs or replacement.

June 22-29, 1955

(Spring runoff/flooding).

Source: *Nelson Daily News*, June 23, 1955; *Trail Daily Times*, June 23, 1955; *The Vancouver Province*, June 25, 1955; *The Daily Colonist*, June 28 and 29, 1955.

Details: On June 22 at 9 p.m., following the hottest day of the year with temperatures of 91° F (32.8° C) and 94° F (34.4° C) in Nelson and Trail, respectively, a spectacular storm lashed the Kootenay area. Other parts of the Kootenays recorded temperatures up to 97° F (36.1° C). Nelson was hit with the "worst" lightning and rainstorm, blacking out the city for 35 minutes and cutting telegraph and telephone communications. It caused five fire calls including three power line fires. Trail, where the damage was light, suffered intermittent power outages overnight. The downpour followed high winds. The Nelson to Trail highway washed out completely 8 mi. (12.8 km) south of Nelson. Between Penticton and Cranbrook, CP telegraph communication lines went down. As the storm moved southward, heavy rain followed.

On June 24, two days after the heavy rain, a disastrous windstorm had left Nelson, Trail and other small west Kootenay towns cut off from the outside for several hours after torrential warm rains caused flash floods in the west Kootenay area. At least six bridges washed out, a hotel was destroyed and two westbound CPR trans-continental trains were held up. The Trans-Provincial Highway bridges at Sanca, Lockhart, Grey (Gray) Creek and La France washed out. Five of the bridges between Sanca Park and the main Kootenay Lake ferry were knocked out. At Sanca Park, the occupants of flooded cabins were evacuated. "More water flowed through the park than down the creek." The 50-mi. (80 km) stretch of highway on the east shore of Kootenay Lake between Kootenay Bay-Creston was closed. Greyhound buses were rerouted through the U.S.

On the Southern Provincial Highway No. 3 between Nelson-Creston about 100 yd. (90 m) of road washed out. Part of the highway was under 3 ft. (90 cm) of water. Along a 30-mi. (48 km) stretch, more than 500 people were isolated. Public Works crews were putting in Bailey bridges. Half a dozen families were evacuated from the flooded Goat River bottom area.

Sandon, the historic mining town in the Upper Columbia Valley and once the mining capital of the Slocan, was probably the hardest hit community. Carpenter Creek, which flows under the town's main street, undermined the ghost town's old buildings. The 16 residents, left without food or drinking water were evacuated. At the height of the storm, the historic Reco Hotel caved in. Rising waters caused some flooding in Trail. Residents of some lower areas and a number of people at Australian Ranch in the Interior were evacuated.

Heavy rains hit Vancouver and thunderstorms swept over Vancouver Island, disrupting communications between Victoria and the mainland. Overnight June 22-23, Pat Bay airport recorded 1.61 in. (40.9 mm) of rain while in the Kootenay valley 0.66 in. (16.8 mm) fell.

At noon on June 24, a rock and mudslide came down 6.5 mi. (10.4 km) east of Golden. It was 150 yd. (135 m) long and up to 40 ft. (12 m) deep, involving 10,000 yd.³ (7,646 m³) of rock and mud.

On June 28, the Fraser River went up 1.5 ft. (45 cm) in 24 hours at the gauge at Mission reaching 20.12 ft. On June 29, it was expected to reach 23 ft. According to dyking officials, a 5.6-ft. (1.7 m) crest heading for the Fraser Valley would not repeat the 1948 flood, which caused \$30 million damage. The dikes were considered to be in good condition and the river was expected to drop.

July 7, 1955

(Spring runoff/flooding?).

Source: *The Vancouver Sun*, July 8, 1955.

Details: Damage caused by high, fast-moving waters of the Fraser River left two areas in the lower mainland without ferry systems. On July 7, the Ladner ferry slip collapsed on the shore side of the dock. About 60 ft. (18 m) of the dock toppled. The repair was delayed by the lack of piles, of which 190 were required, each about 75 ft. (22.5 m) long.

Floodwaters washed out about 100 ft. (30 m) of the Agassiz to Rosedale ferry landing. Work had started in planking the ferry landing. Provincial government engineers announced that the old summer landing would be repaired for use while the river was high. It would be useable only until the water would drop 5 or 6 ft. (1.5-1.8 m). The river was already down 3 ft. (0.9 m) from its 20.2 ft. maximum.

August 22, 1955

(Subaqueous slope failure).

Source: *The Vancouver Sun*, August 23, 1955; Eisbacher 1983 (p. 24).

Details: On August 22, a major slump at the shore face at Woodfibre, along the west side of Howe Sound across from Britannia Mine, dislodged a warehouse and dock about 30 m seaward. *1) At 4 p.m., the wharf began to sag with a crunching sound and within half an hour a large section had slid into the deep water of Howe Sound. John Guthry, plant manager, stated "Apparently a section of sand and gravel shore had collapsed under it." A warehouse and office area collapsed next. At the head of the slump, water depths increased by about 10 m and the disturbed part of the delta front apparently extended to about 150 m below sea level (Eisbacher 1983). The event was triggered by an extreme low tide (Evans and Clague 1999).

The collapse of the wharf and three warehouses into Howe Sound forced the closure of Alaska Pine's rayon pulp mill. Many tons of pulp stored in the warehouses were lost. The damage was estimated between \$500,000-750,000. The main plant, which was not involved in the cave-in, was expected to reopen a few days later. (*The Vancouver Sun*, August 23, 1955).

*1) Woodfibre is a major pulp mill located on the fan delta of Mill Creek. The plant and related warehouse-wharf complex were constructed in the early 1910s (Eisbacher 1983).

October 23-25, 1955

(Flash flood and tidal flooding).

Discharge (m³/s): Max. daily: October 25: Squam.: 793E; October 28: Stamp A: 490; max. instant.: N/A.

Source: *The Squamish Advance*, October 27; November 3, 1955; *The British Columbian*, October 24, 25 and 26, 1955; Environment Canada 1991.

Details: Overnight October 23-24, winds at Sea Island airport reached velocities of 25 mph (40.2 km/h) and 35 mph (56.3 km/h) in parts of the mainland. About 0.5 in. (12.5 mm) of rain was recorded and 0.75 in. (18.8 mm) within New Westminster city limits. Apart from the water main trouble at 6th Street/6th Avenue, the storm caused little damage. The fringe of a major storm passed over northern British Columbia.

Overnight October 24-25, Sea Island airport recorded 1 in. (25 mm) of rain while Hope reported just under 3 in. (75 mm). Squamish reported more than 6 in. (150 mm) of rain in 38 hours

with 4 in. (100 mm) falling in the 24-hour period ending 8 a.m. on October 25. Winds in the Lower Mainland reached up to 30 mph (48.3 km/h).

A washout on the CPR Kettle Valley rail line in Coquihalla Pass trapped a passenger train carrying some 30 people for 36 hours. Early on October 25, washouts marooned the train on a siding at Jessica, 13 mi. (20.8 km) east of Hope. One washout left the rail tracks for close to 100 ft. (30 m) virtually suspended in mid-air. Passengers had to be escorted to a relief train one by one over a temporary catwalk spanning a 60-ft. (18 m) deep gorge.

The heaviest property damage occurred at Squamish where after a 3-in. (75 mm) rainfall the Squamish and Mamquam rivers rose 8 ft. (2.4 m) in 24 hours. On October 25, many acres of the north end of Squamish were flooded. Property damage ran in “the thousands of dollars.” Floodwaters took out the Mamquam River main highway bridge. After debris piled against it both ends gave way and hurled against the railroad bridge. Steel cables were fixed to the remaining centre portion to prevent it from going out and knocking the railway bridge out. On the morning of October 25, the bridge was a “twisted mass of wreckage” with a portion of the bridge draped over a huge logjam in the middle of the river. Both the north and south sections of the bridge were washed out, cutting road communication between Squamish and the Valley. *1) PGE crews managed to save their bridge by blasting away the logs and debris which had lodged against it. Until the completion of a new road bridge, the railway bridge across the Mamquam River was planked and a temporary road built to the highway. It was expected ready for use on November 3.

Many families in the area between the Mamquam bridge and the PGE shops moved out with four of them taking refuge in the school. Between the shops and the Brackendale store, water covered the road in most places. At Leski’s crossing, water was reported to be up to the tops of the fence posts. On October 25, water also came over the road in several spots between the shops and Buckley’s Crossing but soon drained off when the tide went down. Twelve families had to be evacuated from homes in the low-lying north end of Squamish. Clogged drains caused flooding in front of the taxi office and many streets had 1 ft. (30 cm) of water on them. Homes on Britannia Avenue and other streets in the area north of Government Road had flooded basements. North of Government Road, floodwaters coming down the old Mamquam River channel behind the school inundated the streets there. On October 25, both schools in Squamish were closed. As a temporary measure the PGE was transporting 65 pupils from Brackendale to the Shops each day.

A washed-out bridge closed the highway between Squamish-Britannia Mines. As the bridge near the old telephone camp below Shannon was in a “shaky condition,” traffic on the Britannia Highway was halted. Washouts on the PGE line interrupted rail traffic for more than 24 hours. Several PGE trains were cancelled due to washouts and slides. Several small slides came down between Squamish-Lillooet. The two main “trouble spots” were between Rainbow and Parkhurst, where there was a washout 80 ft. (24 m) long and 2 ft. (60 cm) deep. Above Parkhurst, a 300-ft. (90 m) section washed out to a depth of 8 ft. (2.4 m).

*1) Forty percent of the total rainfall of 15.9 in. (403.9 mm) recorded in October fell in less than 48 hours between the afternoon of October 23 to 8 a.m. on October 25. (*The Squamish Advance*, October 27; November 3, 1955).

*2) This was about the tenth time in 28 years that logs and debris coming down the Mamquam took this bridge out. Each time it was rebuilt with the same type, a wooden bridge on pilings. An editorial in *The Squamish Advance* suggested it was time to construct a modern steel bridge across the river. A steel span would permit the logs to pass underneath it. (*The Squamish Advance*, October 27, 1955). On January 26, 1956, the new Mamquam road bridge, replacing the old one washed out by floods the previous fall, opened for traffic. Eight ft. (2.4 m) above the level of the road and just east of the former one, the bridge angled to conform to the river current. The piers were also set in at an angle to permit logs and debris to flow under it and prevent jamming. The latter was one of the causes of the old bridge’s washout. The new structure had four short

bents at the south end and two at the north approach with two centre steel spans each 60 ft. (18 m) long. (*The Squamish Advance*, February 2, 1956).

November 1-4, 1955

(Rain-on-snow and storm surge/tidal flooding).

Discharge (m³/s): Max. daily: November 3: Chem.: 320E; November 4: Cowich.: 213; Nan.: 623A; Sooke: 39.1; Sproat: 146; November 5: CR/CR: 504; max. instant.: November 4: CR/CR: 603; Chem.: 218.

Source: *The Vancouver Province*, November 4, 5, 7, 8, 9, 10 and 15, 1955; *Victoria Daily Times*, November 15, 1955; *The Vancouver Sun*, January 18 and 21; April 5; May 3; September 27, 1956; January 11, 1961; February 16, 1976; *The Vancouver Herald*, November 23, 1955; *The Squamish Advance*, November 10; December 1, 1955; B.C. Ministry of Public Works 1957 (p. N 33); Eisbacher and Clague 1981; Environment Canada 1988; Environment Canada 1991.

Details: A rainstorm with a maximum daily precipitation of 85 mm, or a maximum of 125 mm for the storm total for the downtown Vancouver area, caused landslides in the Vancouver region (Eisbacher and Clague 1981). The “worst rainstorm ever to hit the west coast” caused widespread flooding. In a 72-hour period, North Vancouver recorded 18.58 in. (471.9 mm) of rain. The rains melted over 14 in. (35 cm) of snow from Hollyburn (*The Vancouver Sun*).

It was the second storm in as many weeks to hit the Lower Mainland. Vancouver Airport recorded 2.40 in. (61.0 mm) in 24 hours, while North Vancouver registered a record 4.82 in. (122.4 mm) during the same period. Between the night of November 2-November 4, weather forecaster Ralph V. Tyner recorded 7.71 in. (195.8 mm) in his rain gauge at Sunnycrest, North Vancouver. The bulk of this, 4.55 in. (115.6 mm), fell between 7 p.m. on November 2 and 9 a.m. on November 3. New Westminster and district reported an all-time record rainfall. On November 2-3, New Westminster recorded 3.53 in. (89.7 mm) of rain in 24 hours. In the Interior, the downpour was mixed with snow.

The 48-hour downpour of rain caused an estimated \$5 million damage. Damage in West Vancouver was estimated at \$1 million. The “heaviest rainfall in 45 years” cut British Columbia’s three main highways with washouts and slides, derailed a trans-continental passenger train and forced evacuations in many communities. Floodwaters played havoc with roads through the north shore on Burrard Inlet. Along with sections of western Washington State, the worst stricken areas were North and West Vancouver, Haney district, and sections of Vancouver Island. *1)

On November 4, 800 regular and militia troops were called out to help to control the floods. In North Vancouver, an estimated 3,000 flood fighters turned out, including firemen, policemen, soldiers, sailors, members of Civil Defence, Red Cross, Salvation Army, Scouts, civilians and 150 UBC Engineering students. Overnight November 3-4, almost 250,000 sandbags were placed in North Vancouver. Highways minister P.A. Gaglardi declared the North Shore an emergency flood area. North Vancouver residents noted that the army came too late to prevent a lot of damage. In South Westminster, over 500 homes were surrounded by water.

In Richmond, damage on Lulu and Sea islands was “much less than expected.” The municipality’s new canal drainage system largely in operation now “had speeded up the runoff considerably.” (*The Vancouver Sun*). However, several large ditches flooded roads, farmland and lawns.

In Vancouver and North Vancouver, residents complained about dirty drinking water. Water Board Commissioner T.V. Berry said it was caused by silt getting into the mains. North Vancouver residents were asked to boil their drinking water following the washing away of the Lynn Creek inlet overnight November 3-4.

According to New Westminster’s Board of Works Superintendent Ernie Furness, this “worst rainfall in the city’s history” caused two riverbank slides and flooded hundreds of basements. In New Westminster, the main trouble spots were in front of the B.C. Penitentiary and at Columbia and 10th streets through the commercial district. A riverbank slide near Great Northern station spread

onto Front Street in front of the Royal City Cannery. A second slide blocked a roadway at the approach to the Patullo Bridge where reconstruction was being carried out. The wooden bridge in front of the South Westminster Volunteer Fire Department flooded and was feared to collapse, stranding the fire engine. The provincial government promised a \$12,000 grant or two additional pumps capable of handling 35,000 gal. (157,500 L) of water per minute. The maintenance cost of the pumps, installed at Timberland mill and under Patullo Bridge, would be borne by the district dyking commission.

Surrey municipality would also contribute \$1,500 for widening and deepening drainage ditches. *2) Near Hjorth Road, tracks of the BCER were reported washed out. In the 1,000 block of Columbia Street the office of Joe Haddock Tire Service was flooded with 1 ft. (30 cm) of water. Fogg Motors' car lot was "up to its hubs" in the water. Commercial Truck lots were flooded and water was coming into Butler Tire office. Flooding near Fry's Corner forced traffic on a detour through Cloverdale and along the New McLellan Road into Langley. In the same area, the Latimer Road was reported to be completely washed out. On Scott Road at the intersection of the Old Yale Road, traffic was detoured, as the water was too deep for safe traffic passage. Low-lying areas of South Westminster and Port Mann districts were flooded. On November 3, torrents poured down parts of Coquitlam into Maillardville. Nelson Ave. at Brunette Street had some of its pavement torn out and the basement of an apartment block was inundated.

In Haney, at least six houses, including the ones owned by David Spalding and W. A. Marshall were almost completely demolished or damaged beyond repair. Two more homes were reported swept away near Alco Camp, about 3 mi. (4.8 km) east of Haney. The approaches to the city's three highway bridges were damaged. In Haney, one man was feared drowned and 200 people were evacuated from Alouette River area. On November 7, a 79-year old man walked out after having been trapped by floodwaters since November 4 in his house about 5 mi. (8 km) northeast of Haney. During November 5-6, Haney, 30 mi. (48 km) east of Vancouver, suffered further damage from floodwater of the Alouette River.

On November 3, the Vedder River near Yarrow recorded a maximum daily water level of 3.810 m (Environment Canada 1988). Near Burnaby, Still, Eagle and Byrne creeks overflowed their banks. Many basements were flooded. More than 100 municipal employees cleared plugged culverts and flooded ditches. Three roads, Willingdon (by Still Creek), Sperling Avenue between Lougheed and Grandview highways (by Burnaby Lake) and Piper, were closed to traffic. Barnet Highway, open in Burnaby, was closed by a slide on the Port Moody side. On November 4, the Willingdon Road was still closed as the Vancouver and District Water Board wished to check the Still Creek bridge for possible damage. *3) The Lougheed Highway was blocked off as far as Essondale and many secondary roads were impassable. By November 5, the area towards Essondale was still so deeply flooded "that you could float the Queen Mary on it." Though still under 1 ft. (30 cm) of water, the road to the Essondale provincial mental hospital colony farm where 525 inmates were marooned on November 4, was accessible again.

The Surrey School Board reported the closures of Simon Cunningham and David Brankin schools due to the heavy rain. Overnight November 3-4, four people, including two RCMP constables sent out to rescue a retired couple on Pipeline Road, 6 mi. (9.6 km) north of Port Coquitlam, were stranded for 10 hours on an island in the Coquitlam River above Port Coquitlam. The Johnsons, the rescued couple, lost both their furnished summer home and permanent duplex in the flood. On November 3 in Port Coquitlam, the flooding Coquitlam River forced the evacuation of a dozen families in the Red Bridge area along on Pitt River Road. Despite the deepening of the river, Coquitlam River caused flood problems in the previous years. In South Westminster, 30 families were evacuated. Worst hit in the South Westminster area were homes along Scott Road and Cannery Road, west of the Patullo Bridge.

In the North Vancouver (highways) District, serious flooding occurred on Seymour Creek and Capilano River. Below the upper Bridge, seepage created havoc in houses and yards along Seymour Boulevard and Keith Road. At Seymour Boulevard, higher up the creek, water completely

backed up across the road and flooded some homes. The Keith Road bridge was closed late on November 3 when a 5-yd. (4.5 m) section of sidewalk slid into the river. Above the Keith Road bridge, floodwaters carried away more than 40 ft. (12 m) of the west bank. In North Vancouver, Seymour Creek rose to the top of the dike below the Dollarton highway bridge, flooding a dozen homes. These homes suffered flood damage when river broke through its banks (*The Vancouver Province*, December 2, 1958).

Some heavy equipment used to prepare a riverside site for an Anglo-Canadian Cement Co. gravel crushing operation dropped into the water. A 3-ton bucket from a drag crane was hurled away by the 25-mph (40 km/h) current. A full load of railway track stacked on the bank collapsed into the creek and vanished. The 0.5-mi. (800 m) approach road to the operation was ripped away. Almost the whole of one house was swept away. Despite serious undermining of the west end of its foundations, the lower Seymour bridge remained open. Floodwaters threatened the Capilano Bridge, replaced in 1949 after a flash flood swept away the centre span, was threatened. A temporary 200-ft. (60 m) pile trestle bridge was constructed across the Capilano River (B.C. Ministry of Public Works 1957). Most creeks in West Vancouver overflowed, causing flooding conditions on Marine Drive. Extensive riverbank protection was done on Seymour Creek and Capilano River. Three D-8 bulldozers were used to pile up a huge embankment to block the old course of the Capilano River, running through trees in the 2000 block Capilano. At midnight November 3 along Seymour River, the \$20,000-house at 205 Riverside Drive beside a damaged Seymour River bridge belonging to Joseph Carlson crashed into it after he battled all day to build a flood barrier. At 25th and Mathers, floodwaters seriously eroded the road and caused a cave-in, closing the road to all traffic. At Eagle Harbour, floodwaters from Nelson Creek closed Marine Drive to traffic. At 24th and Marine, floodwaters halted traffic. Vehicles had to be left at Fisherman's Cove. Here, Pacific Stage Lines buses ferried the stranded drivers and passengers across the flooded highway to Horseshoe Bay, Garrow Bay and Whytecliff. Floodwaters trapped by the elevated PGE right-of-way backed up into practically every house in the 1500 block Bellevue. *4) On November 4, the school bus from Deep Cove to North Vancouver was cancelled.

In the Mosquito Creek area around Fairmont and Forest Hills Drive, residents of 20 homes were evacuated. On the southwest corner of Forest Hills Drive, the river cut 4 ft. (1.2 m) under the foundations of a house. According to North Vancouver District Reeve Grant Currie and District Engineer George Meckling, "there was little hope of taming the wild Mosquito Creek." On the question of tree cutting on the North Shore areas and its effect on water runoff, West Vancouver's Reeve Jack Richardson said: "we can't restrict tree cutting on private property." *4) More work was being done to hold back the Capilano River at the Lions Gate development. It was considered a bad move to allow the Lions Gate development on an old creek bed. On November 5, the Mosquito Creek bridge at 15th and Fell was still out but all main roads and bridges were passable. In the Ambleside district of West Vancouver, waves broke against the shore tossing water over shore side houses and littering the beach with logs.

For a second time in two weeks high water threatened the Squamish Valley. Light snow falling on November 2 turned into heavy rain later that day. The rain, which continued all of next day, brought local rivers over their banks. Early on November 3, the bridge across Stoney Creek was "in a precarious condition." School buses transportation to Britannia Beach was cancelled. By early afternoon, the Mamquam and Squamish were rising and Brackendale and Shops pupils were sent home. On November 4, school was cancelled. The Mamquam and Squamish rivers flooded the valley from the former Joyce ranch to below the Shops. About 100 people were evacuated from the area between the Shops and Brackendale. In the lower portion of the valley, some residents in the area between the Shops and the Mamquam River were also moved out. Several families along Britannia Avenue and Newport Avenue temporarily left their homes, most of which had flooded basements. Cleveland Avenue flooded for almost half a block as well as the sidewalk of the street. In front of the taxi office, water lapped over the sidewalk. The lower end of town below Vancouver Street was also inundated. On Cleveland Avenue the drains were plugged in the lower end of town.

As there was not long enough runoff between tides to permit the water to drain away, the floodgates could not be opened. Early on November 5, all the water had drained in that part of the village but Cleveland Avenue was still flooded the following week. *5)

On November 4, Squamish lost power for several hours and also their water supply. The Stawamus River took out part of the pipeline, a section of which had to be rebuilt. The Stawamus River also flooded the road to the Anderson camp and the Indian Reserve. Near Cheekye, the Cheakamus River washed out a small portion of the road to Paradise Valley. Evans Creek washed holes in the upper valley road, portions of which were still under water on November 6. Heavy rains washed out the Empire Mills road near the foot of the hill east of Curly Lewis (Squamish area). A bridge was reported being built over the washout and portions of the washed out area were being filled (*The Squamish Advance*, December 1, 1955). Had the rain continued, the flooding would have been worse. As well, on the morning of November 5 there was a high tide bringing water close to the top of the dykes.

Late on November 3, the heavy rains caused washouts and slides on the PGE rail line between Lillooet-Shalath forcing the cancellation of the passenger train on November 4. Three washouts occurred and in the southern portions of the line at Mile 13, 43.5 and 53. Way freights trapped between the slides acted as work trains for the repair crews. The line was cleared late on November 5.

The southern British Columbia highways sustained thousands of dollars worth of damage. Flood damage to provincial highways was expected to reach \$300,000, with the worst damage on the Hope to Princeton highway. Most of the highway damage was concentrated on the Hope end. The Southern Trans-Provincial Highway was cut by a large 0.5-mi. (800 m) long washout at Nine Mile Creek, 9 mi. (14.4 km) east of Hope on the Hope to Princeton section, halting traffic. A 1,500-ft. (450 m) long slide closed the main Okanagan Valley route to the coast "indefinitely." Four miles out of Hope, a slide and washout left a culvert hanging in the air from "half a highway."

On November 4, several highways were still blocked. The Trans-Canada Highway from Vancouver to Hope was open, but in the Fraser Canyon it was closed to trucks. The Fraser Canyon highway was also knocked out by slides. In the Fraser Valley about 4 mi. (6.4 km) east of Deroche, a new section of the Lougheed Highway washed away. A temporary road was built around the washout. On November 5, the Hope to Princeton highway reopened.

Two slides and flooding cut the CP rail line. Another slide was reported at Albion, 30 mi. (48 km) east of Vancouver. Near Harrison Bay, the tracks were covered by 4 ft. (1.2 m) of water spilling down from the highway. During the high water, all service across the Fraser River at the site of the collapsed CPR bridge at Mission City halted. *6) With the slips under water, the Mission Ferry was suspended. The Fraser River rose to 14 ft. (4.2 m), 5 ft. (1.5 m) above the level for which the slips were designed. On November 4, the river's rate of climb slowed to 6 in. (15 cm) in 12 hours.

Mud and rockslides delayed train arrivals from eastern Canada up to 15 hours. The CNR *Continental* was held up at Stout, 18 mi. (28.8 km) west of Boston Bar due to a mudslide. In the Fraser Valley, two big mudslides derailed a CPR train and tied up communications between New Westminster-Agassiz. On November 3 at 6:10 a.m., the CPR transcontinental train *The Dominion* hit a rockslide 1 mi. (1.6 km) west of Harrison Mills. Three diesel units and an express car jumped the tracks and plunged into the edge of Harrison River and were partially submerged. The passenger cars and baggage cars remained upright. The train's fireman escaped from the engine cab rolled into Harrison Bay. One of the three crewmen trapped in the cab of the engine stated, "We were tossed around like marbles in a bucket." The mudslide was still flowing at the time of impact. Speedy evacuation of the passengers avoided possible disaster as further slides washed mud and debris through some of the emptied cars. Three cars, a day coach and two Pullmans, were suddenly inundated with mud. Several elderly passengers might have had great difficulty to get to safety. The mud was 2 ft. (60 cm) deep and rising quickly. There were no injuries and the 115 passengers and crew were carried by bus. On November 4, CPR officials estimated it would take at least three days before a passenger train derailed by floods at Hamilton (Harrison) Mills would be cleared and the

line repaired. Two express cars of the derailed train had been unearthed. All incoming and outgoing CPR trains were using the CNR track and station in Vancouver. A second mudslide, measuring 8 ft. (2.4 m) by 400 ft. (120 m) blocked the CPR tracks near Albion. A work train from Vancouver headed for Harrison was held up at Albion.

Floodwaters in the Squamish River valley caused heavy losses to the pink salmon stocks. According to Chief Fisheries Supervisor A.J. Whitmore, the salmon “verges on disaster.” The loss to salmon due to flood damage to Lower Mainland streams could run as high as 90% in some varieties. *7) Chum salmon suffered the most damage, running as high as 90% in the Chehalis River, a tributary of the Harrison River. In the Vedder and Chilliwack rivers, losses were expected to be about 50%. The Alouette, Silver, Coquitlam and Kanaka all reported heavy losses. Permanent damage to spawning grounds was expected to be considerable. Residents in the flooded section north of Haney reported millions of fish eggs over their lawn. The flood toll in salmon potential might reach \$3 million. Below the Cleveland Dam, some damage was done to fishways and the weir. Heavy erosion occurred on the Capilano River, filling the lower end with a large amount of gravel and plugging all the vents of the Capilano River fishway.

Damage on Vancouver Island was reported to be widespread. The Trans-Canada (Island) Highway was closed for almost two days after Arbutus Creek washed out 75 ft. (22.5 m) of highway 15 mi. (24 km) north of Victoria. Traffic was detoured via the Mill Bay ferry. The E&N did not carry passengers beyond Cowichan. At Koksilah near Duncan, the tracks were flooded, halting rail traffic on November 3. On November 4, a warning to boil water from wells was issued to all residents with wells located in or near flooded areas on Vancouver Island.

The storm of November 3 caused the Port Alberni water system intake to be blocked by debris 10 ft. (3 m) deep. On November 4, a small hole was blown to allow water through and a temporary pipe was placed to give sufficient supply to the city.

On November 3, the Nanaimo River burst its banks cutting the Nanaimo River area off from the city. The river rose a maximum of about 5 ft. (1.5 m). Residents of the Riverside autocourt and 24 families in low-lying areas were evacuated and returned the next day. Floodwaters moved a garage housing a large truck 10 ft. (3 m). On November 4, the North Cedar School was closed. Haslam Road reopened but MacMillan and Cedar roads remained impassable.

*1) Following “one of the worst flash floods in the North Shore history,” both West Vancouver and North Vancouver District decided to study possible methods to avert future flood damage on the North Shore. To prevent reoccurrence the costly North Shore floods, Liberal Leader Arthur Laing urged the Legislature to find ways to study the matter. (*The Vancouver Sun*, January 18, 1956). Early January Lions Gate Park residents charged the Greater Vancouver water Board ignored pleas for co-operation in flood control by lowering the level of Lake Capilano (sic) during flood threats. Theodore Berry, board commissioner, produced evidence that the dam “skimmed the peak of the floodwaters during the November flood.” Premier Bennett pledged 40% provincial aid and suggested 40% from Ottawa with the municipality paying the balance. (*The Vancouver Sun*, January 21, 1956).

*2) A network of municipal ditches and wide tidal ditches of the dyking commission drained the flooded area. Residents complained about the condition of the ditches and the municipal dyking system they claimed were clogged with grass and berry vines (*The Vancouver Province*).

*3) The flooding caused by Still Creek near Burnaby was blamed on the blacktopping. According to Reeve C.A. MacSorley, the blacktopping of acres of land around the big Grandview highway industries flanking Still Creek on the Vancouver side, provided a huge catchment for the normally thin stream. Since 1970, debris-laden Still Creek, which is part of the Brunette River drainage and provides 50% of the flow into Burnaby Lake, has been posted as unfit for swimming or wading (*The Vancouver Sun*, February 16, 1976).

*4) Seven West Vancouver home owners filed damage claims against PGE for the recent flood damage for the failure to put enough culverts under its right-of-way (*The Vancouver Province*, November 15, 1955). Forty property owners on Mosquito Creek started a suit in Supreme Court against the District of North Vancouver claiming compensation for property damage sustained in the November 1955 rampage. They alleged negligence by the municipality in the control of the creek and in subdividing adjacent property, which was claimed to have resulted in blockage of the water course (*The Vancouver Sun*). On September 24, 1956, North Vancouver District Council proposed to contribute 20% to a fund with the provincial government and make this amount available to the people of the established flood disaster area, plus an exchange of property to be made subject to confirmation by Council and the approval of the Lieutenant-Governor-in Council. The resolution did not specify the estimated \$521,000 cost to rehabilitate flood victims, or contain specific details of a proposal to exchange municipally-owned land for Mosquito Creek flood area (*The Vancouver Sun*). West Vancouver municipal council, anxious to avoid a recurrence of the floods, arranged for an outside consultant to study the entire matter (*The Vancouver Herald*). Mr. A.C. Buckland, one of British Columbia's foremost forestry consulting engineers, hired by North Vancouver District to investigate logging programs in watersheds such as Mosquito Creek, reported that the Grouse Mountain logging did not cause flooding. He denied that the high elevation logging practices did not contribute to November's Mosquito Creek flood. "It is in my opinion based on observations made over a period of years on logged land at high elevation on our coast mountains that logging of this nature improves the runoff problem and does not make it worse. At lower elevations where the timber is predominantly Douglas fir and cedar, there may be a flood problem develop from large areas of logged land. However, at high elevation such as the upper Mosquito Creek watershed, there is no Douglas Fir; the timber is predominantly hemlock and balsam with a dense ground cover of blueberries. In this forest (type) there is a different drainage pattern to that which occurs from areas at lower levels. To some extent the clearing on Grouse and Fromme mountains has been planned as a careful and conservative program." The report stated that the overall drainage pattern from a watershed of more than 2,000 ac. (800 ha.) has not been greatly affected by logging confined to 215 ac. (86 ha.) of recreational (ski trail) purposes. The clearing projects actually lessened the volume of sudden runoff "but unfortunately did not diminish it enough to prevent the flood disaster." The Buckland report confirmed the findings of the Marshall report, which also claimed there was no evidence that high-level logging had contributed to Mosquito Creek flooding (*The Vancouver Sun*).

*5) The cut-off on the Squamish River constructed by the federal government several years earlier carried off a large amount of the floodwater, prevented the flood from affecting the village as well (*The Squamish Advance*, November 10, 1955).

*6) After a section of this bridge had dropped into the river on July 24, district residents had been forced an improvised "ferry" which could not cope adequately with traffic. CPR announced it would go ahead with the \$2 million repairs as soon as steel could be obtained and fabricated. In the meantime, the company considered putting on a third ferry for logging, gasoline, and other big trucks.

*7) Only two rivers, the Upper Capilano and the Indian River, escaped heavy damage. According to Whitmore, in both cases the watersheds had not been deforested. Losses to Coho salmon were not expected to be too high in the Harrison system since they spawn high upstream, while Spring salmon were just going upstream (*The Vancouver Province*).

November 9-11, 1955

Source: *The Vancouver Sun*, November 9 and 10, 1955; December 26, 1972; *The Vancouver Herald*, November 23, 1955.

Details: On November 9, heavy rain began pouring down on the North Shore again. In six hours ending 10 a.m., 0.67 in. (17.0 mm) of rain fell. On November 11 in Vancouver, a record amount of rain for any single day of 3.15 in. (80.0 mm) fell (*The Vancouver Sun*, December 26, 1972).

Mosquito, Seymour and Lynn creeks all rose more than 1 ft. (30 cm) but remained far below the levels reached on November 3. Highways minister Phil Gaglardi ordered heavy equipment in to the stricken North Shore area to shove creeks and rivers back to their original courses and generally trying to build protective bulwarks at weak spots. The minister was unable to estimate costs but expected some federal financial aid. He was heavily banking on a statement attributed to Fisheries Minister James Sinclair, whose federal riding included North Vancouver, that Ottawa would help. *1) Meanwhile, the provincial government engaged former chief engineer for the Department of Public Works and regarded as an outstanding "river engineer" A.L. Carruthers to study the North Shore flood situation.

*1) North Shore flood victims would have difficulty getting aid out of the \$500,000 Fraser River (1948) Flood Fund. This funding was for people who lived with "due precaution in regions that could be considered safe." Fund trustees felt that many North Shore residents had built in areas they knew to be subject to flooding, and thus took a chance (*The Vancouver Sun*). Premier W.A.C. Bennett later assured North Shore residents that the province was prepared to pay them 40% of the flood damage. Bennett had asked the federal government to share the costs on a 40-40 basis, with the municipalities paying the remainder (*The Vancouver Herald*, November 23, 1955).

December 1-3, 1955

(Tidal flooding).

Source: *The Squamish Advance*, December 1 and 6, 1955.

Details: On the morning of December 1, high tides backed by a strong wind sent water across the main street in Squamish. The Shell garage and some of the buildings on Cleveland Avenue had water on the floors. Norman Barr's machine shop was reported to have several inches of water on his shop floor. The tide water also poured over the low-lying portions of the dyke in the lower part of town. Water surrounded the houses at the lower end of Victoria Street.

The dyke behind the PGE tracks near the Western Plywood's dump was breached in two places. Water poured through into the area on the east side of Cleveland Avenue. A foot (30 cm) of water covered Cleveland Avenue and its sidewalks. Crews sandbagged the dyke and the low spot on the Pemberton Road dyke near Cowdell's corner. The latter was raised with almost a foot of dirt and gravel. Part of River Road near the Red Bridge washed out and water completely surrounded several houses in that area. Some of them had several inches of water on the floors.

On the morning of December 3, high tides again sent water over River Road near the Red Bridge. Residents near the bridge had either water in their houses or could not get out for hours as water surrounded their houses. A "miniature Niagara" was pouring over the washed out portion of that road and the area behind it was flooded again. Above Cowdell's corner, water covered the road almost a foot deep. It was also spilling over a 60-ft. (18 m) length of low dyke behind Henry Smith's. Water completely surrounded all houses in that area.

Officials who inspected the dykes, the site of the washed-out floodgate and the waterlogged area around Cowdell's corner, told residents that they would ask the Public Works Department for funds to carry out work necessary to prevent further flood damage. This would involve repairs to the dyke, replacing floodgate at the end of Victoria Street and some dyking behind the houses. *1)

Near record rains, a record cold for November and at least 1 ft. (30 cm) of snow combined to one of the earliest winters on record in the Squamish Valley. Milder weather towards the end of November caused much of the previous week's snowfall to melt by November 25. A cold rain which started to fall around November 28 caused no appreciable melting of snow (*The Squamish Advance*, December 1, 1955.).

*1) An editorial in *The Squamish Advance* called the local dykes inadequate. Dykes around the entire town had been “deteriorating for years.” The newspaper pointed out the district’s need for adequate dyking and flood protection. For several years, the Board of Trade had requested the provincial government to improve the dyke system. The low section of the Pemberton Road dyke near Cowdell’s corner had always been a danger spot but this could easily be raised. A dyke built along the rear of the houses between this corner and Castle’s crossing would safeguard the residents of this area. Raising Red River Road between the Red Bridge and Lonny Wray’s by adding 1.5 ft. (45 cm) of gravel, would protect the residents near this bridge (*The Squamish Advance*, December 6, 1955).

March 2, 1956

Source: *Victoria Daily Times*, March 2, 1956; *The Squamish Advance*, March 8, 1956.

Details: On the night of March 2 at Retaskit, 9 mi. (14.4 km) south of Lillooet, a rock crashed into the side of the day coach of a northbound PGE passenger train. One man was killed and three or four others were injured. *1) The 7-ton boulder was believed loosened by severe winter conditions with its succession of frost, snow and thaws.

Overnight March 2-3, high winds swept through the interior. At Vancouver, winds gusted to 55-60 mph (88-96 km/h).

*1) This was the first passenger fatality on the PGE. On the original grade with lighter steel there were wrecks involving the deaths of railway employees (*The Squamish Advance*, March 8, 1956).

April 2, 1956

Source: *The Province*, April 3, 1956.

Details: On April 2, a debris flow at Wynndel near Creston carried a house 23 m downslope and covered the highway and CPR line with debris. The torrent from Washout Creek was described as “a 5-m high wall of mud, rocks and logs.”

A huge snowslide came down West Crown Creek, 5 mi. (8 km) north of Cleveland Dam. The slide was 35-50 ft. (10.5-15 m) deep at the bottom to 90 ft. (27 m) higher up and 500 ft. (150 m) wide, backed up the mountain for 0.75 mi. (1,200 m). It almost tore out towers of the BC Electric Bridge River powerline.

On April 3, some 15,000 sandbags were used in temporary dike repair of BC Electric’s Alouette weir, which had been damaged in November 1955. The reconstruction that started in January but bad weather had delayed the work.

On the Southern Trams-Provincial Highway, two cars plunged into a 200-ft. (60 m) washout near Creston.

May 23-June 6, 1956

(Spring runoff/flooding).

Source: *The Vancouver Sun*, May 23 and 25; June 7, 1956; *The Vancouver Province*, May 22, 23, 24 and 25, 1956; *Victoria Daily Times*, June 2, 4, 5, 6, 7 and 8, 1956.

Details: On May 19-20, the Similkameen River passed the 1948 flood level in Princeton. Work crews were hauling rock to reinforce dikes. Floodwaters reached the top of the new dike built near the recent river diversion. On May 20-21, the Fraser and Columbia rivers rose rapidly but with cooler conditions in the Interior the rate of rise slowed on May 22. On May 19, the Columbia River reached 6.38 ft. (1.9 m) at Trail and 5.22 ft. (1.5 m) at Revelstoke. During the same period, the Fraser River went up 3.83 ft. (1.15 m) at Mission. On May 21, the Granby River spilled its banks flooding a dozen houses in Grand Forks and 35 others downstream. Several families were evacuated. The city powerplant was sandbagged after floodwaters rose within 18 in. (45 cm) of knocking out the equipment. On May 22, the river dropped 14 in. (35 cm). On that day, the river levels were: Fraser River at Mission, 17.15 ft.; Columbia River at Trail, 21.09 ft. and the Kootenay River at Creston,

20.97 ft. The Southern Trans-Provincial Highway was flooded in several places, including around Yakh. At Six Mile, a restaurant, home and summer camp flooded. The Slocan Highway was flooded in spots but passable.

On May 23, rivers in the Kootenay area were rising. Flood conditions were reported at Kimberley, Nelson and several other places. The Kootenay Lake ferry was discontinued because of high water. Goat River bridge, connecting Creston with Porthill, Idaho washed away. At Fernie, local flooding was reported. A creek carrying water towards Moyie River locally flooded the road with 18 in. (45 cm) of water. The Moyie River threatened the new highway construction in the Yakh and Kingsgate districts. The Waldo bridge over the Kootenay River between Elko-Rossville was threatened. Traffic was detoured south via Phillips Canyon Road. The bridge over Wild Horse Creek, east of Fort Steele, was the first to go out. At Kimberley, scene of the first disaster area in the 1948 flood, the troublesome Mark Creek was sandbagged and heavy equipment was working.

On May 25, the Kootenay River continued to rise reaching 22.77 ft. at Creston. *1) Floodwaters threatened 20,000 ac. (8,000 ha) of reclaimed land. Near flood conditions were also reported from Kimberley, Nelson, Cranbrook and several Interior points. The Fraser River rose to 19.18 ft. at Mission but dropped slightly at Hope to 28.15 ft. Between May 18-24, the Fraser River had risen 6.49 ft. (1.95 m). Dike patrols were expected to begin at the 20-ft. (6 m) level. On May 24, Civil Defence officials in New Westminster were preparing to put some 300 workers on alert as soon as the river would reach 21 ft. (6.3 m). *2) Until then, the only danger point reached was at Annacis Island causeway.

According to Forestry Minister Ray Williston, the snow survey made by the provincial water rights branch on May 15 showed the water content of the snow left to be below average.

On June 2, Attorney General Robert Bonner ordered troops into the Creston area flooded by the Kootenay River. Around June 4, Kootenay River floodwaters forced about 100 people to evacuate from their homes. On June 3, 75 more soldiers left Chilliwack by train to join the 75 already on flood duty. An additional 100 civilians were employed. On June 2-3, the most seriously threatened spot was a 7,000-ac. (2,800 ha) tract known as the Creston Reclamation Co. district. The river was expected to crest on June 6 or 7. The flood crest reported rolling down on Creston, was expected to hit within three days endangering some 25,000 ac. (10,000 ha) of crops. Seventy-five members of the 1st Field Engineering were to aid in sandbagging and general flood control work. If necessary, more troops would be sent. Water levels reached the 24.41-ft. mark, only 8 in. (20 cm) from the top of the dikes. The brims of the dikes started softening and admitting seepage.

Late on June 3, the Kootenay River reached 24.80 ft. (7.44 m) about 8 in. (20 cm) from the tops of dikes. Some 15,000 sandbags had already been used to strengthen water-softened dikes. There were 35,000 more sandbags on hand and another 40,000 more on order. On June 5, the Kootenay River was higher than at the same time in 1948. The 25.10-ft. (7.53 m) reading at Creston compared with a 1948 reading of 23.43 ft. (7.0 m). On June 6, the river dropped 1 in. (2.5 cm) along the 56 mi. (89.6 km) of bolstered dykes. Having saved some 25,000 ac. (10,000 ha) of farmland from the Kootenay River, the army withdrew 100 of the 150 men sent for flood control work.

The Columbia River also rose. At Trail, some basements flooded. On the night of June 5, the level of the Columbia River at Trail rose to within 2 in. (5 cm) of the boardwalks. On June 4-5, the river rose another 10 in. (25 cm) at Castlegar to 31.5 ft. (9.45 m). At Groutage Avenue in Trail, at 42.30 ft. (12.7 m) the river level was still 4 ft. (1.2 m) below the 1948 peak. Upstream at Revelstoke, a 0.73-ft. (22 cm) rise in 24 hours was recorded. The river continued to rise at Trail where 10 Groutage Avenue families were evacuated. On June 6, the river, expected to crest at 43 ft. (12.9 m), had swept into about 40 homes in Trail, threatening to flood more.

On June 7, the Columbia River dropped 1 in. (2.5 cm) from the previous day. On June 7, the Kootenay River was expected to crest at Creston at 25 ft.

*1) In 1948, dykes gave way after withstanding 23-ft. (6.9 m) levels for 13 days (*The Vancouver Sun*).

*2) During the worst floods on record in 1894, the river level reached 25.8 ft (7.74 m). In 1948, it went way over the 24-ft. (7.2 m) mark. Strengthening the dikes after the 1948 flood ranged the danger level from about 20 ft. (6 m) to almost 23 ft. (6.9 m) (*The Vancouver Province*).

June 6-9, 1956

Source: *The Sunday Sun*, June 9, 1956; *The Vancouver Province*, June 9, 1956; *The Vancouver Herald*, June 9, 1956; Pollock 1975.

Details: Heavy rains in the Vancouver area forced up the levels of all North shore streams. Between June 6-9, Seymour Falls recorded 7.43 in (188.7 mm) of rain (Pollock 1975). Port Alberni reported 1.75 in. (44.5 mm) of rain in 24 hours, breaking all records kept since 1949. *1) Most of the downpour happened overnight till 8:30 a.m. on June 8. On June 7, Mosquito Creek rose rapidly and threatened homes when it broke from its bed and tore out Fairmont Road. Fed by torrential rains between 11 a.m. and 2 p.m., it reached its highest level since November 1955.

Near its mouth, Seymour Creek endangered a CNR spur line bridge. Crews of workmen and bulldozers worked throughout the night to clear logs and other heavy debris piling up against the bridge pilings. Early on June 9, the water was still several feet below the top of the retaining walls. Equipment was brought in strengthen the CNR trestle over Seymour Creek leading to the new \$1.5-million Hooker chemical plant. After a week of rain, the Capilano River in North Vancouver had swollen, but caused no immediate danger to the temporary bridge constructed to accommodate overflow of West Vancouver traffic.

The Mamquam, Squamish and Cheakamus rivers, which went on brief rampages, were reported rising 1 ft. (30 cm) an hour. Near Squamish, the Squamish and Mamquam rivers threatened three bridges. On June 7 at 5 p.m., a sudden rise sent logs and debris into a PGE bridge and two highway spans about 3 mi. (4.8 km) north of Squamish. The Mamquam River flooded a road about 2 mi. (3.2 km) from Squamish and was washing away the approaches of a vehicular bridge. Logging companies in the area were blasting logs and debris away from all bridges and moving logging equipment to higher ground. By 9 p.m., the rivers were subsiding.

On June 8 and 9, rockslides came down at Mile 22, 10 mi. (16 km) north of Horseshoe Bay on the nearly completed 40-mi. (64 km) \$10.5-million PGE railway extension. A slide blocked the track 2 mi. (3.2 km) from where work had finished. Rush to get the project completed by June 11 was stalled when the more than 200-ton rockslide covered the rails. On the morning of June 9, a 3-ton boulder fell across the line, again at Mile 88, requiring the replacement of the rail. Between Squamish and Britannia, a bridge washed out. A special train carrying Railway Minister W.R.T. Chetwynd and other government officials was scheduled to travel from Horseshoe Bay to Porteau on June 10.

*1) According to records kept by the Alberni pulpmill division of MacMillan and Bloedel Ltd., the precipitation of 2.52 in. (64.0 mm) during the first week of June broke all records for every month in the previous seven years. (*The Vancouver Province*, June 9, 1956).

August 27, 1956

Source: *Victoria Daily Times*, August 27, 1956; *The Province*, August 30, 1956; *The Vancouver Sun*, September 7, 1956.

Details: On the forenoon of August 27, another rock and mudslide occurred near Horseshoe Bay on the recently completed PGE railway extension. *1) The slide estimated to be 40 ft. (12 m) wide and consisting 200 tons halted the inaugural trains. Within a few minutes, a section of cliff 50 ft. (15 m) wide and 120 ft. (36 m) high tumbled down across the tracks covering the new track for about 100 ft. (30 m) to a depth of 30 ft. (9 m). It occurred in a basalt rock formation sloping toward the ocean. Heavy rains were believed to have undercut the columnar rock layers making the underlying clay so

greasy that the rock slid. This was about the 80th slide since the previous October when construction was begun on the Sunset Beach rock cut, amongst construction crews known as “Social Credit Cut.”

The slide was reported only a few minutes after Premier W.A.C Bennett had addressed a crowd of 3,000 at North Vancouver, who had come to watch three inaugural specials pull out. Earlier that day, C.R. Crysedale, consulting engineer with PGE since it was begun in 1912, had driven a copper “last” spike marking the completion of the last link of the Vancouver-Squamish section. Immediately afterwards, heavy rain started falling. The slide at Sunset Beach on Howe Sound stalled the premier and his 350 guests for 16 hours. Though Minister Chetwynd suspected the slide to be caused by sabotage, his deputy J. S. Broadbent noted it was probably due to natural causes.

Early on August 28, 50 workmen and two bulldozers managed to clear the tracks and inaugural trains began moving at 3: 50 a.m. that day. “Whistle stop” receptions scheduled by the Premier and his cabinet at stations along the PGE line were cancelled. The inaugural trains were due at Prince George 19 hours behind schedule.

*1) British Columbia Liberal leader Arthur Laing claimed the construction of the extension had been a “hurried job” and predicted more slides on the PGE right-of-way. (*The Province*, August 30, 1956). Liberal candidate Frank Millerd claimed construction of the highway to Squamish in the vicinity of Horseshoe Bay was stalled “because they are afraid to blast rocks down on the PGE. Instead, every pound of rock has to be lifted over the PGE and dumped into the water.” (*The Vancouver Sun*, September 7, 1956).

September 24-26, 1956

Discharge (m³/s): Max. daily: September 26: Squam.: 1,620E; max. instant.: N/A.

Source: *The Vancouver Sun*, September 27, 1956; Environment Canada 1991.

Details: On September 26, a flood and a rockslide wreaked havoc on the new PGE Squamish line. On the night of September 25-26, rain caused the Mamquam River to rise 6 ft. (1.8 m) at its mouth at Squamish. The floodwater roaring down the 40-mi. (64 km) Mamquam Valley piled up debris against a railway bridge. At 2:30 p.m., the rain-swollen Mamquam River knocked out a 60-ft. (18 m) section of the PGE main line 2 mi. (3.2 km) north of Squamish. Two workmen on the bridge scrambled off with only seconds to spare. A 35-ton railway crane they were manning toppled upside down into the 12 ft. (3.6 m) deep river. Only half an hour earlier, an eight-coach train with some 140 passengers had crossed the bridge.

Five hours later at 7:30 p.m., a work train bound from Squamish to Vancouver was derailed by a small rockslide at Mile 22 about 5 mi. (8 km) north of Horseshoe Bay. The engine, three cars and a caboose derailed. The rockslide that came about 100 ft. (30 m) down from the highway above, was believed to have been caused by construction work on the Upper Levels Highway. The diesel engine swung off to the left, ramming a cliff. Had it swung to the right, it would have crashed 50 ft. (15 m) into Howe Sound.

The track was cleared before dawn. About 60 passengers aboard the train delayed by the slide were forced to remain at North Vancouver overnight. The two accidents temporarily halted all traffic on the rail lines between Vancouver-Squamish and Squamish-Lillooet. Five trains were cancelled.

October 16-19, 1956

Discharge (m³/s): Max. daily: October 22: Stamp A.: 278; max. instant.: N/A.

Source: *The British Columbian*, October 17 and 20, 1956; *The Vancouver Sun*, October 20, 1956; *The Vancouver Herald*, October 23, 1956; Environment Canada 1991; Eisbacher and Clague 1981.

Details: On October 19, Vancouver (the North Shore area?) recorded up to 6 in. (150 mm) of rain in a 17-hour period starting 7 a.m. The rainstorm with a maximum daily precipitation of 101 mm, a two-day maximum of 112 mm or 151 mm for the storm total in the downtown Vancouver area, caused landslides in the Vancouver region (Eisbacher and Clague 1981). In New Westminster, 0.7 in.

(17.8 mm) of rain overnight caused flooded basements on October 17. In Vancouver, “near-torrential” rains plugged sewers. The Dominion Weather Office reported 0.55 in. (14 mm) of rain at the airport between 4:30-7:15 a.m. On October 19 heavy rains near New Westminister, which set an all-time record for an eight-hour period, caused the “worst flooding in the Lower Mainland in 20 years.” Low areas in New Westminister, Burnaby and the Fraser Valley, were inundated as an all-time record amount of rain fell. On October 19, 2 in. (50 mm) of rain was recorded between 8 a.m. and 5 p.m. In 24 hours, a total of 2.5 in. (62.5 mm) of rain fell, an amount far above the average for the area. The heavy rainfall reached an unofficial 4 in. (100 mm) in some areas. In Vancouver, conditions were described as the “worst since 1936.” In North Vancouver, thousands of minor basement floodings occurred.

The heavy rain brought Lonsdale and Mosquito creeks to record levels. Mosquito Creek threatened families to have to evacuate their homes. Huge boulders were caught in the swollen stream, rolling down the creek bed. Municipal and North Vancouver engineers had every available man from water, public works and garbage collection crews working around the clock clearing roads or patrolling Mosquito Creek.

In New Westminister, water mains were clogged and basements flooded. Central and North Burnaby were hardest hit by the flooding. The Burnaby Board of Works’ full crew of 80 men and seven radio-controlled trucks worked till midnight to alleviate flooding problems. In North Burnaby, catch basins on Hastings Street were overflowing. Still Creek overflowed its banks at Willingdon Street. Water from the southern slope, unable to reach the Fraser River, backed up along Byrne Road almost to Marine Drive. *1) Water from Coquitlam flowed across the North Road into Burnaby at Sullivan and Cameron roads, causing considerable damage. The South Westminister, Maillardville and Coquitlam areas were also affected. In Maillardville, many basements flooded in the Roderick and Blue Mountain roads area. In Coquitlam, Prairie Road near the dikes and Pitt River was inundated. In Haney, the North and South Alouette River were reported overflowing its banks. In one section on 32nd Road near 11th Avenue, the water was more than 2 ft. (60 cm) deep. Overnight, the South Alouette River edged into Maple Ridge Park. At one time, the water almost surrounded the Alouette Hospital. Roads in Port Mann severely flooded. During the night, police had to put flares on Scott Road to guide drivers through the deep water. Elsewhere in the Greater Vancouver area, little flooding was reported.

On the night of October 19, a dozen mudslides blocked the PGE tracks. *2) More than 200 train passengers were ferried by road and sea from Squamish to Horseshoe Bay. About 140 passengers were stranded when mudslides held the southbound PGE train at Squamish. They were ferried by the 99-ft. (29.7 m) vessel *Hollyburn* to Horseshoe Bay from where a fleet of buses carried them to Vancouver. The northbound train was held up by slides at Porteau Beach, 29 mi. (46.4 km) from North Vancouver at 11:40 a.m. and did not arrive at Britannia until 11 p.m. A bridge was also undermined and it would be days before full service from Howe Sound points into the North Vancouver depot could be resumed.

Three mudslides and a washout on the CPR tracks held up trans-continental traffic for four hours. On October 22, slides and a derailment disrupted CPR services. At Shellburn in Burnaby, 7 mi. (11.2 km) east of the Vancouver CPR station, two huge mud and tree slides blocked the tracks and delayed three trans-continental and a Kettle Valley train. One day of heavy rain following the heavy rain three days earlier on October 19 were blamed for the Shellburn slides. One was 100 ft. (30 m) long and 9 ft. (2.7 m) deep while the other was 50 ft. (15 m) long and 5 ft. (1.5 m) deep. More mud sliding onto the tracks during cleanup complicated the track-clearing job. The slides were a repetition of the three mudslides that blocked the tracks west of Shellburn for hours on October 19.

On the Southern Kettle Valley line 40 mi. (64 km) east of Penticton, a diesel locomotive and 13 cars derailed. Some 500 yd. (450 m) of track were ripped up and six cars overturned.

*1) The Burnaby Board of Works blamed the recent pipeline work on Burris Avenue for disrupting the whole drainage system and causing unnecessary flooding there.

*2) This hold-up was the sixth on the new line since it opened on August 27 (*The Vancouver Sun*, October 20, 1956).

November 20-24, 1956

Source: *The Province*, November 21 and 26, 1956.

Details: On the morning of November 20, “thousands of tons” of rock crashed 300 ft. (90 m) down onto the PGE tracks 1 mi. (1.6 km) north of Horseshoe Bay. In blasting operations on the Upper Levels Highway, 8,000 yd.³ (6,000 m³) were “shot.” A second blast to break up the rock sent material flying over 100 yd. (90 m). Rock from a recent blast had sprayed the waters of Horseshoe Bay and even carried to the boat rental floats at the west side of the bay.

On November 24, a rockslide came down at Mile 23.5 on the PGE line. The tons of rock held up the regular morning train with a North Vancouver Board of Trade delegation bound for Squamish for four hours. For the second time in a week and a third time in just over a month, all rail traffic between North Vancouver-Squamish was suspended for one day. On November 27, no trains would move over the extension line to permit blasting operations on the Upper Levels Highway construction project.

December 7-10, 1956

(Rain-on-snow).

Discharge (m³/s): Max. daily: December 9: Chem.: 175; December 10: Sooke: 62.6; max. instant.: N/A.

Source: *The British Columbian*, December 10, 1956; *The Daily Colonist*, December 3 and 9, 1975; B.C. Ministry of Public Works 1958 (p. J 37); Eisbacher and Clague 1981; Environment Canada 1991.

Details: On December 8-9, an all-time record downpour for New Westminster flooded hundreds of homes. According to the official weather observer in New Westminster, 6.15 in. (156.2 mm) of rain fell between December 7 and the afternoon of December 9. In the 24-hour period ending 8 a.m. on December 9, 4.45 in. (113.0 mm) of rain fell, setting an all-time record for New Westminster. The maximum temperature on December 9 was 54° F (12.2° C). The 36-hour rain stopped on December 9 at about 4 p.m. The rainstorm with a daily maximum precipitation of 84 mm, or a two-day maximum of 154 mm in the downtown Vancouver area, caused landslides in the Vancouver region (Eisbacher and Clague 1981).

Earlier that morning when it became obvious an emergency was arising, the Civil Defence (CD) went into operation. More than 50 CD workers were deployed in the operation, which saw at least three families evacuated. Rowboat crews stood by but were not required. Officials ordered 4,000 sandbags from army headquarters at Boundary Bay. Burnaby was hardest hit while New Westminster residents reported only minor damage. On December 9, Still Creek cut off three arterial highways in North Burnaby. *1) Residents of Douglas Road were forced to leave their houses as the water rose above their basements. The Vincent Massey Junior Highschool, which had no basement, had 8 in. (20 cm) of water removed from the pit under the school. Storm sewers in the area were unable to handle the water at 8th Avenue, and a number of homes were flooded. One basement at 731-8th Street was flooded with 4 ft. (1.2 m) of water. In Surrey and Langley, several basements were reported flooded and homes were surrounded by water. Many roads were completely covered and closed to traffic. The lower Scott Road area was the worst hit, with up to 1.5 ft. (45 cm) reported on the road and nearby homes and business establishments. Though no bridges were reported out, creeks and ditches overflowed their banks, washing out portions of gravel roads. In Maple Ridge, the North and South Alouette rivers flooded Maple Ridge Park. The Kanaka Creek bridge was closed to traffic and was not expected to be back in service until late on December 11. The bridge pilings were knocked out by debris carried down by the water. Large trees, stumps and branches were wedged around and under the bridge.

On December 8, Victoria recorded 4.49 in. (114.0 mm) of rain in a 24-hour period. According to Water Commissioner Ron Upward, "It came on top of 6 in. (15 cm) of snow, and the combined rainfall caused \$100,000 damages - and that was in 1956 prices." (*The Daily Colonist*, December 3, 1975). On December 8 between 7-8 p.m., the Gonzales observatory recorded nearly 0.25 in. (6.4 mm) of rain. In the six-hour period ending 10:30 on December 8, 1.02 in. (25.9 cm) of rain was recorded in Victoria. On December 9, temperatures reached 45° F (7.2° C). In Greater Victoria, dozens of basements flooded up to 1 ft. (30 cm) of water and streets and highways were inundated. Worst hit areas were in the Gorge and along Quadra near Lodge. In Victoria, many gutters overflowed. Bowker Creek, a potential flood basin before it was deepened and had culverts installed a few years earlier, was reported "running high." Overflowing drains knocked out underground transformers blacking out overhead-wired streetlights for about an hour. Floodwaters washed out the Patricia Bay Highway at Beaver Lake. Elsewhere in rural areas, shoulders of roads gave way. In Oak Bay, water that backed up in the Transit, Oliver and other low-lying areas swamped some 40 cellars. Esquimalt police received 30 reports of flooding "all over the place."

The serious flooding that occurred in November and December caused considerable damage to road shoulders and blocked culverts and ditches in the North Vancouver (highways) District. However, it did not affect the Capilano or Seymour Rivers, the bank of which stood up very well (B.C. Ministry of Public Works 1958).

A small mudslide came down on the CPR mainline east of Vancouver. Two slides that came down on the CNR main line held up trans-continental passenger trains for several hours.

*1) Still Creek runs parallel with the Lougheed highway and crosses Willingdon, Sperling and Douglas roads (*The British Columbian*, December 10, 1956).

February 20, 1957

(Fatal rockfall).

Source: *The Kootenaian*, February 21, 1957.

Details: On February 20 at 10:30 a.m., a falling rock from an overhanging cliff at Woodbury Bluffs about 9 mi. (14.4 km) south of Kaslo crushed and killed a 57-year old highways employee. Working on a highway project, the victim walked over to the area where a highways crew had set off a blast half an hour earlier.

February 22-24, 1957

(Rain-on-snow and fatal snow avalanche).

Source: *Daily Colonist*, February 26, 1957; *The Kootenaian*, February 28; March 7, 1957.

Details: Overnight February 23-24, Duncan was hit by high winds and flooding. High winds struck the district on the afternoon of February 24, at times reaching "half-gale forces." A number of new homes in Duncan had shingles ripped off. Landslides menaced roads throughout the area.

The 14-in. (35 cm) of snow, which fell during the night of February 22, melted and caused extensive flooding on the Indian Reserves. The Cowichan River through the Qymichan Indian village widened from 75 ft. (22.5 m) to several hundred yards. Many homes on the Cowichan Bay Road along Tzouhalem Road were isolated. Heavy flooding closed the Cowichan Bay Road, between the Island Highway and Beach Road. The flooding resulted from Koksilah River floodwaters being impeded at two bridges.

On February 23 between 2:45-4 p.m., a snow avalanche instantly killed a 36-year old New Denver Anglican minister on the Kaslo to Nelson highway near Woodbury Creek. *1) The victim had stopped 11 mi. (17.6 km) south of Kaslo and was attempting to clear a slide blocking his car. A larger slide, which came down a few minutes later swept him off the highway down an embankment about 50 ft. (15 m). The body was later recovered a few feet from the lakeshore covered by about 8 ft. (2.4 m) of snow. The driver of a second car managed to jump clear from the slide.

*1) The coroner's jury recommended "road improvements be pushed with all possible speed (*The Kootenaian*, March 7, 1957).

February 26-March 1, 1957

Source: *The Vancouver Sun*, March 1, 1957.

Details: Warm temperatures at the end of February caused a series of snow and rockslides and flooding along both the CNR and CPR lines, interrupting rail traffic. Since February 26, 15 minor slides, a derailment and a flooding condition plagued CNR lines. Most snow slides were reported near Lytton on February 26 and 27.

On February 28, a rockslide 70 mi. (112 km) west of Kamloops derailed an engine and 14 cars of wheat and caused delays of up to two hours. Trains were rerouted over CPR lines from Basque to Hope. Track was expected to be repaired on March 1. On the morning of February 28, a 200-ft. (60 m) long slide near Glenogle, 27 mi. (43.2 km) west of Field, hit the eastbound CP *Dominion* passenger train. The force of the slide broke the windows on all four rear cars. There were no injuries. The slide delayed westbound trains for two hours as plows also cleared away a second slide that came down onto the tracks in the same hours.

March 13, 1957

Source: *The Province*, March 14, 1957; *The Vancouver Sun*, March 16, 1957.

Details: On March 13 at about 2 p.m., a sudden shale slide on the Upper Levels Highway at Mile 15.2 on the PGE line killed a labourer working for Marwell Construction Co. The slide about 1 mi. (1.6 km) north of Sunset Beach near Horseshoe Bay blocked the rail line for 15 hours. The workman's body was recovered several hours after the accident.

The slide began in a rock fissure above the victim who had been "scaling down" loose shale and rock left by blasting operations on March 12 on the face of a 100-ft. (30 m) cliff. The rockslide, which carried the 21-year old worker 150 ft. (45 m) down to his death, was described to a coroner's jury as an "act of God." E.L. Causey, in charge of the company's highway construction division, said the slide was not caused by the work of the scaler. "Something happened to touch the slide off when the scaler was in the way." No other workers were endangered.

The company was reported to have had previous trouble with slides in the area. The rock structure, full of dirt seams, tends to erode when water gets in. It would take crews two to three days to remove the rock and shale from the (highway) roadbed. The PGE right-of-way, which parallels the highway about 75 ft. (22.5 m) below, was covered 5 ft. (1.5 m) deep for more than 35 yd. (31.5 m).

April 7, 1957

Source: *Nelson Daily News*, April 8, 1957.

Details: On April 7 around 6 p.m., a debris flow 13 mi. (20.8 km) west of Nelson killed two occupants of a car. * 1) The son of the Renata couple killed was seriously hurt. Their car was swept from the Southern Trans-Provincial Highway near the Corr Linn dam to the CPR tracks about 300 ft. (90 m) below. The car was almost totally wrecked. The slide of a "soupy mixture," estimated at between 50-75 ft. (15-22.5 m) long covered a large portion of the road. Water seeping from the top was believed to be the cause of the slide. The slide blocked highway traffic for some time and held up the eastbound passenger train for 40 minutes.

*1) This was the second fatal highway slide this year. See February 23, 1957 event.

April 16-24, 1957

Source: *The Province*, April 18, 1957; *The Vancouver Sun*, April 18 and 25, 1957.

Details: On April 16, a slide 22 mi. (35.2 km) north of Vancouver came down on the PGE rail line, blocking rail traffic to Squamish. It was 400 ft. (120 m) in length and varied in depth from 8-35 ft. (2.4-10.5 m). Blasting on the Upper Level Highway caused the slide. According to PGE General Manager J.S. Broadbent, such slides were “inevitable” with the highway located above the rail line. *1) It was expected to have the line cleared by 5 p.m. on April 18. The blockage of the track was the longest since the line to Prince George opened. The delay in clearing the slide was caused by the potential danger of further slides in the area. Clearing operations were too dangerous until overhanging rock was blasted away.

During the night of April 17, a second slide came down 18 mi. (28.8 km) north of Squamish, blocking rail traffic to Squamish. It derailed a self propelled Bud car of the PGE Cariboo Dayliner passenger train.

On April 24, blasting operations on the Upper Levels Highway caused an “earth slide” 25 mi. (40 km) north of Vancouver that blocked the PGE tracks with “tons of earth.” It was hoped to have the line clear on April 25. A northbound train from Vancouver was hemmed in by two slides blocking the line 6 mi. (9.6 km) north of Horseshoe Bay for a day-and-a-half.

*1) For the greater part of the 45-km stretch between Horseshoe Bay and Squamish the highway parallels the rail line approximately 50 m above the track.

May 15, 1957

Source: *The Province*, May 17, 1957.

Details: On May 15, a slide on the PGE line attributed to highway construction delayed a PGE passenger train. According to PGE Vice President Einar Gunderson, “road contractors have strict orders not to work while trains are operating below.”

June 27, 1957

(Subaqueous slope failure).

Source: *The British Columbian*, June 28 and 29, 1957; *Prince Rupert Daily News*, June 28, 1957; *The Vancouver Sun*, June 28, 1957; *The Province*, June 28; July 30, 1957; Hickin.

Details: On June 27, a subaqueous slope failure occurred in the Squamish Delta just south of the station at Britannia Beach. *1) Waves generated by a submarine slump washed out a section of the PGE rail line shortly after the grade was constructed. An eyewitness said a section of gravel fill about 50 yd. long and 50 yd. wide slowly broke away and slid into Howe Sound. According to Bob Alexander of Britannia Mining Company, who watched the slide happen, it left the rails hanging about 20 ft. (6 m) above the low-water mark. The giant cave-in left 50 yd. (45 m) of PGE rail line dangling over the water of Howe Sound after one train passed and 35 minutes before a passenger train was due in from Vancouver.

*1) Although there had been numerous rockslides, this was the first time such a cave-in occurred since the section of line between North Vancouver and Squamish opened (*The Province*, June 28, 1957). Angry residents of Britannia Beach criticised the government for rushing through the PGE before completing the Squamish Highway. Immediately following the slide, Robert Strachan, provincial leader of the CCF, demanded a complete and independent engineering inspection of the PGE roadbed from North Vancouver to Squamish. He demanded that all traffic be stopped on the PGE until such a survey would be completed. Strachan noted that the PGE was becoming “once more the laughing stock of the country, only this time it has tragic implications.” Premier W.A.C. Bennett dismissed Strachan’s demand as a “political move.” He added, “It just shows that the CCF is opposed to the PGE. They have way worse slides on the CPR and CNR.” Premier Bennett clearly indicated that there would be no survey. PGE Manager Joe S. Broadbent said that in his opinion the railway was quite safe. “If it wasn’t safe, we wouldn’t be running trains on it.” One PGE spokesman said the railroad runs a track patrol 1,000 ft. (300 m) in front of every

passenger train between Squamish and North Vancouver.

On July 29, Premier Bennett stated that tests carried out by Thurber Engineering showed that the fill that had collapsed into Howe Sound had been put there 16 years previous by the Britannia Mine Company and thus “wasn’t our fault.” (*The Province*, July 30, 1957).

September 5-6, 1957

(Flash flood).

Source: *The Sunday Sun*, September 7, 1957; *The Daily Colonist*, September 8, 1957.

Details: On September 5, torrential rains caused flooding in the Squamish Valley. The swollen Squamish River burst its banks, flooding to a depth of 14 ft. (4.2 m) in places and blocking the only road. Dozens of cars and trucks were trapped. A BC Electric powerhouse under construction at Cheakamus was flooded. The river poured over a dam built above the new powerhouse. It cut off 40 construction workers for two nights. Twenty of them were at the powerhouse and 20 more were marooned on a hillside further up the valley. The flash flood trapped residents in attics of their homes. Residents of a flooded house about 16 mi. (25.6 km) from Squamish had to take refuge in the loft of a barn. The river crept 10 ft. (3 m) up a hillside to swamp a \$35,000 helicopter before it could be moved from its landing site 4 mi. (6.4 km) from the powerhouse. At the height of the flood on September 6, the water had reached about 4 ft. (1.2 m) up the site. The pilot was unable to reach the machine due to the deep water.

At Pemberton, above the Cheakamus Canyon, a washout blocked the PGE railway, forcing the passengers to portage between trains.

October 6, 1957

Source: *Victoria Daily Times*, October 7, 1957.

Details: On the afternoon of October 6, rocks on the track derailed five freight cars of a PGE train 21 mi. (33.6 km) north of Brunswick Beach. The derailment occurred at 2:45 p.m. and a slide of rocks later crashed into the derailed train. PGE officials hoped to have the line open again on October 7.

October 22- 29, 1957

Source: *Victoria Daily Times*, October 23, 1957; *The Vancouver Sun*, October 30 and 31; November 4, 1957.

Details: On October 22, a small bridge 16 mi. (25.6 km) south of Squamish washed out, halting traffic on the PGE line. The crossing was expected to be restored on October 23.

On October 29, the PGE tracks 21 mi. (33.6 km) north of North Vancouver were blocked for nine hours by rocks from blasting operations on the Upper Levels Highway. Loose rock had recently caused small slides in that area. Though the line was cleared by 5 p.m., on November 1 it was closed again until the blasting at Mile 21 would be completed. On the morning of November 5, the line reopened.

December 22-24, 1957

(Storm surge/tidal flooding).

Source: *The Vancouver Sun*, December 23 and 24, 1957;

Details: On December 22, heavy winds lashed southern British Columbia. Blackouts up to 15 hours occurred in Vancouver and the electrical and communication systems in the Okanagan were cut. High tide and wind forced water through a weakened section of the Sea Island dike causing flooding. Municipal crews sandbagged the 8-ft. (2.4 m) hole.

On December 24, the tides and winds also pushed the Fraser River over the tops of dikes on Mitchell Island. The eastern end of the island in the North Arm of the river just east of Fraser Avenue was covered with more than 1 ft. (30 cm) of water. The abnormally high water backed up all along the channels of the Fraser River, flooding and isolating homes and industrial plants. About 30 homes and businesses on Mitchell Road were cut off for more than an hour. At the

height of the flood around 9:15 a.m., lumber from sawmills and debris floated on the water on Mitchell Island. Lumber was floating on 15 in. (37.5 cm) of water in the yard of Crown Lumber at Mitchell Road. R.C. Messenger of Crown Lumber stated, "It's the worst I've ever seen it. I think about 90% of the island is flooded." The combination of high winds and a high tide of 15.7-ft. (4.7 m), more than 4 ft. (1.2 m) above the average, spilled water over the top of the dike near Fraser Street bridge. According to Mitchell Island residents, it was the "worst winter flooding they could remember." The worst of the flooding was over at 11 a.m. *1) The water was also backed up in the Vancouver harbour with water slopping over onto the sidewalk at the north end of the Second Narrows bridge.

Comox recorded 4.5 in. (114.3 mm) of rain in 24 hours while Duncan and the Forbidden Plateau near Courtenay received its first snow of the season. The heavy rain that preceded the snowfall caused to washout a 32-ft. (9.6 m) section of the Crofton pulpmill waterline near Duncan. Crews worked all weekend to dike a 5-ac. (2 ha) lake caused by the break.

*1) According to Richmond Acting Municipal Engineer Norman Donaghy, the December 24 tide was the "highest since 1948." He said floods occur occasionally at this time of year "but the tides are higher than usual this year." (*The Vancouver Sun*).

January 23-25, 1958

(Tidal flooding).

Discharge (m³/s): Max. daily: January 24: Sooke: 25.6; January 25: Cowich.: 194; max. instant.: January 25: Cowich.: 195.

Source: *The Vancouver Sun*, January 23 and 24, 1958; *The Daily Free Press*, January 23 and 24, 1958; *Victoria Daily Times*, January 24, 1958; *The Lake Leader/Cowichan Leader*, January 30, 1958; *The Province*, January 24; December 2, 1958; Environment Canada 1991.

Details: On January 23, heavy continuous rain occurred over the Lower Mainland and Vancouver Island. Almost an inch (25 mm) of rain drenched many areas of the Lower Mainland. In the 24-hour period ending 10 p.m., Vancouver set a January record of 2.56 in. (65.0 mm) *1) On the North Shore, the rain was heavier than in Vancouver. Estevan Point reported 6.5 in. (165.1 mm) of rain. A "score or more" basements flooded. Early on January 23, the nightlong torrential downpour "almost buried" Marine Drive at Kerr. On Marine Drive, cars were backed up for 0.5 mi. (800 m) while crews cleaned out plugged culverts. The swollen Eagle Creek swept a six-year old Burnaby boy to his death. The body washed up on a gravel bar more than 500 yd. (450 m) downstream.

Nanaimo, Campbell River, Estevan Point and interlocking highways all suffered temporary damage. Most spectacular of several hundred city trouble calls occurred under the south end of Granville Bridge where a dike collapsed flooding the yard of Watkins-Winram Ltd. Coal stocks and some machinery were under 5 ft. (1.5 m) of water and trucks were brought to a halt. Marpole Infirmary's basement flooded. At Richmond, more than 100 homes were surrounded by water caused by a combination of heavy rain and high tides that caused ditches to overflow. Acting municipal engineer Norman Donaghy blamed most flooding on blocked drains.

A section of PGE rail line 27 mi. (43.2 km) north of Vancouver washed out. On January 23 at 5:15 p.m., a slide blocked the PGE line at Brunswick Beach. Passengers were moved by boat from Squamish to North Vancouver on the midnight run and again on the morning run northbound. The slide was expected to be cleared and track repaired by noon on January 24.

Overnight January 23-24, Alberni was worst hit by flooding. Rain "fell in sheets" and continued unabated during January 24. Tons of "earth-loosened" rock cut the Port Alberni to Nanaimo highway in two places. Both slides occurred near Angel Rock on Cameron Lake. One carried an estimated 5,000 yd.³ (3,823 m³) of rock onto the road while the second, 0.25 mi. (400 m) east only covered part of the road. The road was expected to open to one-lane traffic on January 23 and cleared by January 24.

Rogers Creek washed out the Gertrude Street bridge. Thirty families were evacuated from the Margaret Street section of Alberni when flood tide backed up Kitsucksus Creek. On January 23, the Kitsucksus Creek bridge washed away. Also evacuated were the residents of 36 trailers in a trailer camp that were towed to safety. Two water lines washed out by the floods were being repaired on January 24. In the twin-city Port Alberni, basements were flooded.

At Port Alberni, the swollen river eroded 17 ft. (5.1 m) of a Dunbar Street backyard. At 8 a.m., a resident felt her house move. On January 23, valley residents at Cameron Lake were cut off after an estimated 20,000 tons of rock came down onto the road near Cameron Lake. By January 24, only a small amount of the slide had been removed as rocks continued to pour onto the road.

On January 23 in Nanaimo, parts of Harewood were flooded after Cat Stream overflowed its banks and spread over a wide area. The worst flooding occurred in the 4th Street and Pine area. Durham Street at the corner of Pine and a short stretch of road further south along Park Avenue where it skirts Robin Park were completely inundated. The Park Avenue and Robin Park areas were also hard hit. The south end of the park turned into a lake while the north end resembled a swamp. At the corner of Bruce and Duke Street, a number of basements were flooded and the entire intersection submerged under several inches of water. Extensive local flooding was reported from points north of the city, particularly the Brechlin area, Northfield, Upper Lynburn and East Wellington where the drainage ditches were unable to carry off the water. Local flooding also occurred in the Chase River and Cedar areas. Areas along Nanaimo River and near Chase River flooded south of Petroglyph Park. In Nanaimo (?), surface water aggravated the subsidence of Pioneer Square where old mine workings were believed to have collapsed. Sandbags and hurriedly dug ditches diverted water away from the depression, where 40 ft. (12 m) of curb and sidewalk collapsed. Water gushed into Commercial Street as rushing waters lifted a manhole cover.

At Cumberland around Ullverson Road, basements flooded up to 3 in. (7.5 cm) from the floors.

The Cayuse weather station recorded 5 in. (125 mm) of rain and between January 1-23, a total of 24 in. (625 mm), which is believed to be a record (*The Lake Leader/Cowichan Leader*). In the Duncan district, Lakes Road and Cowichan Bay Road were flooded and impassable but reopened on January 24 when the water levels of Cowichan and Koksilah rivers returned to normal.

*1) The previous January rain record was 1.38 in. (35.1 mm) set on January 6, 1946. (*Victoria Daily Times*).

February 23-24, 1958

Source: *The Vancouver Sun*, February 25, 1958.

Details: On February 23 and 24, torrential rains hit Vancouver Island. In the 24-hour period ending 8 a.m. on February 24, Campbell River recorded 1.5 in. (38.1 mm) of rain. On February 24, two men drowned when rain-swollen waters swept a small disabled motorboat over a waterfall at the end of Victoria Lake near Port Alice on northern Vancouver Island.

August 1958

Source: Eisbacher 1983; Jones 1959; Evans 1992 (p. 75); Ward and Evans 1992 (p. 356); Clague and Evans 1994.

Details: Following a sudden rainstorm, thousands of yards of tuff breccia debris and logs rushed down the Cheekye River, 5 km north of Squamish. *1) The debris flow built a 15-ft. (4.5 m) high temporary dam across the Cheakamus River at its mouth. According to eyewitnesses, the mudflow moved at 5 mph (8 km/h) near the mouth of the Cheekye. It flowed for several minutes, and appeared to be 10 ft. (3 m) high (Jones 1959). In discussion mudflows, Jones concluded, "the magnitude and frequency is unpredictable, as their occurrence appears to depend upon sudden abnormal rainstorms rather than upon normal autumn rainfall peaks." (Ward and Evans 1992).

From these scant data it is estimated that the debris lobe had a total volume of 50,000-100,000 m³ (Eisbacher 1983). The source material consisted of quaternary volcanic rocks (Clague and Evans 1994 p. 8). Debris floods buried tracts of forest on the floor of the Cheakamus Valley up to 3.5 km below Rubble Creek. Numerous rooted stumps of trees killed by these floods are still visible in the banks of the river (Evans 1992).

*1) According to accounts by local residents, an even larger flow occurred about 30 years prior to 1958 (Jones 1959). Both flows were of the order of 100,000 m³ (Thurber Engineering/Golder Associates (1993).

October 9-13, 1958

Source: *The Province*, October 14, 1958.

Details: Around October 11-12, the North Shore experienced the “worst rainstorm since creeks jumped their banks and ripped out homes three years ago.” The rainfall that measured 3.06 in. (77.7 mm) at Sea Island since October 9, would have been considerably less than the rainfall along the North Shore mountains. On October 12 at 2:30 a.m. in the Fairmont Road and Forest Hills area Mosquito Creek rose to “the highest it has been since then.” At Marine Drive, the creek washed out a chunk of bank and broke a water main, leaving scores of houses along Cumberland Crescent without water for three hours until a new main could be cut in. The district suffered some minor washouts, including two culverts on Mountain Highway.

On October 11, the Squamish River spilled over its banks flooding the road into the Squamish Valley flooded with water up to 5 ft. (1.5 m) deep. As a precaution, two families in the valley were evacuated. The rain gouged out huge potholes in the Squamish Highway north of Britannia and the southern section of the highway from Horseshoe Bay was also reported to be rough.

October 26, 1958

Source: *Kamloops Daily Sentinel*, October 27, 1958; *The Province*, October 27, 1958.

Details: On October 26, a 30-ton rockslide at Messiter on the CNR trans-continental line about 13 mi. (20.8 km) south of Blue River killed a CNR fireman and two other crewmembers. Two diesel units and six freight cars, part of a 54-car train plunged down the bank towards the North Thompson River but did not actually fall into the river. The brakeman leaped from the engine plunged down an embankment. The derailment delayed rail traffic for 12 hours.

November 12-15 and 20, 1958

Source: *Victoria Daily Times*, November 12, 1958; *The Hope Standard*, November 19, 1958; *The Province*, November 21, 1958; *Prince Rupert Daily News*, November 21, 1958.

Details: In 24 hours ending 4 a.m. on November 12, Victoria recorded 2.12 in. (53.8 mm) of rain. *1) The heavy rainfall was localised to the Victoria area. In the same period, Pat Bay, 18 mi. (28.8 km) away, received only 0.99 in. (25.1 mm) while Nanaimo recorded 0.16 in. (4.06 mm). A total rainfall of 5.57 in. (141.5 mm) caused widespread flooding in the Greater Victoria area. A number of basements flooded and work crews were kept busy clearing plugged storm drains but the 2-in. (50 mm) rain caused only slight floods. According to city engineer J.C. Garrett, the extensive sewer clearing programs in the previous two years “put our sewers in very good condition for handling heavy rains.” Saanich, Esquimalt and Oak Bay also reported flooded basements.

Rockslides caused two rail accidents in less than a week. A slide held up the passenger train *Canadian* for 14 hours. Early on November 16, 20 passengers suffered minor injuries when a westbound CPR trans-continental passenger train struck a mud- and rockslide near Haig, 90 mi. (144 km) east of Vancouver. The train ploughed right through the slide and ended up to within 150 ft. (45 m) of the Fraser River. Four diesel engines and two passenger cars derailed. The passengers were picked up by buses and taken to Vancouver.

On November 20 at 9:15 p.m., two locomotives and seven cars of a 107-car CNR freight train derailed at a large rockslide at Boothroyd in the Fraser Canyon, 6 mi. (9.6 km) east of Boston Bar. A brakeman, pinned down in the first engine that plunged 60 ft. (18 m) down an embankment to the edge of the river, died shortly afterwards (Evans and Clague 1999). The two other crewmembers are believed to have escaped injury. Two diesel units and several boxcars left the rails. The first unit remained upright as it rolled 70 ft. (21 m) down an embankment stopping just above the river. The second unit, carrying the victim, jack-knifed as it left the track and burst into flames. The derailment caused "total wire failure" of CN telegraph communications.

*1) This was the highest 24-hour precipitation recorded in Victoria since December 10, 1946 (*Victoria Daily Times*).

November 30-December 1, 1958

(Storm surge/tidal flooding).

Source: *Victoria Daily Times*, December 1, 1958; *The Province*, December 2, 1958.

Details: Around December 1, heavy rain was recorded at Tofino with 3.07 in. (78.0 mm), Comox 2.66 in. (67.6 mm) and Nanaimo 2.01 in. (51.1 mm). Sea Island reported 1.67 in. (42.4 mm) of rain.

*1) Victoria had only 0.07 in. (1.78 mm) in the 24 hours ending 6 p.m. on December 1. In the 24 hours ending 4:30 p.m. on December 1, Nanaimo recorded 1.90 in. (48.3 mm) of rain.

The Nanaimo and Chemainus rivers both rose to within a few inches of their various bridges. Early on December 1, some 100 residents were evacuated after Kitsucksus Creek burst its banks at 5 a.m. Creek waters, the main drainage system for the whole valley area, swollen by 52 hours of continuous rain backed up when the Somass River could not handle the additional flooding. The new Kitsucksus bridge held well under the strain late on December 1. *2) An anticipated crisis feared around 3 p.m. on December 1, when the high tide backed up the Somass River and Beaver Creek, caused less damage than expected. A number of families were evacuated when 2-3 ft. (60-90 cm) of water surrounded their homes. Hardest hit were homes on Margaret Street, River Road, Joseph and Compton Road. Several trailers at the Valley Trailer Camp had to be pulled to higher ground. Residents were trapped in others when Beaver Creek threatened to burst its banks. Earlier on December 1, the highway into Port Alberni was temporarily closed. Preparations were made to again close the highway if the Roger Creek spillway would become blocked again.

Late on December 1, the tide that ran 3 ft. (90 cm) above the expected high level mark caused partial flooding near Duncan. Heavy rain and near gale force winds contributed to the flooding of Tennis Court corner on the Cowichan Bay cut-off. Tall Timbers service station was marooned. The highway between Nanaimo-Duncan had water flowing across in several spots. In the Cedar district, many acres of farmland were under water.

In North Vancouver, Capilano River and Seymour Creek caused flooding. The Capilano River ripped out half of the \$100,000 protective rockfill program. Seymour Creek rose to the top of the dike below the Dollarton highway bridge. If the dike had held, a dozen homes would have been flooded. These homes suffered flood damage when river broke through its banks in November 1955.

The heavy rains brought 15 ft. (4.5 m) of mud, rocks and gravel down on a section of the Seaview (Sea-to-Sky) Highway, 10.5 mi. (16.8 km) north of Horseshoe Bay. The slide was about 100 ft. (30 m) wide and 10 ft. (3 m) deep. Public Works crews built a temporary road over the slide. A second slide nearby, which came down on December 1 at 3 p.m., was cleared without difficulty. A PGE bridge over a creek at Mile 18, 6 mi. (9.6 km) north of Horseshoe Bay, was damaged. Logs and debris piled up and some of the road bank was torn out. As a safety measure, passengers were bussed to Vancouver and the bridge was repaired and traffic resumed late on December 1.

A mudslide on the CNR tracks near Spences Bridge delayed a passenger train for an hour and disrupted telegraph services.

*1) This was far from the 24-hour record of 2.4 in. (61.0 mm), which had been equaled several times.

*2) This bridge replaced the one that washed out on January 23, 1958.

January 6-7, 1959

(Storm surge/tidal flooding and rain-on-snow).

Source: *Victoria Daily Times*, January 7 and 8, 1959; *The Daily Colonist*, January 8 and 9, 1959; *The Vancouver Sun*, January 12 and 16, 1959; *The Province*, January 14, 1959.

Details: On January 7, winds churned up 25-ft. (7.5 m) waves that lashed the Ross Bay seawall. At Oak Bay, exposed to the southeast gale, the Oak Bay Boathouse floats were torn loose and swept onto the beach with small craft. At 11:36 a.m., BC Electric powerlines were down at Bay and Bridge Street, causing power outage to Victoria Machine Depot's Bay Street plant and several residences. Elsewhere, telephone and powerlines went down.

On January 8 at 11:15 a.m., 36 hours of incessant heavy rain, 9 in. (22.5 cm) of melting snow, high winds and the highest tide of the winter caused flooding in the (Alberni) Twin Cities. The riverside motel belonging to Alberni's mayor Jack Luckhurst was severely flooded. The Somass River, backed up by the tide flooded 30 homes along River Road and south end of Beaver Creek Road. Floodwaters covered River Road to a depth of 3 ft. (90 cm) in places and extended westward to Riverbend Bridge across the river. Seven homes along Pineo Road were also completely surrounded by water. At high tide, the walkways leading to the ramp at the fishermen's floats were 6 in. (15 cm) under water. Bird Street properties in Port Alberni flooded. Businessmen stated that the water was "higher than at any time in their recollections." The 12.8-ft. (3.8 m) tide receded rapidly. One bus was stranded with its passengers and driver while another vacant bus was marooned on dry ground.

On January 10, the high 13.8-ft. (4.1 m) tides and high winds broke the dike fronting the Musqueam Indian Reserve. The dike, running between the reserve and the river and the previous year had been reported faulty had been neglected to be repaired. According to city officials, this would not have happened if the Department of Indian Affairs had acted on a report made a year previous. The dike, being "a private project and the responsibility of the land owners at that point" (the Musqueam Indian Reserve) did not fall under the responsibility of the dyking commission. The basements of six homes and about 100 ac. (40 ha.) of the Musqueam Reserve and the Point Grey Golf Club on the Fraser River Flats flooded with 3-6 ft. (0.9-1.8 m) of water. The water swept first across 50 ac. (20 ha) of land in front of the six reserve homes. It rose over the top of a 4-ft. (1.2 m) high dike at the east side of the reserve and finally broke through another dike protecting the golf course. Families from the flooded homes were evacuated. Holes 3-9 on the golf course had up to 6 ft. (1.8 m) of water on them, making it the "worst flooding in 21 years."

On January 12, the water level was 9 in. (22.5 cm) above the road grade and 2 in. (5 cm) below the floor level of some homes. Early on January 13 before the high tide, a temporary lower dike fronting the reserve gave way. A 14-ft. (4.2 m) tide broke through the repaired dike causing some renewed flooding. A 0.5-mi. (800 m) section of rebuilt and strengthened dike, replacing the dike broken earlier at the river mouth, protected the golf course. Floodwaters had drained away from there. Abatement of southeast winds prevented reoccurrence of serious flooding on the reserve. Only surface water, fast running back into the river, covered the gardens of homes in the 3700 block West 51st.

The seasonal high tide accompanied by rain and wind also caused flooding on Mitchell Island. At Kitsilano, tide waters poured over the outer wall of the swimming pool, filling it to the brim.

On January 16, an earth slide caused the collapse of the railway track near Port Mann. The leading diesel engine of a CPR freight train tumbled into the Fraser River, injuring a brakeman. Though the rear part of the train remained on the tracks, it blocked the main line. The accident occurred east of the station near dredging work under way for the new Port Mann bridge.

March 24, 1959

Source: Stethem and Schaerer 1980 (pp. 11-12).

Details: On March 24, an avalanche killed two skiers in McGillivray Pass on the east side of the Pacific Coast Mountains between Anderson Lake-Bralorne. The 1,860-m high summit is situated about 23 km southeast of Bralorne. In the week prior to the accident, approximately 45 cm of fresh snow fell in the McGillivray Pass area. On March 24, temperatures rose above 0° C, making the top 15 cm of snow heavy and moist. The avalanche occurred about 0.8 km southeast of the summit about 100 m above the valley floor on a slope with a south-southwest exposure. The avalanche path was approximately 50 m wide and 200 m long. Its snow was deposited to a depth of 1.5-2.5 m. Deep fresh snow followed by high temperatures and radiant heat from the sun on the southerly slope caused the unstable snow conditions. The bodies were found on March 25 and 26 (Stethem and Schaerer 1980).

March 27, 1959

Source: *Vancouver Sun*, March 28 and 30, 1959; *Revelstoke Review*, April 2, 1959.

Details: On the afternoon of Good Friday March 27, a debris avalanche about 30 m wide and 2 m deep, came down from an embankment east of Revelstoke. The slide, which was 10 yd. (9 m) wide and 6 ft. (1.8 m) deep, came down without warning. A mudslide coming down from Mount Revelstoke toppled a Clearview home. It moved the two-storey frame house, located downslope of construction activity on the Trans-Canada Highway, from the back of the lot to the front fence and pushed it over on one end. Four people trapped inside were killed.

Early in the morning, “slithering gumbo” was discovered against a neighbour’s house located above the destroyed home. Fifteen families living on the hill known as Clearview on the second bench had been evacuated from a nearby unstable area that was considered dangerous. Two had taken refuge in the house and were among the victims. The fourth victim was not found till March 28.

Around 3:30 p.m., mud started to ooze down the hill side. The highways superintendent whose bridge crew was shoring up the supports in the neighbour’s house basement saw it come down. “The whole thing broke away in a split second. It flowed down the hill like water completely devoid of noise.” It ripped the side of the Schutze home. He saw one of his workmen “bobbing up and down” riding the slide down the 600-ft. (180 m) slope. The slide hit the Pletsch home that toppled over “like a cardboard box.”

The new highway above the slide was not affected. It was investigated to decide whether the highway construction had contributed to the condition. According to city superintendent Alex Fleming, everybody living on “The Hill” was aware of the danger. The hill had been moving a little bit for years and all residents were aware of it. However, Pletsch, whose father had built the house in 1912, stated that there had never been a suggestion of a slide. “When you look at the slide, it appears as if all the rockfill used building the road has forced the mud out when the moisture got in it,” he observed.

April 29-30, 1959

Discharge (m³/s): Max. daily: April 30: Nan.: 254E; Sooke: 27.9; Stamp A.: 297; max. instant.: N/A.

Source: *The Nanaimo Daily Free Press*, April 30, 1959; *The Sun*, April 30, 1959; Environment Canada 1991.

Details: Heavy rain caused slides and washouts in the Fraser Valley. Vancouver, Abbotsford and Hope recorded slightly more than 0.5 in. (12.7 mm), over 2 in. (50 mm) and 3.52 in. (89.4 mm) in 24 hours, respectively. In Coquitlam, two bridges, including a \$8,000 structure built the previous year washed out. In Maple Ridge, residents of four homes were evacuated. In Vancouver, telephone service was knocked out in parts of the city and ditches and culvert overflowed, causing minor flooding.

A rock and mudslide struck a moving PGE combined passenger and freight train near Pemberton. The slide hit the train behind the engine, derailling six freight cars. The two passenger coaches at the rear of the train stayed on the tracks. No injuries were reported.

On April 29 in separate incidents, both CNR and CPR rail lines were cut. The CNR line was blocked by a washout at Flood that derailed seven cars of a freight train. Early on December 29, the CPR line washed out at Harrison Mills, 70 mi. (112 km) east of Vancouver, closing this section for a few hours.

November 17-24, 1959

(Rain-on-snow).

Source: *The Vancouver Sun*, November 24, 1959; Sanford 1978 (pp. 238-239).

Details: Between-November 17-24, "Chinook conditions" following heavy rain and 18 in. (45 cm) of snow caused an exceptional high runoff. Near Hope, floodwaters threatened the Trans-Canada Highway and CPR rail line. At Texas Creek 4 mi. (6.4 km) east of Hope, the highway was cut. Floodwaters washed out loose dirt around a main culvert. Highway traffic was rerouted over the Hope to Princeton highway. Train traffic was temporarily halted when floodwaters threatened the parallel roadbed.

Early on November 23, a washout reported on the KVR near Lear turned out to be four separate washouts, all of them severe. The worst one was more than 400 ft. (120 m) long and nearly 100 ft. (30 m) deep. The following day another major washout occurred at Mile 38.3. Dozens of smaller washouts and slides also hit the line. On November 28, the CPR announced that the line would be closed temporarily until the unseasonably wet weather abated and the damage could be repaired. *1)

*1) However, the Coquihalla line was never repaired and on July 18, 1961 CPR was granted government approval to abandon the line. (Sanford 1978).

December 22, 1959

Source: *The British Columbian*, December 23 and 24, 1959.

Details: On December 22, a rockfall occurred on Bastion Mountain. Millions of cubic feet of rock and rubble thundered down the Vella Mountain from a cliff about 1,000 ft. (300 m) above the Shuswap Lake. It narrowly missed a number of resort homes on the shore of an adjacent lake. The three separate slides with boulders "as big as houses" crashed into Shuswap Lake, 15 mi. north of Salmon Arm. About 1,000 ft. of road along the north shore of the lake were covered with up to 6 ft. (1.8 m) of rubble. The slides cut communications to about a dozen of families living in cottages within 500 m from the slide. A sudden thaw was given as the possible cause for the slides.

According to RCMP Const. John Slavic, a huge crag was "waiting to come down." When the slides occurred, they left other sections of the mountain face loose and there were some cracks 5 ft. (1.5 m) wide. Though further slides were expected, there would "almost be no possible chance of a tidal wave" in the 60-mi. (96 km) long lake. *1) On December 23, highway crews cleared the road blockage that had isolated eight families in the area.

*1) According to a local legend, a Shuswap Indian tribe was wiped out in the 19th century when a "tidal" wave caused by slides deluged their village (*The British Columbian*).

January 7, 1960

(Fatal slide).

Source: *The Province*, January 11, 1960.

Details: On January 7, a "vast landslide" buried two log boom workers alive and took the life of a fellow worker. Donald McKilligan, one of the survivors described the ordeal. "Suddenly we saw this huge wall of gravel move towards us. It was about 100 ft. (30 m) wide, 11 ft. (3.3 m) high, and

stretched about 50 ft. (15 m) back.” The logging company had bulldozed the extra gravel to the site of the accident. The men started running, but “then it caught up with us. It knocked me off my feet and covered me. I felt as if I was sinking but actually was being carried out into the lake. In the lake the gravel washed away from me and I tried to get to the surface.” McKilligan was about 70 ft. (21 m) out in the lake. He could see the other survivor standing on a log about 30 ft. (9 m) out but there was no sign of the third man.

The victim was apparently hit on the head by a log when the landslide smashed the logboom. Divers spent two days to no avail looking for the body of the 58-year old man in the deep waters of Arrow Lake near Forstall beach, 8 mi. (12.8 km) north of Nakusp.

January 16, 1960

Source: *The Vancouver Sun*, January 16 and 25, 1960.

Details: On January 16, an earth slide came down onto the CNR main line at Port Mann. It caused the collapse of the railway track and a diesel engine to plunge into the Fraser River. The rear part of the freight train remained on the tracks but blocked the main line. A brakeman was injured but five other crewmen were unhurt. The incident occurred east of the station near dredging work underway for the new Port Mann bridge.

January 24-29, 1960

(Storm surge/tidal flooding and rain-on-snow).

Discharge (m³/s): Max. daily: January 29: Capil.: 142; Chem.: 258; Kok.: 157; Rainy: 130; January 30: Sooke: 42.8; January 31: Cowich.: 139; max. instant.: January 29: Capil.: 272; January 31: Cowich.: 141.

Source: *The Vancouver Sun*, January 25, 1960; *The Province*, January 28, 1960; *Victoria Daily Times*, January 29, 1960; *The Daily Colonist*, January 30, 1960; *The British Columbian*, January 30, 1960; Environment Canada 1991.

Details: On January 24, heavy rain and melting snow caused a washout on the CNR main line at Port Mann. *1) Fifty-eight passengers were bused to Vancouver. On January 24, a broken waterline at Britannia weakened 300 ft. (90 m) of PGE roadbed. Ten southbound passengers were bussed to North Vancouver.

At the end of January, a weather system centred over the Oregon coast caused the weird weather over Vancouver Island and the Lower Mainland. The main storm off the coast, extending 700 mi. (1,120 km) in all directions, did not strike the Lower Mainland. On January 29, Abbotsford recorded an all-time high temperature of 60° F (15.6° C). *2) A weather ship off the British Columbia coast reported a barometer reading of 942 Mb, making it the deepest storm ever recorded by the weather ship. On January 29 at 8 p.m., winds with gusts up to 75 mph (120.7 km/h) were recorded. In Surrey, seven power lines were downed and in New Westminster two high-tension lines came down.

On January 27, a 100-ft. (30 m) section of cliff came down onto the Squamish Highway and the PGE rail line near Porteau. The slide, 15 ft. (4.5 m) deep and 150 ft. (45 m) wide, was in the same area as the slide that delayed the inaugural train in 1956. The operator of a loading machine operating on the highway had to run for his life as the “truck-size” boulders hurtled down, pushing the machine near the road edge. Officials estimated it would be till late the next day before road and rail traffic would be able to resume. Engineers blamed the slide on frost penetrating the rock (*The Province*, January 28, 1960).

Overnight January 28-29, central Vancouver Island reported 2.6 in. (66.0 mm) of rain, the highest since 1955. A record 3-in. (75 mm) of rain fell on Duncan. The continuous rain washed out bridges, caused mudslides and thousands of dollars worth of flood damage. The Vancouver airport recorded 2.05 in. (55.3 mm) of rain in 36 hours ending the evening of January 29. In the 24 hours ending January 29 at 8:30 a.m., 3.3 in. (83.8 mm) of rain fell. This made a total of 6.19 in. (157.2 mm) for the previous five days. Nanaimo recorded nearly 3 in. (75 mm) of rain in a 30-hour period.

Most serious flooding in the Greater Victoria area was at Sidney, where a seasonal high tide caused drains to back up, flooding a low-lying residential area about eight blocks square. The neighbourhood affected extended from Oakland across Orchard to Ocean and from Bazan Bay back to Eighth Street. Water reached 2-3-ft. (60-90 cm) depths on lawns and in basements. Hardest hit area was at Orchard and Eighth and Orchard and Sixth. The home at 9646 Sixth was completely cut off by water over 1 ft. (30 cm) deep and had 2 ft. (60 cm) of water in the basement. Roaring waters streaming down an open drain on Oakland Avenue surrounded two brand new homes, as yet unoccupied. The residents of the area, known to old-timers as "Whiler's Swamp," blamed the flooding on water draining from the Victoria International Airport immediately to the west. An extremely high tide early on January 29 held back the outflow of the storm drains which open directly into Bazan Bay. Water in ditches along Lochside Road, leading into Sidney, was at roadside level, and in some places overflowing. Farmlands in the vicinity of Sidney were flooded in places. At Sidney, Wains Cross Road and Mills Road were covered with 5 in. (12.5 cm) of water at Patricia Bay Highway intersections. Miniature waterfalls were forming on the banks of Patricia Bay Highway and there were "cascades from one end of the Malahat to the other." Near Langford, Dewdney Flats were flooded. The Island Highway at Fanny Bay was inundated.

On January 29 at Cowichan Bay, "hundreds of tons rain-soaked mud, rocks, trees and stumps" slid from a 60 to 75-ft. (18-22.5 m) bank. The slide, which occurred at 8:30 a.m. in the heart of the community, blocked the highway and sent three parked cars crashing over the side of the road. A boat-building shop erected on pilings over the beach prevented them from being swept into the bay. It was blamed on drainage problems in a 2-ac. (0.8 ha) field above the bank and had been aggravated by 30 hours of heavy rains. The slide, which covered about 30-40 ft. (9-12 m) of highway, was cleared by noon. On the same road south of Bench Road, four other minor slide and a washout occurred. Logs jamming a creek caused floodwaters extending well back from the road. As it was feared that the Fairbridge bridge was weakened by floodwaters, five busloads of students dismissed early from Fairbridge Elementary School were detoured. Floodwaters cut off five homes in the delta land near the Cowichan and Koksilah rivers. Department road foreman Ted Marsh reported eight slides at Cowichan Bay. A "raging torrent" was going over the Trans-Canada Highway just south of the Mount Slicker Road near Tall Timbers. "The heaviest rainfall in five years" melted snow on Mount Benson causing flooding in residential districts of Nanaimo.

On January 29 at 5 p.m., high winds estimated at more than 45 mph (72.4 km/h) brought down power and telephone lines between the Malahat-Nanaimo. Rampaging Koksilah and Cowichan rivers rose 6 ft. (1.8 m), forcing at least half a dozen of homes to be abandoned. Sections of Nanaimo were flooded as Chase Creek overflowed its banks. Damage from flooding in Cowichan and Nanaimo was estimated in the "thousands of dollars." Roads were reported under water varying from a few inches to 5 ft. (1.5 m) on one section of Cowichan Bay Road. On January 30, the water was so deep that bus drivers had to move suitcases and parcels from the luggage well to the passenger compartment to keep them dry. In Duncan, the heavy rain and clogged drains caused flooded basements with water up to 2 ft. (60 cm) deep in many stores and at least 15 homes in the 1st and 2nd Street.

The combination of heavy rain, an unusually high tide and a strong east wind swamped the E&N railway track at Koksilah with 17 in. (42.5 cm) of water, peaking at 5:45 p.m. and disrupting freight and passenger service. Part of the E&N track at Chase River washed out. Southbound passengers were bussed to Victoria. Homes in suburban Lynburn, some valued at \$35,000 were reported flooded. The floodwaters and jammed logs threatened bridges over the Chase River. Many homes at Lantzville were cut off when the Lantzville Creek overflowed. In Harewood, scores of cars were stalled and their drivers had to walk through waist-deep water to dry ground. Some water mains were cut, leaving homes without domestic water supply. On Commercial Street, manhole covers were pushed off. In Parksville, an almost record 2.5 in. (63.5 mm) fell during a 24-hour period, overflowing culverts and flooding basements. Englishman River overflowed its banks.

*1) The washout occurred at the same location where on January 16, 1960 an earth slide sent a diesel engine into the Fraser River (*The Vancouver Sun*, January 25, 1960).

*2) A previous record of 59° F (15° C) was set on January 31, 1940 (*The British Columbian*, January 30, 1960).

1960

Source: *PEP Talk*, Provincial Emergency Program, June 1990.

Details: In 1960, the Goat River flooded near Creston.

1960

(Tsunami).

Source: *Alberni Valley Times*, December 12, 1979.

Details: In 1960, the Chilean earthquake, registering 8.3 on the Richter scale caused a tsunami. The wave passed through the Tofino gauges at 126 cm and swept into Port Alberni at about 200 cm. However, as the tide was low at the time, in Port Alberni the wave was experienced as a sudden high tide. Water rose above the floor level of a boom shack and although the damage was costly for MacMillan-Bloedel the city itself was unscathed. *1)

*1) In 1963, another earthquake of similar strength, registering 8.2 Richter, produced a tiny 16-cm wave at Tofino and a modest 27 cm at Port Alberni. These measurements are for a whole wave; from bottom of trough to tip of crest. Usually oceanographers will refer to a "half wave"- the surface portion, which is that part tending to move inland (*Alberni Valley Times*, December 12, 1979).

March 24, 1960

Source: *The Vancouver Sun*, March 24, 1960

Details: Early on March 24, a rockslide blocked both the Seaview (Sea-to-Sky) Highway and the PGE line near Porteau 15 mi. north of Horseshoe Bay. Public Works officials estimated it would take 24 hours to blast the 8,000 tons of boulders.

June 27, 1960

Source: *Victoria Daily Times*, June 27, 1960; *Ashcroft Journal*, July 7, 1960.

Details: On June 27, the front diesel of the 38-car CNR train struck a rockslide 4 mi. (6.4 km) west of Ashcroft in the narrow Thompson Canyon and plunged 60 ft. (18 m) into the water. The second unit and seven cars derailed but remained on the riverbank. The derailed cars were all laden with fruit. The engineer and the fireman of the CNR fast freight were killed. The brakeman jumped when the lead unit hit the slide.

Soon after the accident, one body was sighted floating down the fast moving river. Skin divers searched the submerged wreckage for the second body. They had to abandon the search for the bodies as river water was too turbulent and rocks hurled against in the water damaged diving gear. Attempts to salvage the diesel unit were put off till August when water levels would be lower.

October 20-23, 1960

Source: *The Vancouver Sun*, October 21, 22, 1960; Eisbacher and Clague 1981.

Details: In a 24-hour period ending 10 a.m. on October 21 (?), 0.75 in. (19 mm) of rain was recorded at the Vancouver airport. At the Seymour dam some 2 in. (50 mm) of rain were reported. In the 24-hour period up to 9 p.m. on October 21, more than 1.5 in. (38 mm) of rain were recorded. In three days of almost non-stop rain ending 4 p.m. on October 22, the Vancouver airport recorded 2.95 in. (74.9 mm) of rain. In North Vancouver, the three days of rainfall ranged from 5.4 in. (137.2 mm) to 6.21 in. (157.7 mm). West Vancouver reported 3.23 in. (82.0 mm).

The rainstorm with a maximum daily precipitation of 40 mm, a two-day maximum of 70 mm or 115 mm for the storm total in the downtown Vancouver area, caused landslides in the Vancouver region (Eisbacher and Clague 1981). The heavy rain caused about 30 ft. (9 m) of the roadway and shoulder of Edgemont Boulevard to fall into the gully above Mosquito Creek immediately north of the overpass at the new Upper Levels Highway. The cause was an overloaded culvert running under the embankment. Edgemont Boulevard was closed until October 22 when it was reopened to single-lane traffic. On the morning of October 21, Keith Creek spilled its banks, causing flooding at Keith and Mountain Highway with 6 in. (15 cm) of water. Throughout Greater Vancouver, minor flooding of roads, basements and catch basins occurred. Coquitlam crews continued to keep Pipeline Road open to traffic.

November 24, 1960

(Storm surge/tidal flooding).

Source: *The Province*, November 25, 1960.

Details: On November 24, a wind-induced abnormally high tide caused the Nicomekl River to flood its bank at Surrey. The river overflowed in 15-20 places but only one break occurred. An 18-ft. (5.4 m) gap was torn in the dike south of Cloverdale between Coast Meridian Road and Pacific Highway. A large area between the river and Mud Bay Road was flooded.

January 8-17, 1961

(Rain-on-snow, dam burst flooding and tidal flooding).

Discharge (m³/s): Max. daily; January 10: Rainy: 149; January 11: Zeb.: 303; January 15: Capil.: 360A; Chem.: 275E; Kok.: 190; Nan.: 1,250 (extreme record); Sooke: 75.3; Sproat: 300; Stamp A.: 759; January 16: Cowich.: 309; January 17: CR/CR: 575; max. instant.: January 14: Zeb.: 654; January 15: Chem.: 360; Nan.: 1,550 (extreme record); January 16: Cowich.: 314; January 17: CR/CR: 640.

Source: *The Vancouver Sun*, January 10, 11, 13, 16 and 17, 1961; April 22, 1961; *The Province*, January 16, 17 and 21, 1961; *The Nanaimo Daily Free Press*, January 16, 1961; February 2, 1961; *The Daily Colonist*, January 18 and 20, 1961; *Comox Free Press*, January 18, 1955; *Victoria Daily Times*, January 18, 1961; *Prince Rupert Daily News*, January 11, 16, 18 and 19, 1961; *Ocean Falls Advertiser*, January 23, 1961; *West Coast Advocate*, January 19 and 26, 1961; *Times Colonist*, January 25, 1982; Saywell 1967 (pp.124-125); Pollock 1975; Environment Canada 1991; Eggington, pers. comm.

Details: Starting at 10 p.m. on January 9, three days of torrential rains hit the Lower mainland and caused widespread flooding. During the 24-hour period ending 4 a.m. on January 11, the Vancouver International Airport recorded 1.69 in. (42.9 mm) of rain. Haney recorded 4.42 in. (112.3 mm) of rain in the 24-hour period ending 6 p.m. on January 10. At the Seymour Dam in a 72-hour period starting at 8 a.m. on January 8, 9.46 in. (240.3 mm) of rain were recorded. On January 15, Victoria set a record rainfall for a single day with 92.5 mm. (*Times Colonist*, January 25, 1982). On January 9 and 10, high temperatures at the Grouse Mountain Chalet between 35-42° F (1.7-5.6° C) melted 5 ft. (1.5 m) down to 2 ft. (60 cm).

Property damage was estimated at \$500,000. On January 10, hardest hit was the North Vancouver district. The estimated municipal damage was \$75,000 alone, to replace and repair three main sewers, roads and culverts. On January 10 in North Vancouver, an old 2.3 million-Gal. (10.35 million L) Prospect Road Dam burst its mud banks 1 mi. (1.6 km) north of Evergreen Place. *1) This reservoir, fed by Mission Creek, sent a 7-ft. (2.1 m) wave of water down the mountainside into the two tributaries of Mission Creek. It caused a wide path of destruction and flooding in the Mission and Mosquito Creek areas. The wave crushed cars and carports, washed out roads, crumbled fences and flooded houses in the Mission Creek area. Between 10-13 expensive houses in the Mission Creek area sustained extensive damage. At least 14 families fled their homes. An eyewitness described the wave as "it sounded at first like muffled thunder. It got louder and louder until it was a

terrifying roar.” The Mission Creek drainage system probably would have handled the storm water. Patrols of the creek just before the dam burst at noon showed its channel and culverts at Evergreen, Windsor and Queens were handling the flow without trouble.

A hired bus took students from Braemar Elementary School, about half a block from Mission Creek off Evergreen Place, home after a small bridge and culvert washed out, cutting off their usual route home. Just after the noon bell, Don McEwon, Principal of Braemar Elementary School, noticed the school lights flicker and saw the powerlines trembling. He observed “a huge mass of trees on the perimeter of the school grounds fell and broke all over the place.” McEwon said trees along the creek bank, which runs parallel to the schoolyard, “toppled for a city block as though felled by loggers.” The Jensen family at 725 Queens was hit by flooding a third time in six years. The water ripped out the front lawn, knocked down ornamental trees and destroyed their backyard and terrace. At one time, the water threatened some 50 homes in the reservoir area. None of the residents was injured as the wave of water carrying trees and rocks struck their homes. Floodwaters tore a car out of a garage and carried it 400 ft. (120 m). Municipal Engineer George Meckling said, “I have never seen anything like it, and probably never will.” Municipal and Civil Defence personnel cut a channel to drain the area. Some North Vancouver residences were evacuated. Power and telephone communications were cut and streets and schools were closed. A large area of the district was without regular water supply when mains were washed out.

North Shore creeks flooded their banks. Mosquito Creek ripped out a 15-ft. (5.5 m) deep, 30-ft. (9 m) section of embankment. A small bridge and a new bridge not open yet were threatened by boulders washing down Mosquito Creek. Residents stated to have been nervous the first time since Mosquito Creek went on a rampage in 1955. Other North Shore creeks were also reported rising. Water flowed across Canyon Boulevard and Montroyal when Mackay Creek flooded its banks. Mission Creek spilled its banks in the 600 block of Windsor. Water was reported running into houses at Queens and Delbrook. Flooding was also reported serious in Surrey. Scott Road was closed from Old Yale Road to the Patullo Bridge, which was under 2 ft. (60 cm), of water. A 2-mi (3.2 km) stretch of water as high as 2 ft. (60 cm) blocked Scott Road between the Trans-Canada Highway and the Townline. No. 1 Fire Hall on Scott Road at the south end of the Patullo Bridge was evacuated. The main office was flooded with 1 ft. (30 cm) of water. In New Westminster, the main trouble spots were at Tenth and Columbia and on East Columbia in front of the B.C. Penitentiary, which was under 18 in. (45 cm) of water. Essondale was practically isolated.

Extensive soil erosion also occurred in Lynn Creek near the sewer treatment plant and at Delbrook Park. Late on January 14, this \$130,000 North Vancouver facility which had been partially destroyed a day earlier, “tumbled” into Lynn Creek. Since January 10, the creek had cut a new channel eroding 200 ft. (60 m) of sandy embankment. Late on January 15, the creek threatened two houses under construction in the 1600 block Arborlynn on a treed bluff 120 ft. (40 m) above the creek. Two other houses, both at river bends near bridges were endangered. The Capilano River flooded many homes. On January 10, some 40 municipal employees were kept busy clearing plugged culverts. Firemen pumped water from 30 basements in homes from Cypress Park to the British Properties. Flooding from Deer Lake blocked Burnaby roads. Closed streets in Burnaby included Pyper from Winston south. Coquitlam Lake spilled over its dam, flooding basements of at least 20 homes forcing one family at 2650 Wilson to evacuate for the second time in five years. Water had seeped through a dike and surrounded the house. In Vancouver, rocks and mud blocked Marine Drive in the Spanish Banks area. Industrial buildings were flooded in many low-lying sections. Great Northern Railway tank cars were shunted onto the Brunette Creek bridge to prevent the structure from floating away. The span was covered with 2 ft. (60 cm) of water. Coquitlam’s Brunette Street was closed with two flooded sections, one near the New Westminster boundary and the other adjacent to the Swift Canadian plant.

On January 13, heavy rain and gale force winds caused additional damage on Vancouver Island and the Mainland. The area affected by the storms ran from Hope to Vancouver and included much of Vancouver Island. Overnight January 14-15, between 4-10 in. (100-250 mm) of rain fell in

the area. During a storm, which lasted for 126 hours, Bear Creek recorded 15.93 in. (404.6 mm) and Seymour Falls, 20.87 in. (530.1 mm) of rain. Nitinat recorded 12.91 in (327.9 mm) in 150 hours and Seymour Falls 11.09 in. of rain (281.7 mm) (Pollock 1975). From 4 p.m. on January 14 till late the next day, a record total of 14 in. (355.6 mm) of rain fell at the Seymour Dam.

The unseasonably mild weather with temperatures reaching as high as 54° F (12.2° C) and nearly a week of heavy rains cut road and rail links. All railways, CNR, CPR and PGE, cancelled outbound trains. More than 30 slides occurred in the area affected by the storm. Floodwaters and slides knocked out the Trans-Canada Highway and severed both the CPR and CNR lines in the Fraser Canyon. Early estimates put the damage at between \$500,000-750,000. The biggest slide, 300 ft. (90 m) long, occurred at the CPR line at Saddle Rock, between Yale-Hope. Then, other slides were reported in the same general area. The CPR reported its biggest washout, about 200 ft. (60 m) long, 19 mi. (30.4 km) west of Boston Bar. Five other major slides were reported on the railway near Boston Bar. Greyhound buses were shuttling rail passengers between Vancouver-Kamloops. Airlines rescheduled extra flights to airlift train passengers. Slides between Pemberton-Lillooet interrupted service on the PGE line. A CNR spokesman said with the temporary repairs, service would not be restored for at least two weeks. CPR officials whose railway was hit even harder by washouts would not venture to guess when their trains would be running again. CNR ran freight trains from Red Pass Junction near Jasper to Prince George and down to Vancouver on the PGE, which was expected to be cleared of slides on January 17. *2) The CPR ran a daily fast freight through Washington State on Great Northern tracks to Everett junction and up from Spokane to Grand Forks. Service on the CPR main line was scheduled to resume on January 22, after a weeklong interruption. The CNR needed another week's of repair work to open its line through the Fraser Canyon.

Rail traffic on the CPR south of North Bend and the CNR at Boston Bar were interrupted. CPR reported 18 slides and washouts on a 27-mi. (43.2 km) stretch between North Bend-Yale. The largest slide on the CPR line was at Sailor Bar, where rock and dirt covered the tracks 350 ft. (105 m) high (wide?) and 100 ft. (30 m) deep. Floodwaters weakened the footings under CNR's 700-ft. (210 m) Anderson Creek railway bridge near Boston Bar, requiring a major reconstruction program. CNR Mountain Region Vice-president G.R. Graham stated that five other bridges might have to be build "where I believe there have never been bridges before." Railway passengers for destinations east of Calgary were airlifted from Vancouver to Calgary to join eastbound trains from there. At Gordon Creek near Hope, the track washed out with the rails left hanging in the air. The CPR expected to reopen its trans-continental line through the Fraser Canyon on January 21. The CNR line was expected to be closed for about two weeks. A slide near Pemberton halted traffic on the Pacific Great Eastern railway for a day. In many areas, power, telephone and telegraph lines were cut. All service was restored on January 16.

Heavy rain and abnormally high temperatures caused 45 slides and washouts in the Fraser canyon. The Trans-Canada Highway was closed in the Fraser Canyon due to flooding west of Chilliwack and west of Hope. Water was building up over a bridge on the Trans-Canada Highway 18 mi. (28.8 km) east of Chilliwack. If this bridge maintaining the last link between Chilliwack-Hope would have closed, all traffic would have had to go via Washington State. This highway was hardest hit between Spuzzum-Boston Bar. The Fraser Canyon communities of Yale, North Bend and Boston Bar were cut off from the outside world, except for a small emergency airfield at Boston Bar. An eastbound CNR train with 18 passengers was trapped for 36 hours 7 mi. (11.2 km) north of Boston Bar. On January 19, the Trans-Canada Highway was expected to be open for traffic. The worst of an estimated 70 washouts occurred at Sailor Bar north of Yale on the west side of the canyon. A 300-ft. (90 m) washout cut a deep swath across the Trans-Canada Highway and also cut 100 ft. (30 m) of railroad track running below it. An estimated 500,000 yd.³ (382,300 m³) of earth and debris was dumped into the Fraser River. According to Highways Minister Phil Gaglardi, the washout at Sailor Bar was the largest that had ever occurred in the canyon. Sections of the Trans-Canada Highway running alongside the railways were also blocked. For a time, the only main highway open east from Vancouver was Highway 3 through Hope. Late on January 15, slides and washouts threatened the

Hope-Princeton highway. Sandbagging crews worked frantically to keep this only east-west link open. About 1 ft. of water was washing across the highway about 7 mi. (11.2 km) east of Hope. Overnight January 15-16, Vancouver reported a temperature of 46° F (7.8° C) and the Vancouver airport 51° F (10.6° C). At Duncan, Port Coquitlam and Chilliwack, families were forced to evacuate their homes. In Coquitlam, the Dewdney Trunk Road flooded. Several hundreds of homes were flooded. On January 15, the floods and landslides closed many highways and roads in the Lower Mainland, Fraser Valley and on Vancouver Island. Hardest hit on the Lower Mainland were Maple Ridge, Coquitlam and Port Coquitlam.

The Lougheed Highway was closed to all traffic at Essondale while floodwaters threatened near Coquitlam and Haney. At least three homes were in danger of being swept away by the Coquitlam River. The Wissar barn toppled over drowning two head of cattle and 25 chickens. An overflow of Nicomekl River closed Berry Road in Langley. Highway workers and private citizens worked for a straight 40 hours in the Fraser Valley sandbagging and clearing debris from buildings. On January 15 at 1 a.m., Coquitlam River flooded the Lougheed Highway and Dewdney Trunk Road. Livestock drowned and water and debris moving at an estimated speed of 40 mph (64 km/h) threatened the CPR bridge near Coquitlam. A huge jam of logs and trees washed down the Coquitlam River threatened the Red Bridge at Essondale. Debris was piled 400 ft. (120 m) upstream from the bridge. At Haney, water from Alouette Lake flooded 5 ft. (1.5 m) over the BC Electric dam unleashing a torrent into the North and South Alouette rivers. Three bridges at 14th and 8th on the South Alouette and 8th on the North Alouette were reported near collapse. Wreckers were trying to pull logs jamming the bridges. Maple Ridge Park was under water and at least one house was cut off. The Lougheed Highway and some Vancouver Island roads were closed until January 18 or 19. A home on Seymour Boulevard close to the Keith Road bridge was threatened during the high tide that backed up the flood level in Seymour Creek near its mouth. At the Dollarton Highway bridge over Seymour Creek, the department of highways dumped thousands of tons of boulders over a low bank to stop the erosion that threatened the highway and a house. Another house at 1964 Dollarton was evacuated. In Surrey, Scott Road was inundated.

On January 14-15, torrential rains caused an estimated \$1 million damage at mid and upper Vancouver Island points. On Vancouver Island, Duncan and Alberni took the brunt of the storm. On January 14, Port Alberni recorded 3.70 in. (94.0 mm) of rain and a temperature of 55° F (12.8° C). *3) In a 90-hour period, some 2.2 in. (55.9 mm) of rain fell. Fifty families were evacuated in Duncan and North Cowichan area; 24 in Port Coquitlam and Coquitlam; 15 in Haney; 10 in Alberni and three in North Vancouver. Following a lull in precipitation on January 13, it was hoped the floodwaters of the previous week would subside. On January 15, a combination of the previous week's heavy rain, adverse wind conditions and a high tide caused flooding in Alberni Inlet. During the high tide on January 15, River Road was flooded in many places with up to 16 in. (40 cm) of water. Ten homes were flooded and some residents evacuated. The intersection of Beaver Creek and River Road was flooded and impassable. On January 15, washouts on the Franklin River Road caused closures. Severe flooding occurred in the Kennedy River area and many washouts on the Tofino to Alberni highway closed the roads indefinitely.

Residents of riverside homes in Alberni and lakeshore homes at Sproat Lake were threatened with evacuation. On January 15, the fast rising water of Sproat Lake caught a big loader at the M&B log loading works at the shore of south end of the lake in 7-8 ft. (2.1-2.4 m) of water. Many homes overlooking Somass River had their basements and ground floors flooded. Somass River apparently reached its "highest level in 25 years." Several Sproat Lake residents reported that previous record high water markings on buildings and mooring floats had been covered by 2-3 in. (5-7.5 cm) of water. The water first broke out in two areas of the Indian Reserve and then broke through at Mary Street. Heaslip Road and Alexander Street residents suffered severe damage. In Port Alberni, floodwaters of Somass River and creeks peaked on January 15. Near Alberni, ten homes on River and Sproat Lake roads were still flooded. Floodwaters in the Alberni valley abated next day. A 13.7-

ft. (4.11 m) high tide at 11:30 a.m. on January 16 had little effect on flooding. River Road north of Port Alberni was still closed.

At Port Alberni, damage caused by an 80-ft. (24 m) washout of the municipal water main was estimated at \$1,000. With city crews working continually on January 15, service to the reservoir was restored early on January 16. To avoid future problems, major changes were required to the main water line, which crosses a blue clay slide area above a bent in China Creek. The removal of a portion of the slide and a system of under draining seemed necessary. Logs jamming in the spillways and an excessive amount of water in the watershed caused trouble and damage to the dam. The water intake at the dam was completely filled with rocks, gravel and logs completely sealing both gates with debris. It took a week for the water level in the creek to drop sufficiently to allow crews to clean it out. Using a bulldozer and dynamite, work started on January 23 to open the spillgate and intake.

Hard hit were Nanaimo and Duncan where the Nanaimo and Cowichan rivers caused severe flooding, "the worst ever known" in the Cedar district adjacent to the Nanaimo River. In the South Wellington area, 7 mi. (11.2 km) south of Nanaimo, the Nanaimo River completely washed out Thatcher Road. The pavement was completely destroyed and the bridge severely damaged. The Nanaimo River turned into a "huge body of muddy, turbulent water 0.5 mi. (800 m) wide in places." Homes along the banks were either evacuated or isolated. Early on January 15, about a dozen homes on the west side of the river were evacuated. The occupants of Riverside Auto Court and the San Salvador (auto court) had to leave their homes due to rising waters. Raines Road, which follows the riverbank, flooded north of the Cedar highway bridge. Deep floodwaters completely cut off a dozen homes on Raines Road. The road to Harmac Mill flooded with 4-5 ft. (1.2-1.5 m) of water in the hollow near North Cedar school. York Lake, a tiny 1.5 ac. (0.6 ha) swamp, became a vast body of water, 1 mi. (1.6 km) long and almost as wide.

On January 15, the Cowichan and Koksilah rivers flooded their banks again. Overnight and in the early morning, over 6 in. (150 mm) of rain fell in the area. The two rivers swept through the south and southeast fringes of Duncan. A battalion of Princess Patricia's Light Infantry from Victoria was called in to battle floods in the Duncan area. It was feared that the hundreds of logs being carried down the Cowichan River might form large logjam below Skutz Falls. Near Shawnigan Lake, one bridge on Bear Creek washed away. The 3 p.m. high tide at Cowichan Bay on January 16 caused the water to back up south of Duncan. By 2 p.m. on January 15, hundreds of acres near Cowichan Bay were flooded up to depths of 5-6 ft. (1.5-1.8 m). Ted Robson's 300-ac. (120 ha) farm was flooded. All the farm buildings were surrounded by water. Nearby Cowichan Bay Road leading off the Trans-Canada Highway about 2 mi. south of Duncan proper was under 7 ft. (2.1 m) of water. The Chevron gas station and the Tall Timbers Café had water up to the windows. According to Mr. and Mrs. J. Malgrem, operators of the café, this was their 20th flood in the 13 years they had lived there. The last real big flood had been in 1955 when similar conditions prevailed. After evacuation, Mr. Malgrem was unable to check the house because the current was too strong. On January 16, all Duncan area schools closed giving over 3,000 school children in School District No. 65 a holiday. A warning was issued to boil all drinking water in the flood area where 50 homes had been evacuated. On January 16, floodwaters were running within inches from the road surface of Allenby Road. The road, which runs along the Cowichan River, was threatened with closure. Though it remained open, for a short while it was partially blocked by a small landslide. In the morning, nearby reservation properties were threatened. By noon, several of the homes were in knee-deep water. At the previous week's principal trouble spot, the Wall subdivision, water was again lapping at doors and flooding septic tanks.

Near Duncan, Tzouhalem Road was flooded and closed to all traffic while the Harmac Road near Nanaimo was flooded and washouts were expected. When water from the Cowichan River and Somenos Creek flooded their homes near Duncan, 50 families were evacuated. *5) In the Somenos Lake area, which usually flooded each year at this time of the year, floodwaters spread out over an area three times the normal size of the lake. A creek that empties into the area about 1.5 mi. (2.4 km) north of Duncan threatened to wash out a culvert under the roadway. Floodwaters hit hardest the

lowest part of the area to the southeast of the city, which was mostly Indian land. At least 30 families were evacuated from the area. Civil Defence crews sandbagged dikes at the foot of Beech Street in Duncan. North and South Cowichan schools were closed. Alexander Elementary School in North Cowichan municipality was surrounded by water.

A flood occurred (in 1961 near Lake Cowichan), which isolated the south side (Cowichan) river for some days. It flooded the south shore road at two places as well as the E&R track. Houses flooded along the river sustained considerable damage. Floodwaters inundated King George Street from the bridge to the United Church. Most of the schools were closed for two days. It was generally believed that the flooding was "higher" than the January 1935 flood (Saywell 1967).

Youbou, which was completely cut off on January 15, had light traffic over an emergency bridge built on the highway. Floodwaters washed away one section of the Deering bridge 2 mi. (3.2 km) north of Port Renfrew, putting more than 200 BC Forest Products loggers temporarily out of work. On January 20, the bridge was open for foot traffic. Children from nearby Harris Creek were unable to attend school after washouts made some back roads impassable.

Low-lying land at Campbell River was flooded. On January 10-11, the Salmon River flooded the road near Sayward with 2.5 ft. (75 cm) of water for 18 hours. On January 15, Sayward and Kelsey Bay were isolated for one day till the Island Highway was cleared for traffic.

On January 17, still 7 ft. (2.1 m) of water was passing over the Cleveland Dam. Cheekye Bridge, 8 mi. (12.8 km) north of Squamish was expected to reopen allowing eight evacuated Indian families to return to Brackendale Indian Reserve.

Around January 14-15, the Tsolum River flooded Dove Creek Road again. For the second time in two weeks, the Trent River bridge at Royston was closed to heavy traffic. Floodwaters sent logs down the river damaged the temporary bents, closing the bridge between 8 p.m. on January 14 till the afternoon of January 16. *4)

A number of deaths, including an eight-year old West Vancouver boy who drowned, were attributed to the storm. On January 15, Robert J. McMillan, a bridge and building superintendent for CNR was crushed to death by a slide when inspecting a washout 3.5 mi. (5.6 km) west of Boston Bar. Another man was feared drowned when a boat capsized in the Cowichan River near Duncan. Near Ladysmith on Vancouver Island, a man drowned when high winds capsized his small boat. On January 16, the body of a 28-year old man, who had gone out in his small boat washed ashore at Evening Cove, 3 mi. (4.8 km) southeast of Ladysmith.

Initial estimates put the total storm damage bill at well above \$2.5 million. The damage from rockslides and washouts was much worse than first estimated. After a personal survey, highways minister Phil Gaglardi estimated damage to the Trans-Canada Highway in the Fraser Canyon at about \$1 million alone. Following inspection by helicopter, Graham estimated CNR's temporary repair bill as high as \$350,000. Though CPR officials did not release any damage numbers yet, unofficial reports said its temporary repair bill could also run as high as \$350,000. Municipal officials in the flood-hit areas on Vancouver Island, Fraser Valley and the North Shore estimated damage to public and private property at \$663,000. Vancouver Island was the hardest hit with damage estimated at \$371,000; \$200,000 to mills, \$113,000 to homes and private property and \$58,000 to roads and public works. Duncan listed \$50,000 for private property and \$10,000 for public works; Cowichan \$28,000 for private property; Alberni \$20,000 for private property and \$2,000 for public works; Cedar \$15,000 for private property; and Port Alberni \$1,000 for public works. This total of \$2,333,000 did not even cover the cost of permanent railway repairs.

*1) The reservoir built in 1930 that previously supplied water to North Lonsdale homes, had not been used since new waterlines were laid two years previous (*The Vancouver Sun*, January 11, 1961). As a result of the break in Mission's storage dam, claims totaling \$30,768 were filed in Supreme Court against the North Vancouver District (*The Vancouver Sun*, April 22, 1961).

*2) This was the first time the smaller provincial PGE railway had been called on by a national railway to assist in an emergency (*The Vancouver Sun*).

*3) The 19.03 in. (483.4 mm) of rain that fell on the Albernis between January 1-16 did not constitute a record for that period. (*West Coast Advocate*). Port Alberni's total precipitation for January was 22.98 in. (583.7 mm) including 3.3 in. (8.25 cm) of snow (*The Nanaimo Daily Free Press*, February 2, 1961). January 1961 was one of the wettest and warmest January's on some station's records. It was the wettest January at Seymour Falls in its 1927-2002 record, the second wettest in Woodfibre's 1960-2003 record and Squamish's 1959-1996 record, the fourth wettest in Hollyburn Ridge's 1954-1995 record and Vancouver Harbour CS's 1925-2002 record, and the fifth wettest at Britannia Beach in its 1913-2000 record. Squamish and Britannia Beach both recorded their second warmest January's in 1961 (Egginton, pers. comm.).

*4) For some time, the bridge had been scheduled for replacement. Damage in such a short time now assured replacement in 1961. The improvements would also include raising the level of the Island Highway near the CRA swimming pool and to reinforce the riverbank there to prevent flooding of the road.

*5) An engineering report prepared and submitted in June 1958 by the Prairie Farm Rehabilitation office for the Cowichan Indian Affairs branch made a number of recommendations to solve most of Duncan and the Cowichan district's flood problems. Recommendations contained in the 17-page report were primarily designed to prevent further erosion and flooding on Indian Reserves in Cowichan and Koksilah districts but at the same time would also prevent most flooding in low-lying areas of Duncan and adjacent North Cowichan municipality. The report recommended construction of one new bridge and excavation of three new channels to straighten the Cowichan River and diversion of the Koksilah River through a new channel to Cowichan Bay. Main work and improvements included 1) New channel on Cowichan River above the E&N Railway bridge, just southwest of Duncan. The new channel would straighten the river's approach to the bridge, continually threatened by erosion. 2) New Channel just above confluence of Cowichan River with Somenos Creek, which overflowed annually, to its original outlet eliminating erosion on the southern channel of the Cowichan. 3) Eliminate two present meanders of Cowichan River above Pimbury Bridge in the Tzouhalem Road area improving the gradient to the river mouth. 4) Replace bridge with a structure of sufficient span and deck elevation to pass flood flows without restriction. 5) Isolate Koksilah River in its own channel and shorten its course by following the south side of the MB&PR logging road at Cowichan Bay for a distance of 3,500 ft. (1,050 m). 6) Improve a 4,000-ft. (1,200 m) stretch below the Trans-Canada Highway bridge. The total estimated cost was \$235,000 (*Victoria Daily Times*, January 18, 1961).

January 20, 1961

Source: *The Daily Colonist*, January 21, 1961.

Details: On January 20, a mud and rockslide cascaded down on a group of workers, killing a logger. The slide hit the Taisho Logging Co. bridge near Gold River. The victim had been working below the bridge with a group of men. None of the others were injured.

January 29-31, 1961

Source: *Victoria Daily Times*, February 2, 1961.

Details: On January 29, Port Alberni recorded 2.8 in. (71.1 mm) of rain.

Early February about two weeks after the first flooding, the Koksilah River flooded a second time this winter. The river, which was 4 ft. (1.2 m) above normal, burst its banks in five spots along Cowichan Bay Road. Slower rising Cowichan River and Somenos Creek were still within their

banks but were being watched closely by residents in low-lying areas who feared a repetition of the mid-January floods.

February 20-21, 1961

Source: *The British Columbian*, February 21, 22, 23 and 25, 1961; *The Daily Colonist*, February 22, 1961; *Prince Rupert Daily News*, February 22, 1961; *The Province*, February 22 and 27, 1961; Eisbacher and Clague 1981; Evans, unpublished data.

Details: On February 20-21, a rainstorm with a maximum daily precipitation of 31 mm, a two-day maximum of 56 mm or 84 mm for the storm total in the downtown Vancouver area, caused landslides in the Vancouver region (Eisbacher and Clague 1981).

Torrential rain overnight February 20-21 caused McConnell Creek to overflow its banks, flooding Hatzic Prairie. Early on February 21, it triggered a debris avalanche on Dewdney Mountain, 7 mi. (11.2 km) northeast of Hatzic Lake. According to an eyewitness the slide made a noise "like the roar of a truck." Stopping 50 ft. (15 m) short of a house, it buried a 20 x 75 ft. (6 x 25 m) chicken house under 5-6 ft. (1.5-1.8 m) of mud and covered a nearby brooder house up to the eaves. It traveled 0.25 mi. (400 m) before hitting some farm buildings, 14 mi. (22.4 km) northeast of Mission. The slide was 200 yd. (180 m) long, 75 ft. (22.5 m) across and 12 ft. (3.6 m) deep displaced "millions of tons of mud and rubble" and covered an area about 250 x 150 ft. (75 x 45 m).

The slide killed a 32-year old chicken farmer. A rescue team working with a bulldozer made slow progress moving the oozy wall of mud 12 ft. (3.6 m) high and 75 ft. (22.5 m) wide. The search for the victim was hampered by the shifting mass of mud and gravel. The mud moved ahead faster than it could be cleared away. Rescue workers said the continuous noise made by the trapped chickens made it impossible to hear any cries for help. On February 26, the body was found under 8 ft. (2.4 m) of mud, gravel and rock near the second of the two smashed chicken houses.

Between 5 p.m. on February 20-8 a.m. on February 21, nearly 3 in. (75 mm) of rain fell in the Luxton Langford area. In Victoria, 2.16 in. (54.9 mm) of rain fell in 24 hours ending 4 p.m. February 21. The rains caused widespread flooding in the Luxton district near Greater Victoria. Bowker Creek, cause of many previous floods, ran deep and swift but stayed within its reinforced banks. Some homes and a few business firms experienced basement flooding. The area at the junction of Sooke Highway and Happy Valley Road and Dewdney Flats were inundated with 1 ft. (30 cm) of water.

Bilston Creek spilled its banks flooding roads, homes and business establishments. Water, which was "waist-deep" in the basement, surrounded a house on Cogan Road. High winds which followed the heavy rain tore two 80-lb. (36 kg) signs in the shape of paint cans off the roof of a hardware store, which had water come within 3 in. (7.5 cm) from flooding its furnace.

The heavy rains on February 21 caused washouts and slides on the CPR tracks in the Fraser Canyon and Fraser Valley. The worst washout, 60 ft. (18 m) long, occurred at Deroche, 42 mi. (67.2 km) east of Vancouver. Two slides blocked the tracks at Saddle Rock, in the Fraser Canyon, 150 mi. (240 km) east of Vancouver, the scene of a major washout a month earlier.

On February 21, a debris flow occurred in Allan Creek near Miracle Valley (Evans unpublished data).

On February 21, the Vedder River near Yarrow reached a maximum daily water level of 3.139 m (Environment Canada 1988).

May 11, 1961

Source: *Revelstoke Review*, May 11 and 18, 1961.

Details: On May 11 at 8:30 p.m., a mudslide at Albert canyon about 10 mi. (16 km) east of Revelstoke derailed a 78-car grain train. Four diesel units and 19 wheat cars left the tracks. The line was blocked for 36 hours. Passengers were transferred to Revelstoke by bus. *1) (Twin Butte debris flow in Illecillewaet Valley).

*1) This was the first time the new Rogers Pass Highway was used in transferring passengers by rail and bus (*Revelstoke Review*, May 18, 1961).

June 5-6, 1961

Source: *Daily Free Press*, June 6, 1961; *The Province*, June 23, 1967.

Details: On June 5, about 30 families in Trail were forced to evacuate low-lying areas near the Columbia River. One of the city's main streets was flooded at the lowest part of Bay Avenue. Here in the area of the movie theatre, floodwaters crept up to the level of the hole in the box office window (*The Province*, June 23, 1967). Traffic across the Trail bridge was slowed to one-way operations. One city theatre, forced to close during the 1948 flood, closed its doors on June 5. In the same general area near the bridge, many basements flooded.

On June 6 following the Columbia River's steady rise to flood level, the highways department ferry service at Castlegar was suspended. As the Castlegar School Board officials sought to maintain regular classes for district students, some 175 high school students were "marched" across a CPR trestle bridge to attend school. Sixteen other students from nearby Renata remained in Castlegar until the flood threat passed. Two families were evacuated from low land at Castlegar. At Creston, more than 150 soldiers and civilians continued shoring-up and raising the level of dikes along the Kootenay River. At Kinnaird, with floodwaters within 2 ft. (60 cm) of the 1948 flood level, precautionary measures were taken to protect its water supply and pump house. Provincial and civic officials were considering having a state of emergency declared for both Trail and Creston. It was feared that at Trail the bridge across the river might be swept away.

July 19, 1961

Source: Stethem and Schaerer 1980 (p. 15).

Details: On July 19, an avalanche in the Mount Garibaldi area near Squamish killed one climber and injured another one. During the week prior to the accident, temperatures at Squamish ranged from 12-25° C. On July 16, 3 mm of precipitation was recorded. At 5 a.m. the group of three climbers was hit by avalanche about 250 m below the Saddle Peak of Mount Garibaldi. The unhurt climber notified the Royal Canadian Mounted Police at Squamish. The Air Force Search and Rescue Group at Comox dispatched a helicopter for an aerial search. One injured survivor was picked up at 4 p.m. Late in the evening a ground crew located the body of the victim who had died from severe chest injuries (Stethem and Schaerer 1980).

October 7-12, 1961

Source: *The British Columbian*, October 11 and 13, 1961.

Details: Heavy rain on October 7-8 caused the Douglas Road freeway site to flood. Heavy rain on October 12 caused flooding at the Scott-Old Yale Road area of New Westminster. Floodwaters isolated the No. 1 Fire hall on Scott Road, flooded with 1 ft. (30 cm) of water, forcing the evacuation of fire fighting equipment. The flooding on Scott Road was the highest during evening rush hour traffic.

October 20-23, 1961

Source: *The Vancouver Sun*, October 21 and 24, 1961.

Details: On October 20-21, the first big rain of the season hit the Lower Mainland. At the Seymour Dam on the North Shore, 2 in. (50 mm) of rain was recorded in a 16-hour period ending 8 a.m. on October 21. In three days of almost non-stop rain starting 4 p.m. on October 20, the Vancouver International Airport recorded 2.95 in. (74.9 mm). North Vancouver recorded between 5.4 in. (137.2 mm) and 6.21 in. (157.7 mm), while West Vancouver received 3.23 in. (82.0 mm) of rain.

On the North Shore, an overloaded culvert under the embankment caused about 30 ft. (9 m) of roadway and shoulder of Edgemont Road to fall away into a gully above Mosquito Creek. It closed the road immediately north of the overpass at the new Upper Levels Highway. Minor flooding

was reported on roads, basements and sewer catch basins throughout Greater Vancouver. In Coquitlam, crews were kept busy keeping the Pipeline Road open to traffic.

Winter 1962

Source: *The British Columbian*, February 6, 1963.

Details: During the winter, washouts in the Fraser Canyon suspended all rail and highway traffic for a week.

March 20, 1962

Source: *The Province*, March 21, 1962.

Details: On March 20, a rockslide on a road building project at Granite Creek in the Renfrew logging division of B.C. Forest Products Ltd. killed an engineer and a hardrock driller. A large section of a slope collapsed without warning. The men died when the slope they were examining collapsed and carried them down a steep incline. Part of the slope had just been blasted away and had been cleaned up by a mechanical shovel when the two men moved forward.

August 16, 1962

Source: *The Vancouver Sun*, August 17, 18 and 20, 1962.

Details: On August 16, a bulldozer driver and his 24-ton machine disappeared in a giant mud and clay slide at Harrison Lake camp. *1) A 45-men crew searched for him before pulling out because of the threat of more slides. The victim had been working on road construction near the Pretty Logging Comp. Ltd. operation at Bear Creek. According to witnesses, the area in which he was working with the heavy machine suddenly gave way. A "sea of mud, clay and earth" swept the victim and his machine over an embankment. On August 17, eight-men crews were working in shifts to find the body.

*1) August had been very wet. In the first 20 days of August, Vancouver International Airport recorded 3.31 in. (84.1 mm) of rain. With 11 days to go, Abbotsford had already recorded 5.25 in. (133.4 mm). Estevan Point, Port Alberni and Vancouver city reported 8.69 in. (220.7 mm), 4.2 in. (106.7 mm) and 4.55 in. (115.6 mm), respectively. In August 1948, Vancouver International Airport set a record for the whole month with 2.97 in. (75.4 mm). Previous records set for the month of August were for Abbotsford in 1948 with 4.63 in. (117.6 mm); Estevan Point in 1960 with 7.73 in. (196.3 mm), Point Alberni in 1957 with 3.96 in. (100.6 mm) and Vancouver city in 1912 with 5.86 in. (148.8 mm) (*The Vancouver Sun*, August 20, 1962).

October 3, 1962

Source: *The Province*, October 4, 1962; *The Daily Colonist*, October 5, 1962.

Details: On October 3, a mud and rockslide at Wright's logging camp near Alert Bay on Seymour Inlet killed a logger. The victim and two others had been operating a log-loading machine on a steep side of a hill. The slide, which broke loose 1,500 ft. (450 m) above them, carried the victim and his loader away. Searchers only located part of the machine from a path of rock, tree stumps and mud 0.5 mi. (800 m) long. The body still had not been recovered on October 5.

October 11-13, 1962

Source: *The Vancouver Province*, October 15, 1962; *The Daily Colonist*, October 13 and 14, 1962; *The Vancouver Sun*, December 31, 1996 and December 16, 2006; *Times Colonist*, July 17, 2000; September 11, 2005; *Pacific Yachting*, October 2003 (pp. 44-48); Lewis and Moran 1985 (p. 5.50); Jackson et al. 1985 (p. 4-21); Thurber Consultants 1983 (Appendix B); Egginton, pers. comm.

Details: In October, the Pacific coast from northern California to British Columbia was hit by the worst storm in recorded history. Between October 11-13, two very severe storms struck the coast from California to southern British Columbia in rapid succession. The first storm caused severe

damage in the Vancouver-Victoria area with power blackouts and uprooted trees (Lewis and Moran 1985). The second storm, nicknamed “Columbus Day Windstorm,” was one of the most destructive ever recorded in the Pacific Northwest. The storm with gusts of 145 km/h struck southwestern British Columbia just after midnight on October 13, after a day in which gale-force winds had already battered the region. The storm, an extra tropical continuation of typhoon “Freda” left 48 people dead and caused \$110 million in 2000-dollars (*Times Colonist*, July 17, 2000). *1) According to *The Vancouver Sun*, the storm caused \$750 million in damage, about \$5 billion in 2006 dollars (*The Vancouver Sun*, December 16, 2006). In British Columbia, the storm claimed seven lives, mainly from electrocution from downed power lines, heart attacks and falling trees.

Although often referred to as “hurricane” or “typhoon” Freda, it was neither. Instead of forming over warm southern waters like hurricanes and typhoons, Freda was an extra tropical storm or mid-latitude cyclone. Even though the storm originated as a tropical typhoon off Wake Island in the first week of October, she had run out of steam and almost disappeared. Then, in mid-Pacific, warm zephyrs of the dying Freda clashed with an unusually cold air stream from the Gulf of Alaska, creating perfect conditions for young storms.

Between October 10-12, three of these surges struck the Pacific coast between California and British Columbia. The first one was relatively weak; the second produced gale-force winds of 60 knots/h (111 km/h) while the last one was a “true monster.” As it neared the coast, the storm deepened and turned north. A system of sub-tropical origin packs much warmer and moister air than traditional storms. And the sudden release of this latent heat energy resulted in sudden and unexpected intensification. As the atmosphere attempted to fill the low, rapidly falling pressures offshore created a tremendous rush of air through coastal valleys.

On the morning of October 12, a U.S. Navy radar picket ship 340 mi. (544 km) off California reported a drop in barometric pressure of 0.66 in. in three hours, and winds gusting to 92 mph (146.5 km/h). This report was so extreme that few took it seriously. Shortly after noon, the Bay area was struck with a torrential 8 in. (200 mm) of rain followed by winds as high as 121 mph (194.7 km/h). Over the next 12 hours, Freda dashed northward, striking California, Oregon, Washington and British Columbia in rapid succession.

Unlike the more traditional storms, this one moved very quickly, cutting a relatively narrow corridor of destruction only 125 mi. (200 km) wide along a 1,000-mi. (1,600 km) stretch. Approximately 500 mi. (800 km) in diameter, it was moving so fast that its duration over any one place was only two hours. At 11 p.m., Victoria was being pounded by sustained winds of 55 mph (88.5 km/h) with gusts to 89 mph (143.2 km/h). Vancouver experienced sustained winds of 54 mph (86.9 km/h) and peak gusts of 78 mph (125.5 km/h). *2) At the height of the storm, observers reported an “eerie light on the water and all through the woods, which was as bright as the early dawn.”

Twenty percent of Stanley Park was flattened, with a loss of hundreds of giant trees (*The Vancouver Sun*, December 16, 2006). A dozen floatplanes were sunk and demolished, along with a 42-ton Martin Mars being converted as water bomber. In southern Vancouver and the Lower Mainland, most homes lost power and telephone service. Radio stations went off the air and looting broke out. Families had to cook dinner in their fireplaces. One gas station powered its gas pump by an attendant pedalling a bicycle (*The Vancouver Sun*, December 16, 2006). The Lions Gate Bridge, swinging in the wind, was closed until engineers could inspect it the next day. In View Royal near Victoria, a carport with a large Fiberglas boat suspended from the ceiling was ripped off its foundations and carried, boat and all, over the house to crash into a neighbour's bedroom.

Damage on and near the water was relatively light as the storm was at its height between 1 p.m.-1 a.m. roughly at low tide. Because of the time of the day, there were few small boats out on the water, but a large BC Ferries vessel was forced to seek shelter behind Bowen Island, and was two hours delayed. As far north as Campbell River, towboats reported a “terrible night.” With gusts approaching 80 mph (127.8 km/h) could cause a storm surge of 4-5 ft. (1.2-1.5 m).

Waves driven by these winds could have wrecked docks and boats, flooded low-lying areas and closed roads. Luckily at 11:51 p.m. the tide at Point Atkinson was very low; at only 3.8 m it was the lowest of the daily cycle. *3) Another factor was the tremendous speed of this storm's passage. The highest winds lasted such a short time; the sea never had a chance to build up to its full potential.

William Creighton, a young operations officer in Marpac Esquimalt on duty that evening remembers Freda. "There was an exercise off the west coast of Vancouver Island involving the Pacific Fleet and 407 Sqn. Comox (Argus patrol planes). The storm hit with a vengeance about 7 p.m. Many of the smaller ships in Esquimalt broke their lines and were floating down the harbour. The patrol planes could not land at Comox. Strangely enough, the ships off Tofino were experiencing very calm conditions, possibly the eye of the storm. What a night to be on duty." (*Times Colonist*, September 11, 2005).

As fast as the storm came up, after only two hours it began to weaken. Pressures rose and the storm dissipated, with one surge continuing up the west coast and the other one moving to the Interior toward Hope. By 3 a.m. on October 13, the waters were calm and glassy. Damage to private property was estimated at \$10.5 million (*Pacific Yachting*, October 2003). The majority of the storm damage was most likely caused by severe winds. However, heavy rains were also apparent in the climate data. At the Vancouver International Airport, the precipitation on October 12 was only 15.0 mm, but wind gusts were very significant at 89-126 km/h from the east to southeast direction for the period of October 11-13. (Egginton, pers. comm.).

On October 12, the storm caused high runoff and high-level snowmelt. In the Howe Sound area, a flood on Magnesia Creek generated a small debris torrent in the lower course. A logjam at Brunswick Beach, 7 mi. (11.2 km) north of Horseshoe Bay, caused the flood. The storm only lasted four hours, from 11 a.m. to 3 p.m. The creek went up and down very quickly before and after. Cottages on the south side of the creek flooded. This was the worst debris torrent on the creek since 1938 or earlier (Jackson et al. 1985). According to local resident Merna Gates, it was the "worst event since she had come to the area in 1938" (Gates interview 1982 In: Thurber Consultants 1983). The PGE railway bridge and wooden trestles for the highway and a logging road were washed out. The torrent piled up tons of debris in front of some houses and pushed one house off its foundation (Thurber Consultants 1983).

*1) It has been called the "worst West Coast disaster since the Great San Francisco earthquake of 1906," and is still commemorated today in parts of Washington and Oregon (*Pacific Yachting*, October 2003).

*2) Since 1985, the automatic weather station on Solander Island, off Brooks Peninsula, has reported over 460 cases of sustained hurricane winds, i.e. 64 knots (118.6 km/h) or better. In the Strait of Georgia, just a short distance away, such high winds are rare. In fact, Vancouver, Victoria, Nanaimo, Comox and Campbell River have never recorded sustained hurricane force winds. However, these locations have recorded some high gusts. Vancouver recorded top gusts of 119 km/h in February 1961, and 129 km/h in November 1957 and October 1962 (Freda). Top gusts for Comox were 119 km/h in December 1959 and March 1966; 121 km/h in March 1961 and December 1967; 129 km/h in October 1962 (Freda) and November 1962; 133 km/h in March 1985; and 159 km/h in October 1990 (*Pacific Yachting*, October 2003).

*3) Winter and summer tides can exceed 15 ft. (4.5 m). It is not hard to imagine what kind of damage 80-mph winds could do under those circumstances.

November 19-20, 1962

(Rain-on-snow).

Discharge (m³/s): Max. daily: November 19: Capil.: 151 Chem.: 242; Kok.: 108; Rainy: 172;

November 20: CR/CR: 479; Sooke: 28.9; max. instant.: November 19: Capil.: 251; November 20: 513.

Source: *The Vancouver Sun*, November 20, 1962; *The Daily Free Press*, November 20-21, 1962; *The Province*, November 21, 1962; Environment Canada 1991.

Details: On November 19, heavy wind and rain melting snow cut several British Columbia road links. Three railways were also affected. In the Interior, telephone communications were out, and power links with Chilliwack, Kamloops and Boston Bar were severed. Telephone communications between Vancouver-Hope, Penticton, Princeton, Nelson, Lytton, Vernon and Cranbrook were severed.

In the Vancouver area, many basements flooded. In the Fraser Canyon, the Trans-Canada Highway and CPR mainline were cut. The storm caused an estimated \$100,000 of highway damage, slightly less than caused by typhoon Freda in October.

Hurricane-force winds of 65 mph (104 km/h) struck the Fraser Valley, causing thousands of dollars damage. Near Flood, an autocourt office was flattened after having been lifted from its foundation and thrown 80 ft. (24 m). Fallen trees severed all wire communications along the road. The storm killed a 27-year old man when a tree crushed him in his car on the Hope to Princeton highway, and injured another man.

At the washout at Texas creek, 8 mi. north of Hope part of a CNR train derailed. A caboose and two cars remained upright off the rails and two other cars dangling "crazily" 25 ft. (7.5 m) above the creek bed on a bridge whose approaches were weakened by floodwaters. Three families at Texas Creek, 8 mi. (12.8 km) north of Hope, were left homeless. The washout at Texas Creek also put out of service the 60,000-V feeder line from Hope, leaving Boston Bar and Chilliwack without power. On November 21, highway crews were still busy filling the 150-ft. (45 m) washout at Texas Creek. In an area less than 1 mi. (1.6 km) from Texas Creek, directly across the Fraser River from the CNR derailment, several washouts and a mudslide hit the CPR line.

The CNR line was blocked by a rockslide in the Fraser Canyon. The line was expected to reopen on November 20. At Choate in the Fraser Canyon between Haig-Yale, a washout 10 ft. (3 m) deep and 120 ft. (36 m) long closed the CPR line. Westbound passengers were moved by bus from Kamloops to Kelowna and flown from there to Vancouver.

East of Hope, rising creeks threatened the Hope to Princeton highway. The 1,000-man trekking Doukhobor Sons of Freedom were forced to seek higher ground. The sect members, camped at Coquihalla Park at Hope, were flooded out by the rapidly rising Coquihalla River and lost part of their food supplies.

On November 21, all highways were back in service with only one-lane traffic at Texas Creek and at several spots on the Seaview Highway and along the Hope to Princeton highway. Both CPR and CNR were still detouring passengers and freight in the Fraser Canyon.

Overnight November 19-20, the PGE rail line, which follows the road several hundred feet below it, was closed. Crews working all day cleared the rail line by 2 a.m. on November 20. Officials said numerous mud and rockslides had blocked the line. "Tons of rock and mud cascaded down" on the Seaview (Sea-to-Sky) Highway between Vancouver-Squamish and also blocked the PGE line. The Highway later reopened to light traffic.

The road between Port Hardy-Beaver Cove was cut and the Port Alberni to Tofino logging road closed indefinitely. On the Alberni to Tofino highway a small washout occurred 6 mi. (9.6 km) west of Allison Pass. This highway reopened on November 20 at 3 p.m.

December 14-15, 1962

(Rain-on-snow).

Discharge (m³/s): December 15: L. Qual.: 69.1; Stamp A.: 583E; December 16: Sprout: 203; max. instant.: N/A.

Source: *The Daily Free Press*, December 15, 1962; Environment Canada 1991.

Details: On November 14-15, heavy rains caused flooding in the Comox Valley. During the storm,

the freezing level was at between 6,000-9,000 ft. (1,800-2,700 m). A total rainfall of 1.45 in. (36.8 mm) caused roads and some homes to flood. Three rivers flowing into Courtenay, including the Puntledge and Tsolum spilled their banks flooding the outskirts of Courtenay and cutting the highway to Campbell River. The area around the CRA Hall and Lewis Park flooded. Rising water threatened Condensory Road and bridge. Dike Road leading into Comox flooded and Dove Creek Road was cut.

December 30, 1962-January 2, 1963

Discharge (m³/s): Max. daily: December 30: Nan.: 493E; January 2: Sooke: 36.8; max. instant.: N/A.
Source: *The British Columbian*, December 31, 1962; January 2, 1963; *The Daily Free Press*, January 2 and 3, 1963; *The Province*, January 3, 1963; *The Vancouver Sun*, January 4, 1963; Environment Canada 1991.

Details: Heavy rains between December 30-January 2 caused widespread flooding from Surrey to North Vancouver. In Surrey, a flash flood occurred on Old Yale Road. Hume Park flooded after a stream overflowed its bank.

Following “one of the heaviest rainfalls in recent years” on the southern part of Vancouver Island, hundreds of homes were flooded between Duncan-Victoria. On January 1, in Victoria almost 2 in. (50 mm) of rain fell in a matter of hours. At Tofino airport, nearly 4 in. (100 mm) of rain fell since New Year’s Eve or 13 in. (325 mm) during the previous week.

At Cobble Hill, between the Dutch Latch restaurant and the Malahat Chalet, a family of four fled when it looked a flood weakened stretch of the Malahat Highway 60 ft. (18 m) above them would topple onto their \$40,000 home. Some 500 ft. (150 m) of Trans-Canada Highway appeared threatened by the backwater of a runoff. Water spilled across and under the pavement and sluiced across the property that had to be evacuated. Trees and rocks moved slowly through the yard. Douglas Angus, owner of the evacuated home, thought the highway above them “looked like it was going to give way.” Highways department crews used dynamite and a frogman in an effort to clear backed up rainwater that rose 15 ft. (4.5 m) to the road level.

At Duncan, the Cowichan River overflowed its banks for the second time since October’s typhoon Freda. Residents used small boats to get around Duncan.

On January 1, floating debris in San Juan River caused the Deering bridge, 1 mi. (1.6 km) north of Port Renfrew to wash out. It was not expected passable till January 7 at the earliest. The Shawnigan to Bear Creek road, though rough and covered with big rocks from slides was open and passable as far as Deering Creek.

On the night of January 1, an avalanche 30 mi. (48 km) east of Revelstoke blocked both ends of the Canark snow shed on the Rogers Pass highway, trapping two cars inside. Using heavy equipment, provincial highways department dug the two cars out. All occupants escaped unhurt. According to a Parks official, 72 in. (180 cm) of snow fell in six days.

February 1-6, 1963

(Rain-on-snow).

Discharge (m³/s): Max. daily: February 6: Nan.: 532; Sproat: 221; Stamp A.: 767E; Zeb. 317; max. instant.: February 4: 886.

Source: *The Citizen*, February 4, 6, 7 and 8, 1963; *The Daily Free Press*, February 5 and 6, 1963; *The British Columbian*, February 6, 1963; Environment Canada 1991.

Details: During the first four days of February, with a rainfall of 3 in. (75 mm), Nanaimo and Cassidy reported more rain than during the whole month of January. A sudden warm spell and almost continuous rainfall melted the recent heavy snowfall in the mountains. The Nanaimo and Haslam rivers were in flood while the Millstone River was rising.

According to a B.C. Power Commission employee at the Puntledge power plant, rivers in the Courtenay area were “going crazy.” Early on February 6, Courtenay was hit with flooding. The muddy brown waters of the Tsolum and Puntledge rivers started spilling flooding basements of

homes and cars in low-lying areas. In Lewis Park, the water was up to the goal posts, completely covering the park. Water ran through the grandstand across the CRA parking lot and Island Highway north. At least two large sections of the highway were flooded. Near Courtenay, floodwaters caused damage near the Condensary bridge. The Island Highway south was flooded in several places. On Dike Road between Courtenay-Comox water advanced flooding businesses and basements.

A 2.8 -in. (71.1 mm) rainfall and melting snow combined to wash out three large sections of the Trans-Canada Highway and the two trans-continental railway lines in the Fraser Canyon. Damage was estimated at \$1 million. According to highways officials, the washouts, most of them in the Lytton area, might be even more costly than similar ones the previous year. The highway was not expected to be reopened before late on February 8.

On the night of February 4, a mud and rockslide, 200 ft. (60 m) and 15 ft. (4.5 m) deep cut through the highway 5 mi. (8 km) east of Lytton. The slide kept oozing down a steep slope all night. Five cars were abandoned between the washouts and a sixth was swept into the Thompson River moments after the occupants jumped out. There were also several smaller slides along the highway from Hope to Spences Bridge. On February 5, snowslides also closed down the Rogers Pass section of the Trans-Canada Highway between Revelstoke-Golden.

On February 7, a temporary Bailey bridge was installed over the 130-ft. (39 m) washout on the Trans-Canada Highway near Lytton and a detour was built around another slide nearby. Two detours cut around washouts were swept into the Thompson River.

The CPR reported "more than 10 trouble spots" on a 45-mi. (72 km) stretch of track through the Fraser Canyon. On February 7, the CPR tracks were cut a second time in one week. A 225-ft. (67.5 m) long and 100-ft. (30 m) deep washout near Lytton left the tracks suspended in the air. An 85-ft. (25.5 m) section of the CPR mainline washed out 8 mi. (12.8 km) from Lytton.

In the Lytton area, part of the CNR track washed out. CNR passengers were carried by bus between Vancouver-Kamloops. Though the CNR might reopen their line by February 6, the CPR line would be out longer.

Ca. July 1963

(Earthquake?).

Source: Souther 1980; Clague and Souther 1982; Evans 1992 (p. 76).

Details: Ca. July, a large landslide occurred on the west flank of Mount Cayley in the southern Coast Mountains of British Columbia. *1) The volume of the slide was estimated at 5 million m³. The *fahrboschung* of the slide was 22 and velocities calculated from superelevation data, reached 15-20 m/s (Evans 1992). The slide originated on a moderately steep, but heavily forested slope near the base of a precipitous cliff of Vulcan's Thumb rocks. It headed at 1,450 m elevation and terminated at about 500 m elevation. It was approximately 2.5 km long, an average of 250 m wide, and sloped about 17 ° from head to toe. The failure slid into the valley of Dusty Creek, a small tributary of Turbid Creek. The landslide debris moved about 1 km down Dusty Creek as a wedge-shaped mass up to 70 m thick, banking up on turns. The debris mass thinned as it spread across the broader, flatter valley of Turbid Creek, and was deposited as an irregular blanket with a maximum thickness of 65 m along a 1-km length of this valley. The slide blocked Turbid and Dusty creeks, forming lakes behind the debris. These debris dams were soon overtopped and rapidly breached, causing floods and probably debris flows to sweep down Turbid Creek valley far beyond the terminus of the landslide. The debris flow that traveled down Turbid Creek had no effect upon the Squamish River (Clague and Souther 1982).

From an analysis of the annual rings of slide-damaged trees, it was concluded that the landslide probably occurred in July 1963 (Clague and Souther 1982). Between July 20-22, a summer rainstorm with a total precipitation of about 50 mm was not an unusually severe storm for this area. An earthquake, which occurred on July 12 west of Vancouver Island, had a magnitude of 4.8, making it the largest in western Canada for 1963. A smaller earthquake with a magnitude of 3.1 on July 13 had an epicentre only 65 km from Mount Cayley.

*1) Deposits of one or more landslides that predate the 1963 event also occur in Turbid Creek valley. These older deposits are present over a much larger area than the 1963 slide deposits and probably were emplaced by highly mobile debris flows with high water content (Clague and Souther 1982).

October 21, 1963

Source: *The Vancouver Sun*, October 21 and 25, 1963.

Details: On October 21, heavy rain and high winds battered the Howe Sound area. At 1:20 a.m., a PGE train derailed near Mile 20, about 3 mi. (4.8 km) south of Britannia Beach. Six diesel-electric units derailed but stayed upright. Eight boxcars of the northbound 109-car freight train plunged over and embankment. They crashed down a steep slope but stopped short of toppling into Howe Sound. Several other boxcars also fell over on their sides. The train's 43-year old conductor died three days later of injuries received in the accident. The train engineer and fireman escaped with minor injuries (*The Vancouver Sun*, October 25, 1963). The track was badly damaged in the derailment.

November 24-26, 1963

Source: *The British Columbian*, November 26, 1963.

Details: On November 26, the heavy rainfall in the Lower Mainland of the previous 48 hours caused minor but widespread flooding in almost all areas. Blocked culverts were mostly the cause of the flooding.

December 6, 1963

Source: *Victoria Daily Times*, January 8 and 9, 1964.

Details: On December 6, an 80-ft. (24 m) part of the Jordan River bed collapsed into a mined out part of the Cowichan Copper Co. mine. It caused the river to flow through the mine works and out the portal, more than 8,000 ft. (2.4 km) away. Damage was estimated at \$25,000. To resume operations, the river would have to be permanently diverted for about 500 ft. (150 m) where it suddenly poured into the mine.

December 22-23, 1963

(Storm surge/tidal flooding).

Discharge (m³/s): December 23: Kok.: 134; December 25: CR/CR: 419; Cowich.: 198; max. instant.: December 25: Cowich.: 200; December 27: CR/CR: 467.

Source: *Victoria Daily Times*, December 23, 1963; *The New Westminster Columbian*, December 23, 24, 1963; *The Vancouver Sun*, December 24, 1963; *The Daily Free Press*, December 23 and 24, 1963; British Columbia Ministry of Environment 1975; Environment Canada 1991.

Details: In the 24-hour period ending 9 a.m. on December 23, New Westminster recorded 3.04 in. (77.2 mm) of rain. Vancouver reported a total of 1.6 in. (40.6 mm) while Saanich recorded 1.42 in. (36.1 mm). The torrential rain caused widespread flooding throughout the Lower Mainland. The District of Coquitlam was one of the worst hit areas. In Surrey, up to 2 ft. (60 cm) of water covered a part of Scott Road on the flats below the Scott Road hill. Farmland in some sections of the municipality was flooded. A culvert plugged with gravel caused a section of the King George Highway near 80th Avenue to be flooded with 6 in. (15 cm) of water. In Delta, many basements were flooded due to backed up drain tiles. In Surrey, at least 100 homes were flooded over the weekend, mainly due to plugged culverts. There were numerous reports of water washing over roads. A section of Columbia Street below the B.C. Penitentiary in New Westminster was flooded.

As an aftermath of the storm, an 81-year old pioneer resident of Crescent Beach was killed. Early on December 24, a rain-weakened bank of the Nicomekl River collapsed. A 50-ft. (15 m) wide and 150-ft. (45 m) long section of bank slid into the river. The slide buried the victim's two-room cabin situated 155 ft. (46.5 m) below Crescent Road on the edge of the river. The collapse of the 125-ft. (37.5 m) bank caused tons of earth to slide into the Nicomekl River. According to the victim's

son who lived nearby, after two minor slides occurred on December 23 he had asked his father to move. The wall of mud loosened by the rain of the previous two days demolished the building and carried it to a small private wharf on the edge of the river.

On December 22-23, torrential rains and melting snow caused flooding in Britannia Beach. Streets and lawns were inundated with water up to 6 ft. (1.8 m) deep. On December 22, seven families were evacuated and the highway at Britannia Beach washed out. This was the fourth flood in three years (British Columbia Ministry of Environment 1975). Homes and a medical centre were flooded. Twelve families were forced to leave their homes. As rains subsided, the feared "second punch" never came. All services, including flooded water mains and severed roads were restored for Christmas.

On December 23 at 11:30 a.m., a high tide caused the Nanaimo River to flood to the steps of the Autocourt at the Cedar Road bridge south of town, forcing 12 families to evacuate their homes. On the morning of December 23, all low-lying lands along the river flooded. The flooding included a section of Thather Road in the South Wellington area where floodwaters marooned seven families all day. Nanaimo got less than half the rain dumped on Port Alberni and the Vancouver North Shore. Harmac Road No. 1 was flooded with 5 ft. (1.5 m) of water. The Millstone River flooded in many locations. Flooding occurred on Cedar and MacMillan roads. Early on December 24, many farms in the Harewood region around 3rd Street flooded.

A week of heavy rains with practically no let up on December 23 caused heavy damage in areas of the Cowichan Valley, expected to be in the thousands of dollars. The Cowichan, Chemainus and Koksilah rivers all spilled their banks. Large areas were flooded after almost 2 in. (50 mm) of rain fell in 30 hours. The Cowichan River flooded in the lower reaches. Floodwaters 2 ft. (60 cm) deep closed Cowichan Bay Road to all traffic. The heavy rain washed out some suburban roads up (Vancouver) island and elsewhere, disrupting traffic.

Worst hit area was Westholme where the Chemainus River broke its banks and flooded hundreds of acres, completely isolating Pinson's Corner, a small settlement between Crofton-Chemainus. At Pinson's Corner, a garage, restaurant and several homes were completely flooded with 4 ft. (1.2 m) of muddy water. Just south of Westholme, the rail line also flooded. Water was across the road between the Pimbury bridge and the Klemkemaetz bridge. On the Cowichan Indian Reserve some homes were cut off, forcing some families to evacuate.

Late on December 23 as the Somenos River flooded, Maple Bay, a residential district 5 mi. (8 km) east of Duncan, was in danger of being cut off. The Somenos River flooded the Tzouhalem Road a mile (1.6 km) from Duncan to a depth of 1 ft. (30 cm). Overnight December 23-24, floodwaters in Chemainus, Pinson's Corner and several other areas in the Cowichan Valley subsided. On the morning of December 24 Beverley Street in Duncan, however, was still flooded. Several families living on a low lying residential area on Beverley opposite Alexander school evacuated after water levels in the Somenos rose to a dangerous level. A large area to the north and the east flooded, cutting off all vehicular traffic along Lakes Road. Cowichan Bay, where the Koksilah and Cowichan rivers terminate, was cut off from Duncan. For two days, even bus service was impossible.

Continuous rainfall during the previous 36 hours caused the Courtenay River to overflow its banks. On the early evening, muddy floodwaters spilled into Lewis Park. On December 23, the field was a lake and the water was still rising. Floodwaters blocked off many smaller roads throughout the Comox Valley. In some parts of the valley, power and telephone service was impaired. Along Dyke Road between Courtenay-Comox, the (Tsolum) river caused some flood damage. High water blocked off several homes. High winds impeded air traffic at RCAF station Comox.

On December 22, Port Alberni reported about 7 in. (175 mm) of rain in 36 hours. About 3 mi. (4.8 km) south of Port Alberni, a "gigantic" mudslide, measuring a height of 40 ft. (12 m) and a width of 150 ft. (45 m), cut more than 100 ft. (30 m) of the domestic water pipeline into Port Alberni. It forced the closure of the Macmillan-Blodel and Powell River Company (MacBlo) pulp and paper plant. Coin laundries and car washes were ordered closed and residents were urged to a voluntary

water rationing. Repairs to the 7-mi. (11.2 km) long pipe from the intake at China Creek were expected to take several days.

The slide diverted a stream of water through the property of Bill Verbrugge, whose farm storage buildings were located in the slide area. He lost two tractors and other farm equipment as well as 150 tons of potatoes valued at \$20,000. The slide also closed the Franklin River Road.

Overnight December 22-23, winds up to 60 mph (96 km/h) lashed the Port Alberni coast. Rainfall measuring over 5 in. (125 mm) during the previous 24 hours washed out the Franklin River Road, a logging trail to Bamfield maintained by MacBlo. The Ucluelet to Tofino road also closed due to the heavy rains. Late on December 22, a private bus carrying 30 persons for the fishing villages was forced to return to Port Alberni.

On December 23, a rock and mudslide blocked the Fraser Canyon section of the Trans-Canada Highway. One car was reportedly caught in the slide, which was cleared an hour and a half later. There were no injuries reported.

January 7-8, 1964

(Dam burst/flooding).

Source: *Victoria Daily Times*, January 8 and 9, 1964.

Details: On January 7, a “spectacular” landslide occurred at the water-filled Cowichan Copper Co. mine and threatened the small logging community of Jordan River with flooding. Following unusually heavy rains through most of December, increased flow of water from the Jordan River through the Cowichan Copper Co. mine site had carried enough debris with it to block the main portal about 1,500 ft. (450 m) inside. The water backed up, rising through 250 ft. (75 m) (of gravel?), finally breaking out and carried on down the mountainside. Where the water welled out of the earth, was a crater 100 ft. (30 m) wide and 60 ft. (18 m) deep. It cascaded down the side hill past the mine office, shops and laboratory. The slide took staging and loading equipment down into the river 100 ft. (30 m) below. Debris, trees, timber, three small mine diesel locomotives and a truck, supplies and the thousands of yards of gravel and rock raised the riverbed by about 40 ft. (12 m). Damage had not been assessed yet, except for the \$25,000 damage done to the mine earlier. Thousands of dollars worth of mine equipment with the diesels valued at about \$20,000 each was carried into the river.

On January 8, attempts were made to have this flow diverted about 300 ft. (90 m) to the riverbank where it could freely run to the sea. The slide caused heavy silting downstream. An estimated 100,000 yd.³ (76,460 m³) silt and gravel washed into the Jordan River. It was carried downstream and filled the Canadian Puget Sound Logging Co. booming ground. The silt, halting this operation 1 mi. (1.6 km) from the slide and restricting the river’s path to the sea grounded the company’s tug. As a result of the booming ground shutdown, some 70 men were left idle.

A Canadian Puget Sound bulldozer later cleared a channel to tidewater. On January 9, despite 0.5 in. (12.5 mm) of rain overnight, the treat of flooding river’s north bank at Jordan River eased. Crews had succeeded in blasting and bulldozing a 300-ft. (90 m) diversion channel from the outflow to the riverbank. At the mine site, about 20 of the mine’s 125 employees were involved in diverting the two streams of the Jordan River, which effectively had shut down the mine’s operation.

Cowichan Copper president Oswald G. MacDonald expected the original job of stopping the river flow into the mine to be completed within a week or two and the mill operating by the end of January. The plan was to permanently divert the river for about 500 ft. (150 m) from where it suddenly poured into the mine. The original hole would be separated from the river by a dike until the levels in the mine could be sealed off with concrete plugs. Upon completion, the mine could be pumped dry and put back into production at the end of the month. After drying out the motors and switching gear, the copper ore refining mill located underground some 7,400 ft. (2,220 m) inside the portal could resume operation. Original efforts to reduce the river flow by half by dumping gravel and car bodies into the bed were abandoned in favour of diverting the river.

March 27-29, 1964

(Earthquake, subaqueous slope failure and tsunami).

Source: *Alberni Valley Times*, December 11, 12, 14, 17 and 19, 1979; *The Vancouver Sun*, April 25, 1969; July 28, 1998; January 1, 2005; *Times Colonist*, January 27, 2000; December 28, 2004; January 5, 2005; *The Province*, December 27, 2004; *National Post*, January 7, 2005; Alberni Tidal Wave Disaster. summer 1964; Wigen and White 1964; Coulter and Migliaccio 1966; Wigen 1979; Thompson 1981; Hay 1983 (pp. 17-20); Clague (Compiler) 1989 (p. 82); Clague 1991 (p. 812); Clague and Bobrowsky 1996; Clague et al. 1996; Wood 1996 (p. 9).

Details: On Good Friday March 27, a 9.2 Richter-scale megathrust earthquake, the second largest of the 20th century, struck the Alaskan coast. The quake triggered a large, about 75-million m³, submarine slump near Valdez, Alaska. South of Anchorage, the ocean floor dropped causing a local tsunami that destroyed waterfront facilities and the fishing fleet (Coulter and Migliaccio 1966).

At Anchorage, the damage generally involved larger buildings and structures like bridges. At Seward, Alaska, the greatest damage was attributed to foundation collapses along the entire waterfront due to sliding and subsidence caused by successive sea level drawdowns. Near Kodiak City, Alaska a “bore” (a steep, fast moving, breaking wave) developed, travelling at over 60 km/h at a height of over 10 m. Though a crab boat rode the foaming crest of this wave and survived, the wave tore out docks and canneries in its path (Hay 1983).

Captain Merrill Stewart while aboard the 10,815-ton vessel *Chena* in Valdez harbour, gave an eyewitness account of the earthquake, “The Valdez piers started to collapse right away. There was a tremendous noise. The ship was laying over to port. I had been in earthquakes before, but I knew right away that this was the worst one yet. The *Chena* rose about 30 feet (9 m) on an oncoming wave. The whole ship lifted and heeled to port about 50 degrees. Then it slammed down heavily on the spot where the docks had disintegrated moments before. I saw people running – with no place to run to. It was just ghastly. They were just engulfed by buildings, water, mud, and everything. The *Chena* dropped where the people had been. That was what kept me awake for days. There was no sight of them. The ship stayed there momentarily. Then there was an ungodly backroll to starboard. Then she came upright. Then we took another heavy roll to port.” (Hay 1983).

The slide and concomitant tsunami were responsible for the loss of 30 lives, nearly 25% of all the casualties of the earthquake. A tsunami resulting from this earthquake also caused severe damage on the west coast of Vancouver Island and elsewhere. The earthquake generated a series of sea waves that moved radially outward from the epicentre near the head of Prince William Sound. The main tsunami swept southward across the Pacific Ocean at a velocity of about 830 km/h, reaching Antarctica in only 16 hours. Within a few hours, the waves reached the outer coasts of the Queen Charlotte Islands and Vancouver Island.

A series of up to 4-metre high waves surged into narrow Alberni Inlet, first flooding the piers and moored fishing boats, then the waterfront homes and industrial plants, before halting 300 m inland. *2) The three main waves struck Port Alberni between 12:20 a.m.-3:30 a.m. on March 28. Had the largest wave coincided with the highest tide 200 minutes earlier, that wave would have been nearly 3 ft. (90 cm) higher (*Alberni Valley Times*, December 12, 14, 1979). Although nobody was killed, the water did \$10 million in damage. The tsunami inundated the Port Alberni marsh to a depth of 4-5 m and washed away a section of the elevated water pipeline that crosses the marsh. Many boats were capsized and 58 buildings were destroyed (Wood 1996). The four large waves up to 7 m high swept into the lower parts of Port Alberni, damaging 260 homes, 60 extensively. No one was killed but 200 families were evacuated and more than 400 homes were either damaged or destroyed. The total loss here and elsewhere on Vancouver Island was estimated at \$10 million or the equivalent of more than \$15 million in 1998 dollars (Clague 1991; *The Vancouver Sun*). *1)

The first wave struck at 30 minutes after midnight, at the highest tide. But this was a wave of only 9 ft. (2.7 m). Combined with the tide it gave a water level of 12.7 m. Most people in town were asleep when the first wave rolled in. *3) The sea surged up Somass River at a velocity of about 50

km/h and spilled onto the land, inundating whole neighbourhoods in chest-deep water. This wave reached 3.7 m above geodetic datum and knocked out the Port Alberni tide gauge.

The second and most destructive wave swept into town less than two hours later, at 2 a.m. By now the tide was receding and the water forces rose to a combined height of 14.3 ft. (4.3 m). The lights of the waterfront mills went out as the water smashed through the facilities. The surging water splintered the ground floor of the Barclay Hotel, 1 km inland. Guests had to be plucked from an upper floor by police in boats. Logs and debris crashed into buildings, cars were cast about, and houses were swept off their foundations and hurtled inland. As the water subsided, some buildings were dragged seaward. Two houses drifted into Alberni Inlet and were never seen again. The second wave left a mark on the tide station at 4.3 m above geodetic datum.

The third wave, which arrived at about 3:30 a.m., was the largest of all. Fortunately the tide was at - 0.7 feet causing a combined water level of 13.6 ft. (4.1 m). Because the tide had fallen, it crested at 3.9 m and did little further damage. Had the third wave coincided with the tide at 12:30 a.m., then the wave would have been a massive 17 ft. (5.1 m) (*Alberni Valley Times*, December 14, 1979).

Other waves oscillated in Alberni Inlet with decreasing strength for another two days (Clague and Bobrowsky 1996). In all there were 13 wave cycles in a space of 22 hours with a time between each of about 102 minutes. Of those waves only three were significant, and only two sufficient to cause major damage (*Alberni Valley Times*, December 14, 1979). The waves were amplified as they moved up Barkley Sound and Alberni Inlet. Consequently, they were two and one-half times larger at Port Alberni than at Tofino and Ucluelet on the open coast.

A report titled Alberni Tidal Wave Disaster, published in the summer of 1964, gives a slightly different sequence: "The first wave struck at approximately 12:10 a.m., rising 8 ft. (2.4 m) above normal high tide. The second wave rose to 10 ft. (3 m) at 1:15 a.m., followed by the third, which dropped to 6 ft. (1.8 m) by 3 a.m. Three more waves, all at 5 ft. (1.5 m), arrived between 4:30 a.m.-6:45 a.m., while a wave surge continued in Alberni Inlet for 18 hours."

"Where the first wave served to alert the communities just enough to prevent loss of life, the second marched inland to carry off homes, automobiles, and the pathetic personal remainders strewn about by any disaster." Damages were estimated at \$5 million. Some 58 properties - individual homes, stores and multiple auto courts - were assessed as 100 percent losses. Buildings were swept inland, log booms and boats smashed into buildings, heavy industry shut down because of water damage.

Residents found widespread destruction in the town. Boats, buildings, cars, "everything was on its side," one eyewitness said. "It was just like a wind storm that picked everything up and threw it around." (*Times Colonist*, December 28, 2004). Observers in Alberni reported floating logs and houses reached speeds in excess of 33 km/h. The giant MacMillan Bloedel and Powell River sawmill operation employing 4,000 men was damaged and closed down. A 1,370-mm water main supplying the pulp mill was ruptured by logs, which knocked out support trestles (Hay 1983).

Ann (Neilson) recalled, "Then the tidal wave came. It was absolutely frightening because we were sitting in the living room and I actually watched water come up the window. It was really, really scary. (In 1964, Webber lived in a house that, in 1979 would be at about berth 15 in the Clutesi Marina. Walking over the Victoria Quay bridge near the marina, the roof of her two-storey house would have been below you!) (*Alberni Valley Times*, December 14, 1979).

The wave and logs hit Mrs. Rose Hargreaves' house on River Road: "The house moved off its foundations and floated away. Luckily we were dragging some bricks - it stabilised the house - stopped it from tipping. We were moving fast, spinning around and around.... We were afloat from midnight. As the house started to circle and move out down the canal, I thought 'this is it'.... Water was right up to my mouth I've got a little place in my cupboard. I'll never paint over that. That's how high the water was - at about 46 inches or more. It turned grey afterwards."

Herman Weinmuller, another resident of River Road, noted "... we could see two houses floating down the old driving range (behind the Greenwood Hotel and opposite the Co-op station).

One had people in it. We could see a little light in there.” (*Alberni Valley Times*, December 12, 1979).

The house Weinmuller was referring to was probably the one belonging to Mrs. King who also lived on River road. “The house took off and we were all petrified. We thought we were going out towards the ocean. My son was watching out the window and he could tell by the skyline – it was pitch dark – we were not going towards the ocean, we were going inland.” Mrs. King’s house eventually ended up in a grassy area, on the edge of a ditch, opposite the Co-op Petroleum station on Beaver creek Road (*Alberni Valley Times*, December 14, 1979).

Ron Volkman’s first impression was that the island was sinking. “I didn’t think it was serious. I thought maybe a dam had burst somewhere.” When he saw it coming through his River Road home, however, he figured it was time to get out. “We grabbed the kids. I opened the back door and the back steps floated in. It was bad. My wife had one kid, I had another and we carried our daughter between us. She nearly drowned. The water was up to our necks. This was the first wave (*Alberni Valley Times*, December 19, 1979).

Eli Ivens, living on Richardson Road directly behind the Kitsucksus Creek dyke, recalled, “The water came in and picked up an old kitchen stove I had there and blew it across the other side of the basement about 20 feet (6 m). There was that much force. It came in with an awful roar. It took the door off the jambs.

“It was a good thing that the wave happened at night. If it had happened in the daytime with mothers and children playing outside, they wouldn’t have a chance. That water had such a roll you couldn’t swim in it, the force was so strong. It was like a big rolling wall of water. Lives could have been lost.” (*Alberni Valley Times*, December 17, 1979). Fifteen years later Ivens was still living in the same place.

In the early 1970s, the residents of Port Alberni’s low-lying River Road-Lugrin Creek area had all but forgotten the night of the tsunami. With the dykes providing a sense of security, people were content to carry on their lives on the bank of the river, happy to enjoy the shaded boulevard in one of the city’s prettiest areas. As the chief of planning division at Water Investigations, Doug Watts remarked, “People have short memories. As time passes, fears ease and it is difficult to convince the public that new dangers still exists.”

Watts recognised that “people cannot be protected from all risks, such lightning.” Nevertheless, courts do expect government to take reasonable protective steps, especially when the risks are well known and technology exists, as it does with flooding, to provide protection.

The study prepared by Reid, Crowther and Partners Ltd. on the Lugrin Creek area was a joint municipal and provincial project. It was undertaken because, with increasing pressure for subdivision – and increased concern for allowing any development at all in flood plains, protected or not – there was a need to assess both flood and tsunami risks.

Both the Somass River and Kitsucksus Creek area were dyked to the level of a 1:50-year flood. But no protective works had been constructed on Lugrin Creek itself. Lugrin Creek emptied the Kitsucksus by a flap-grated culvert, which closed at high tide causing back up and ponding of floodwaters. This whole area was inundated by the 1964 tsunami.

At least four lakes (Sproat, Elsie, Oshinow and Great Central) eventually drain into the Somass River. According to the study, this waterway is straight with no noticeable erosion in the previous 25 years. The Somass River is the largest local waterway and, in the flood plain area, is fed by Kitsucksus Creek. On the community side, as the river approaches the Alberni Inlet, a dyke was built in 1969.

On its way to the Somass River, Kitsucksus Creek winding down from high ground passes through residential parts of the flood plain. In turn, two branches of Lugrin Creek feed Kitsucksus Creek. This portion of the creek has been widened and dyked since the 1964 tsunami. By 1979, this dyke was subject to some erosion.

A recommendation of the Lugrin Creek study stated, “ . . . Steps should be taken to make the public living in the areas of possible flood and tsunami threat aware of these dangers. A suitable

information and warning system should be developed for the Alberni area as the potential hazard must be kept fresh in people's minds if emergency action is to be effective...." (*Alberni Valley Times*, December 17, 1979).

Port Alberni Harbour Master Don Brooks' quick action saved the fishing boats tied up at the dock. "Accompanied by a fellow called Tom Yates, who lived on a boat with the fishing fleet in the harbour, I went around with an axe and we cut most of the lines on the boats – the ones on the floats. So when the tide came up and the floats came to their limit on the piling, the boats wouldn't be pulled over. This was as the second wave was approaching. I left the scene when the water was up to my waist. We got off the floats at that time – we'd pretty well chopped all the lines. We didn't lose any fish boats, none keeled over and sank." (*Alberni Valley Times*, December 19, 1979).

"The bus depot at that time was where the CPR station is now (1979) and water had flooded in that area at that particular time I was heading for higher ground. Water was flooding onto Kingsway, and in the liquor store it was flooding in and around the floor. The liquor store was in a building right next door to the Somass Hotel, right across from the bus depot. I was in the parking lot between the liquor store and the hotel. There was water up to my waist.... Meanwhile, down on Third Ave., water had flooded up over the A&W, flooded in Stewart and Hudson (Revelstoke), and as the water pushed in over those gas stations, it pushed a lot of the gasoline out of the holding tanks. So there was quite a smell of gasoline in that particular area. And from a lot of the rental housing along there, people were making their way out to the high land. Now what was happening in the harbour was that the second wave dislodged every log tie-up we have in the upper part of the harbour. The harbour was absolutely jam-packed with logs. The wave pushed most of the logs up on the airport. It took them four months to relog (delog?) the airport."

Port Alberni is the only major urban area in Canada to have experienced a tsunami. It was historically the most destructive tsunami to hit British Columbia (Wigen and White 1964; Thompson 1981). In a March 1979 report commissioned by the City of Port Alberni, Sydney O. Wigen of the Institute noted, "It is clear that the tidal waves (tsunamis) of 1960 and 1964 (in Port Alberni) were not freak events... tsunamis larger than the one in 1964 are a probability on the British Columbia coast. it was not a unique event, but that it will probably be equalled or exceeded in a 100-year period." Indeed there was quite strong evidence to suggest that its severity on the west coast may have been equalled or exceeded in 1896. (Wigen 1979) *4)

The Assistant Deputy Minister of the Environment G.E. Simmons noted, "Tsunamis therefore need to be recognised as a significant factor in planning for land use in low-lying areas both at Port Alberni and other vulnerable portions of the British Columbia coast."

The town's location at the head of Alberni Inlet places it at much higher risk than other communities along the coast. (*The Vancouver Sun*). The damage at Port Alberni resulted, in large part, from the funneling effects of the long narrow inlet up which the waves traveled (Clague 1991). Not only were the residents in the low-lying areas unaware of their vulnerable situation, but local authorities did not have procedures adequate for the emergency. The headquarters and storage site for the volunteer Search and Rescue group, for example, was located in a low-lying area directly in the path of the tsunami. Also, the dyking system at the time would ensure water not to immediately recede after inundation. Rather it would remain as a lake for several days, impeding with rescue operations (*Alberni Valley Times*, December 14, 1979).

Elsewhere on the west coast of Vancouver Island, the tsunami destroyed 16 or 18 homes at Hot Springs Cove, knocked 30 homes off their foundations at Zeballos and displaced 37 persons at logging community of Amai (Alberni Tidal Wave Disaster 1964). A former Zeballos resident remembers the tsunami. "... all of a sudden we heard this roaring sound and came out to see this raging river going through the main street of Zeballos. Logs and garbage cans, everything was floating." Families headed to the school, which was on higher ground. Damage in Zeballos was limited because the 5-m wave came at low tide (*The Province*, December 27, 2004).

Compared to Port Alberni, little damage was caused at Tofino, only 65 km from Port Alberni. At Tofino, the tsunami was measured at 2.5 m, which swelled to 7 m by the time it traveled

up the increasingly narrow Barkley Sound and Alberni Canal to Port Alberni. It also had very little effect in protected waterways such as the Strait of Georgia. Victoria saw wave of just a third of a metre and Vancouver experienced a surge of just a couple of centimetres. Some large waves were observed in Ocean Falls in the Inside Passage. These differences are attributable to the morphological complexity of the British Columbia shoreline and the adjacent sea floor.

A 10-metre high wave struck the water front section of Hilo, Hawaii. *8) Lesser-sized waves swamped coastlines as far south as Peru and Antarctica. In Crescent City, Ore. The waves drowned some sightseers. In total, 122 lives were lost (Wood 1996). Clague et al. (1996) put the number of people killed, some as far as California, at 130.

Many Port Alberni residents, particularly officials, insisted that there was no real tidal wave in 1964, but in fact there was only a fast rising flood. Eyewitness accounts indicted, however, this is an incorrect assumption. In certain locations, this fast rising water did form a moving, breaking wave.

Although tsunamis rising up may threaten ships, these waves go often unnoticed in the open ocean. During the 1946 Hilo tsunami, an unusual feature of the waves was observed. The crew of a ship offshore watched the waves crashing over the tops of buildings without being aware that a wave had passed beneath their ship.

During the 1964 tsunami, the Port Alberni RCMP detachment's boat *Ganges*, commanded by staff sergeant Green undertook spotting duties in the canal. They became aware of the wave potential only because at one point they were sailing over 18 ft. (5.4 m) of water. Minutes later, in the same spot they were stuck on the bottom. As the wave passed beneath them, it had literally "sucked" the water out of the canal.

The City of Port Alberni and the province together commissioned a study on the topic of flooding. It concluded the greater danger to Port Alberni was from tidal waves, not other forms of flooding. It suggested that flood plain style restrictions might be widened to include other lower lying areas of Port Alberni. *5) In reaction, the province informed the city that no subdivisions would be allowed anywhere in the city on land below 20 ft. At least one provincial official voiced the suggestion that residents-at-risk could be relocated to new homes on higher ground (*Alberni Valley Times*, December 11, 1979). The city's Mayor found the provincial authorities to be very rigid. "Doug Watts, for example, thinks there should be no development at all below 33 ft. (10 m)."

Further complicating the issue is the economic need to protect the vital salmon spawning areas of Kitsucksus and Lugin creeks.

In 1964, the provincial Water Rights Branch carried out a study of protecting the area from future tsunamis as well as Somass and Kitsucksus flooding. The following recommendations were made: raise River Road to 12 ft (3.6 m) geodetic; straighten, improve and dyke Kitsucksus Creek channel and provide drainage through dykes; purchase unprotected land along the Somass River outside the dyke; and, develop the purchased unprotected lands for parks and a marina. *6) The study suggested these improvements would increase market values of properties as well as providing flood protection.

Also in 1964, the City of Alberni (as distinct from the adjoining municipality of Port Alberni) brought in a bylaw, which stated minimum floor heights on all new dwellings would be 12.5 ft. (3.75 m). *7) This was based on an analysis of extreme high tides.

*1) Port Alberni is located at the head of Alberni Inlet, a 40-km-long fiord that extends east and north from Barkley Sound, deeply indenting the west coast of Vancouver Island.

*2) The tidal wave caused some \$1.5 million damage in Port Alberni. The province spent about \$800,000 toward flood relief; about \$200,000 came from the federal government and \$410,000 was raised from other sources (*The Vancouver Sun*, April 25, 1969).

*3) Alberni residents had no advance warning. The tsunami hit the community one year after Port Alberni disbanded its Civil Defence service. Today, the Alberni Valley is unique in British Columbia in that it established, in late 1993 for just over \$192,000, its own tsunami warning system. A grant from the provincial government covered \$90,000 of that amount. A series of four solar-powered, radio-controlled speakers positioned atop wooden hydro poles in strategic low-lying areas of the community. Every month, on the first Wednesday at 1 p.m., the Port Alberni fire department conducts a test. Before that, the fire department had to drive around with a loudspeaker, the sort of cumbersome system employed in Kelowna to evacuate residential neighbourhoods during the 2003 wildfire (*The Vancouver Sun*, January 1, 2005; *Times Colonist*, January 5, 2005).

*4) Seismic sea waves comparable to those generated by the 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). From the end of the 19th century through 1960, there were over 1,500 earthquakes around the world. Of their number, 33 were identified as having produced measurable waves at Tofino. Of that group, six out of seven since 1960 have produced waves measurable at Port Alberni. Wigen discovered from a catalogue of tsunamis that out of 70 earthquakes examined since 1900 at least 21 produced a tsunami at Tofino. Meanwhile out of 19 of these events five tsunamis were produced at Port Alberni. According to the report, the 1960 event was moderately damaging, while three more tsunamis may have been close to the point of doing damage (*Alberni Valley Times*, December 12 and 14, 1979).

*5) The Port Alberni flood plain is that area of the city bounded by the Somass River, Falls Road, Compton Road and Kitsucksus Creek. The area was one of those portions of the city hit by the 1964 tsunami as well as tsunamis on other occasions. It is also subject to flooding caused by run-off and high tides.

*6) Zero feet (or metres) geodetic equals the water height in the Somass River leaving out tidal influence. In 1969, the proposed dyking was constructed but expense prohibited the purchase of waterfront property.

*7) As a consequence of the joint cooperation during the disaster and problems consequent to the disaster, the twin cities of Alberni and Port Alberni were amalgamated in 1967 (*Alberni Valley Times*, December 12, 1979).

*8) An earthquake warning centre was opened in Hilo in 1946 after a 55-ft. (16.5 m) wave struck that community, killing 170.

March 1964

Source: *The Vancouver Sun*, October 26, 1990.

Details: In March, tons of rock came down onto Highway 99, narrowly missing six motorists.

June 1964

(Spring runoff/flooding).

Source: *The Vancouver Sun*, June 10 and 18, 1964; June 15, 1967; *The Province*, June 1, 16 and 19; November 16, 1964; May 8, 1967; *Victoria Daily Times*, June 10 and 11, 1964; *Prince Rupert Daily News*, June 16, 1964.

Details: On June 1, the Fraser River at Hope reached 16.5 ft., up more than 3 ft. (90 cm) since May 29. Though rising, it was still below the 16-ft level reached the previous year. At Mission, it reached 13.5 ft., up nearly 2 ft. (60 cm) in the same period.

The Fraser River caused flooding near Agassiz, Hope and Matsqui. On June 9, the river reached 21.4 ft. at the gauge at Mission. In most areas of the lower Fraser Valley dike patrols were

put on a 24-hour on call basis. On June 9, seven families were evacuated from their homes near Agassiz. The homes affected were in the pastureland between the river and the dike at the north end of the Agassiz to Rosedale bridge. Municipal workmen and local farmers reinforced a 100-yd. (90 m) stretch of dike near Ferry Road. At Hope, a street running alongside the Fraser River and part of the Hope golf course were flooded. An undyked stretch of farmland in the Glen Valley area of Matsqui was flooded. Roads in the area were covered by up to 18 in. (45 cm) of water.

Early on June 10, the river level at Mission rose to 21.69 ft., up from 20.7 ft. 24 hours earlier. *1) At Hope, the river at Mission rose to 31.13 ft. The rise was caused by 80° F (26.7° C) temperatures in the interior. Warm weather in the Prince George region pushed the snowmelt line from 9,000 ft. (2,700 m) to 11,000 ft. (3,300 m). On June 11, the Fraser River rose to the 23-ft. mark, the unofficial danger level. But according to federal engineers there was no cause for alarm since after 1948 the dikes had been raised to 28 ft. The river crested at 22.72 ft., the highest level since 1950 (*The Province*, May 8, 1967).

On June 18 at 6 a.m., at Harrison Mills, a farming community 12 mi. (19.2 km) west of Agassiz, the Harrison River broke a 40-ft. (12 m) hole in the municipal dike weakened by prolonged high water. The break, about 1 mi. (1.6 km) north of the highway 8 mi. (12.8 km) east of Agassiz, was the most serious one in 1964 in the Fraser Valley. Three hours later, floodwaters covered a triangular 200-ac. (80 ha) area, bounded by the dike on the north and the Lougheed Highway on the south, to a depth of almost 3 ft. (90 cm). Kent municipal clerk P. John Gairns described the area as a “trouble spot that had been flooded several times before.” Three families were evacuated. Kent council met on the highway and declared the flooding an emergency. Seepage was excessive. Many volunteers and inmates at the correctional work camp at Agassiz were sandbagging, which prevented floodwaters from crossing the road and flooding another 800 ac. (320 ha) on the other side. About 100 head of cattle were moved to higher ground while five head were reported drowned. As a precautionary move about 300 head of cattle on the south side of the highway were moved to higher ground. On the Lougheed Highway where it ran between the Harrison and Fraser rivers, the flood threatened another 20 families. The two-room Harrison River Elementary School, attended by 50 children from grade 1 to 5, was closed. *2)

On June 18 at New Westminster, high river levels and heavy rain combined to flood a section of Columbia Street. At the foot of Eighth Street, a block-long area was under more than 1 ft. (30 cm) of water for an hour as water backed up in storm drains. The front doors of several stores and some basements were flooded. The Fraser River at Mission dropped for the second day in a row. On June 18, it dropped about 2 in. (5 cm) from 22.53 ft. to 22.39 ft.

At Trail, on the Columbia River, about two dozen homes and businesses were threatened along an unprotected section of the riverbank with water within inches.

*1) The danger point is considered to be 23.5 ft. (*The Vancouver Sun*, June 10, 1964).

*2) A survey undertaken by Dewdney farmers showed that this summer’s flood damage in the Fraser Valley exceeded \$500,000. The survey did not include damage in Glen Valley, Delta and Pitt Meadows (*The Province*, November 16, 1964). The damage in the Agassiz, Matsqui and Dewdney areas was estimated at \$260,000 (*The Vancouver Sun*, June 15, 1967). The newly formed Fraser Valley 1964 Disaster Relief Committee was seeking meeting with directors of the Vancouver Foundation, which was holding about \$425,000 as balance of the 1948 Fraser Valley Disaster Fund. The committee was to discuss compensation for farmers from the fund (*The Province*).

June 12, 1964

Source: *The Interior News*, June 17, 1964; *Victoria Daily Times*, June 11, 1964; *The British Columbia Roadrunner*, Vol. 1 No. 4, October 1964.

Details: Heavy rains on June 12, caused slides and washouts on the PGE rail line around Lillooet. A “raging mountain stream,” which empties into Seton Lake cut the line 13 mi. (20.8 km) south of Lillooet.

A number of roads in the Lillooet and Chilcotin area were also washed out. The rainfall was the “heaviest in recorded memory” in that area.

Following several days of torrential downpours in June, Churn Creek went on a rampage. *1) A 74-ft. (22.2 m) King truss bridge was taken out along with 400 ft. (120 m) of approach roads serving the Empire Valley Ranch. The remains of the bridge ended up in the creek, 600 ft. (180 m) downstream from the original site.

*1) Churn Creek drains the area behind the Gang Ranch, 70 mi. (112 km) north-west of Clinton and empties into the Fraser River.

August 19, 1964

Source: *Western Fisheries*, September 1964. pp. 16-17; Forester and Forester 1975 (p. 97); Evans 1986a; Clague and Evans 1994 (p. 8).

Details: On the evening of August 19, an immense landslide came down at Farwell Canyon. It spilled into the Chilcotin River (Forester and Forester 1975; Evans 1986a). It was estimated at 9 million yd.³ (6,881,400 m³) of earth – enough to fill 2 million standard dump trucks. The 75-ft. (22.5 m) high dam created a lake 3 mi. (4.8 km) long (Forester and Forester 1975). According to International Pacific Salmon Fisheries Commission chief engineer Al Cooper, 5 million yd.³ (3,823,000 m³) of sand and gravel collapsed into the Chilcotin River, 12 mi. (19.2 km) above its junction with the Fraser River, 20 mi. (32 km) south of Williams Lake. The “tremendous” landslide, which contained very little rock, piled up to height of 70 ft. (21 m) and extended for 0.3 mi. (480 m) (*Western Fisheries*).

A lake, 3 mi. (4.8 km) long backed up behind the slide, completely blocked the river for five hours. When the river finally broke through, it carried downstream 0.5 million yd.³ (382,300 m³) of mud, gravel and silt in the first wave and about 1 ft. (30 cm) of silt a day for weeks afterwards. (*Western Fisheries*). At the rate of 1 ft. (30 cm) a day, the river began carving a new channel through the earth dam. The dam, which was formed by quaternary sediments, failed after one week. Rising lake waters floated a highway bridge off its foundations (Clague and Evans 1994).

The slide delayed the salmon migration but by late September a quarter million or more fish had reached the spawning grounds (Forester and Forester 1975). For several days, it appeared that the slide would wipe out the Chilcotin sockeye salmon, causing the most serious threat to this major Fraser River sockeye run since the slide at Hells Gate. For six days after the slide occurred the sockeye salmon held back, refusing to move out of the Fraser River into the mud-heavy waters of the Chilcotin River. But when the river had cut a large enough swath through the mud and the silt had cleared, the fish began to move again. The peak of the run arrived on the grounds a few miles below Chilco Lake around September 10. According to biologists on the scene, there was no evidence that the week’s delay had done the fish any harm. (*Western Fisheries*).

September 15-16, 1964

Source: *The Victoria Daily Times*, September 17, 1964; *The Province*, September 17, 1964; *The New Westminster Columbian*, September 17 and 18, 1964; *The Vancouver Sun*, September 17, 1964; *The Daily Colonist*, October 3, 1964; Eisbacher and Clague 1981; Trenhaile 1998 (pp. 83-84).

Details: On September 17, following torrential rains overnight September 15-16, a massive mudslide wiped out eleven buildings, including three bunkhouses of a logging camp on Ramsay Arm, 30 mi. (48 km) north of Campbell River. On the opposite side of the 5,000-ft. (1,500 m) mountain, a dammed creek broke loose. It washed away part of the cookhouse in the Canadian Collieries No. 3

Camp. Most of the camp was pushed out to sea. Only the tail end of the slide and a few of the 11 buildings remained above water. Prior to the slide, some 50 mm of rain fell in a 12-hour period. The camp, owned by Canadian Collieries and operated by Cattermole Timber Ltd., was situated beneath an overhanging logged off area 500 ft. (150 m) almost vertically above it, which collapsed when the soil overlaying rock weakened. Most of the camp was buried under a 50-ft. (15 m) wall of mud and debris. The slide was about 1,000 ft. (300 m) wide and 50 ft. (15 m) deep. The starting zone of the subsidiary debris avalanche was located on a logged-off mountain terrain several kilometres inland from the camp.

Many of the 29 survivors sought safety in the Cattermole and Trethewey Contractors camp 2 mi. (3.6 km) to the east. The Quantan River between the two camps flooded on September 16, after the survivors had crossed. Creeks plugged with debris overflowed their banks. Because of the continuing slide threat, two helicopters were used to lift out nine loggers after washed-out bridges cut them off. BC Airlines cancelled or diverted all scheduled flights and put seven planes into emergency service. All 19 survivors at the campsite were flown to Campbell River.

The total number of missing and fatalities varies. Eisbacher and Clague (1981) and Trenhaile (1998) report that the catastrophe claimed three lives. According to Evans (unpublished data), the Ramsey Arm and Price Channel event took a total of five lives. On October 2, the accident claimed a fourth life when a 54-year old man, who had been buried in mud and debris for some time, died in a Vancouver hospital. The bodies of three other victims have never been found (*The Daily Colonist*, October 3, 1964). On September 17, the cook was still reported missing (*The Province*, September 17, 1964).

September 30, 1964

Source: *The Daily Colonist*, October 1, 1964.

Details: Early on September 30 heavy rain fell in Victoria and Vancouver. The two cities reported 1.44 in. (36.6 mm) and 1.33 in. (33.8), respectively. In Greater Victoria, two basements were reported flooded in Oak Bay, three in Esquimalt and three in Victoria near Tolmie and Quadra where water stood 2 ft. (60 cm) deep.

November 26, 1964

Discharge (m³/s): Max. daily: November 30: Capil.: 159; Chem.: 169; Zeb.: 147; max. instant.: November 30: Capil.: 222; Zeb.: 294.

Source: *The Vancouver Sun*, November 26, 1964; *The New Westminster Columbian*, November 26, 1964; Eisbacher 1983 (p. 22); Environment Canada 1991.

Details: On November 26 at 3 a.m., a rockslide with some rocks 16 ft. (4.8 m) in diameter came down near Porteau covering 350 ft. (105 m) of highway and railway tracks. At 2:45 a.m., a loaded northbound freight train preceded by a patrol speeder had passed the area. Heavy rains along Howe Sound were blamed for the slide. At the point of the slide, both the road and rail line follow the contour of Howe Sound. Several thousand cubic metres of rock slid from the Porteau Cove cut, 10 km north of Lions Bay, onto Highway 99 (Eisbacher 1983). According to Highway officials, 30,000-40,000 yd.³ (22,938-30,584 m³) of fill was washed away. The rockslide closed the West Vancouver-Squamish Highway and the PGE rail line for 18 hours. The highway was expected to reopen to one-lane traffic on the afternoon on November 26. PGE hoped to clear its tracks by the evening of the same day.

December 22, 1964-January 1, 1965

Source: *The Campbell River Courier*, December 30, 1964; *Victoria Daily Times*, January 2, 1965.

Details: Overnight December 29-30, Campbell River was hit by more than 1 ft. (30 cm) of snow. According to Elk Falls weatherman Al Hodgkinson, between December 22 up till midnight on December 29, a total of 38.4 in. (96 cm) or since December 17, 62.60 in. (156.5 cm) of snow fell. The total snowfall since December 1 was 67.60 in. (171.7 cm). At the John Hart generating station, a

total of 56.4 in. (143.3 cm) of snow had fallen till December 29, 32.5 in. (82.6 cm) of which in the previous seven days. Camp 8 reported only 2-3 in. (5-7.5 cm) and Camp 10, only 4 in. (10 cm). At the end of December, almost two weeks of snow disrupted business and caused buildings to collapse in Campbell River. Campbell River's snow clearing budget of \$2,000 "melted away" in short order. On December 30, estimates were placed at double that already.

The heavy snow caused the collapse of a building being constructed by Tony Karpiak on Duncan Bay Road, causing about \$500 damage. The old Campbell River Wood Workers' warehouse just across the bridge, collapsed. The roofs of two double duplexes under construction in north Campbell River and the canopy above the entrance to Ken Forde's garage at Willow Point collapsed. *1) On Quadra Island, a trailer with and extended canopy was reported split in two under the weight of the heavy snow.

By December 30, the road to Gold River was plowed and open to traffic. The top end of the Nimpkish Valley road system to Port Hardy, which had been closed, reopened. Elk River Timber's logging operations scheduled to start on January 4 were delayed due to the plowing operations of the logging roads expected to take two weeks. Crews of MacMillan-Bloedel and Powell River's Menzies Bay Division were on stand-by.

On December 31-January 1, a snowslide at Sutton Pass on the Alberni to Tofino highway trapped six motorists in three cars for 24 hours. A second slide, caused by the heavy snow and rainfalls prevented the trapped vehicles to return to Alberni. Highway crews began rescue operations from both ends. After eight hours a crew from Alberni reached the trapped vehicles.

*1) Most roofs on homes and commercial structures were designed for a maximum 46 lbs./ft.² According to engineering estimates, for every 10 in. (25 cm) of snow pressure increases 5-6 lbs./ft.². Melting and ice conditions will increase the weight and pressure to around 15-20 lbs./ft.². 10 in. (25 cm) of wet snow could weigh as much as 46 lbs. (*The Campbell River Courier*, December 30, 1964).

January 9, 1965

(Earthquake).

Source: *Prince Rupert Daily News*, January 11 and 13, 1965; *The Victoria Daily Times*, January 14, 1965; (See also January 15, 1965); *The Province*, January 11, 1975; January 7, 1989; Evans and Gardner 1989; Mathews and McTaggart 1978; Smith and Milne 1970; McGill 1979 (p. 31); Wetmiller and Evans 1989; Weichert et al. 1990 (p. 1145); B.C. Ministry of Energy, Mines and Petroleum Resources 1993.

Details: On January 9, a massive landslide came down on the Hope to Princeton highway, several miles east of Hope. The slide, later dubbed "The Hope Slide," occurred on the southwest slope of Johnson Peak in the Cascade Mountains. It smashed three vehicles killing four persons, two of which were never recovered. The bodies of two of the victims were found on January 10. Neither the car nor the oil-tanker cab was ever recovered. The Hope Slide is British Columbia's largest rockslide (B.C. Ministry of Energy, Mines and Petroleum Resources 1993) and Canada's largest known historical landslide (Wetmiller and Evans 1989).

An estimated 100 million tons of rock, earth and snow, the entire 0.5-mi. (800 m) wide side of a 4,000-ft. (1,200 m) high mountain slammed down into the valley at a speed of 100 mph (160 km/h). It buried a highway under 60 million yd.³ (46 million m³) of debris. After running 200 feet (60 m) up the far side of the valley, the mass was hurled an equal distance back up its original path. It took 21 days to push a temporary road through the debris (McGill 1979). The extent of the slide was equated with an area the size of Burrard Street to Stanley Park in Vancouver being covered with rubble to twice the height of the BC. Hydro building (*The Province*, January 11, 1975).

A small earthquake, the epicentre of which coincided with the landslide, initiated the slide site (Mathews and McTaggart 1978). On the day of the slide two small earthquakes, at 3:56 a.m. and 6:55 a.m., were recorded in the vicinity of the slide area. From the peak trace amplitude recorded at

Victoria, Smith and Milne (1970) calculated for these quakes Richter magnitudes of 3.2 and 3.1, respectively. The epicentre for both earthquakes was in the Nicolum Valley, near the 600-m Johnson Peak, about 15 km east of Hope. It was calculated at 49° 36' N, 121° 14' W, with an uncertainty of 20-30 km. One quake occurred just prior to, and the other approximately at the same time as, the slide. The rock avalanche was not observed by anyone who survived it, so the exact time of the slide is not known. It is estimated that it occurred sometime between 6:00 and 7:15 a.m. Soon after the first earthquake occurred at 3:56 a.m., Highway 3 was blocked to traffic by an approximately 4.5-m deep snowslide. Around 6 a.m. the road was found blocked by the snowslide and the victims were last seen alive by a road crew.

The second earthquake occurred at 6:58 a.m. At 7:15, the road was found buried by the rockslide and rescue efforts began. The slide mass was strongly shaken by other earthquakes in the region in 1872, 1946, and 1949 and must have had significantly more shear strength at those times than it had in 1965. The prime factor leading to the 1965 slide thus appears to have been a loss of shear strength in the slide mass sometime after 1949 putting the mass in a state of near-limiting equilibrium by January, 1965 (Wetmiller and Evans 1989). It occurred at the site of a prehistoric rock avalanche and limited non-catastrophic slope movement on the slopes adjacent to the slide was identified (Mathews and McTaggart 1978).

The slide involved 47 million m³ of Palaeozoic metavolcanics (Evans and Gardner 1989). It was an estimated 500 ft. (150 m) deep and between 0.75-1.25 mi. (1.2-2 km) wide. It also obliterated the highway for more than 1 mi. (1.6 km). The entire side of an unnamed 4,000-ft. (1,200 m) peak broke over the highway. The crumbling wall plunged into the valley. It was carried 1,000 ft. (300 m) up the other side and washed down. The debris spilled into Nicolum Creek below at depths of 200 ft. (60 m).

After investigation of a well documented collapse of an eight million ton open pit mine wall, the view of the two small earthquakes being associated with the Hope Slide is challenged. This collapse about 100 km northeast of Hope was recorded as a regional seismic event of magnitude 2.3. Comparison of seismic signals with energy and efficiency considerations lead to the conclusion that the seismically recorded Hope Slide events were not earthquakes but the rockfall itself that occurred in two approximately equal stages a few hours apart (Weichert et al. 1990).

April 10, 1965

Source: *The Province*, April 12, 1965.

Details: On April 10, a wall of rock at the Fountain Indian Reserve near Lillooet gave way and killed a 13-year old Indian boy. Three other boys were buried for 45 minutes to an hour before being rescued. They all were taken to hospital with multiple fractures and bruises. The body of the victim was not found until about two hours after the slide occurred.

In the late afternoon about 12 boys had climbed the slide of an old washout about 11 mi. (17.6 km) east of Lillooet to carve their names in the soft shale. A 20-ft. (6 m) section of the wall gave way and crashed down on them. A passing motorist heard the boys' cries and went for help. The slide was in the same area where a recent washout took out a section of the PGE rail track.

Ca. April 19, 1965

Source: *The Province*, April 19, 1965.

Details: Around April 19, a mudslide washed out the CPR rail line at Bonnington, 12 mi. (19.2 km) from Trail. The slide, which contained sand and snow struck six cars, pushing four off the tracks. More than 40 ft. (12 m) of track was ripped out and some of the undercarriages of the hopper cars were torn off. There were no injuries but the damage was estimated at several thousand dollars.

October 5-6, 1965

Source: *The Daily Colonist*, October 6, 1965; Evans, unpublished data.

Details: On October 5, heavy rain caused a debris flow into Clementine Creek, Indian Arm. Five

buildings in a logging camp were destroyed and machinery was swept into Indian Arm, causing \$80,000 damage. Seven people escaped from partial burial in destroyed buildings (Evans, unpublished data). According to *The Daily Colonist*, six persons escaped the mudslide that wiped out their camp at a logging site 20 mi. (32 km) northeast of Vancouver. Heavy rains triggered the slide. It destroyed two small buildings and sunk a boat docked at the Wigwam Inn site on the north arm of Burrard Inlet.

Overnight October 5-6, high winds and heavy rain hit northern Vancouver Island, downing telephone and hydro wires, flooding many roads and forcing small vessels in from the sea. By midnight, in a 50-hour period 5.02 in. (127.5 mm) of rain had fallen in the Alberni Valley. Many telephones were out and the Tofino to Alberni road was closed. Shell Beach Indian Reserve and the Department of National Defence signal station at Nanoose were left without power.

October 19-22, 1965

(Rain-on-snow and tidal flooding?).

Discharge (m³/s): Max. daily: October 21: Sall.: 86.1; Squam.: 1,330; Stamp A.: 351; October 22: BC/BB: 638; BC/H: 906E; Wan.: 2,000; max. instant.: October 21: Sall.: 107; Squam.: 1,470; Stamp A.: 351; October 22: BC/BB: 776; Wan.: 2,110.

Source: *The Vancouver Sun*, October 22, 1965; *The Upper Islander*, October 27, 1965; *The Province*, October 22, 1965; *Prince Rupert Daily News*, October 22, 1965; Pollock 1975; Environment Canada 1991.

Details: Between October 19-22, Zeballos recorded 13.71 in. (348.2 mm) of rain in 90 hours (Pollock 1975). The extremely heavy rains caused a road to flood and wash out near Sayward, closing it for 16 hours. The road sustained minor shoulder damage. The Salmon River's runoff, already risen by floodwaters, was slowed down by a high tide. A logjam, which built up in the Salmon River, broke itself loose without causing damage. The north end of Vancouver Island was isolated for 24 hours when all roads north and west of Campbell River were cut by slides and floodwaters. A 9-mi. (14.4 km) stretch of highway to Kelsey Bay was flooded as the Salmon River overflowed its banks. Mudslides cut off the road link to Gold River and traffic on the north end of Vancouver Island was blocked by a washout 11 mi. (17.6 km) west of Beaver Cove on the Nimpkish Road.

On October 21, the rampaging Kingcome River cut through the tiny isolated fishing village of Kingcome Inlet. The river, swollen by torrential rains and rising freezing levels, rose 20 ft. (6 m). Freezing levels suddenly rose from 4,000-12,000 ft. (1,200-3,600 m). Reaching its highest level in 28 years, it pushed into the houses that perch on stilts along the riverbank. Residents of the Native Indian village, the Halliday Ranch and the Cheslake Logging Co, camp were flooded out. According to rancher Al Halliday, at the mouth of the Kingcome River, 2 mi. (3.2 km) downstream from Kingcome, the normal river level of 7 ft. (2.1 m) crested at 17 ft. (5.1 m) at 6 p.m. on October 21. Over the past 10 days over 14 in. (355.6 mm) of rain had fallen in the area, including a fall of 6.5 in. (165.1 mm) on October 20 and 21. Halliday estimated that near his ranch the river reached a speed of 14 knots (25.8 km/h).

Two barges, including the equipment carrier *Georgia Transport* were moved to the area in case the estimated 100-150 residents would have to be evacuated.

Late 1965

Source: Evans, unpublished data.

Details: Later on in 1965, a major rock avalanche severed Highway 3 near Hope. Calculated in 1984 dollars, the direct costs of re-establishing road access across the debris amounted to \$1.01 million (Evans, unpublished data).

Early November 1965

Source: *The Campbell River Courier*, November 10; December 1, 1965.

Details: In early November, heavy rains washed out a diversion made in the Zeballos River to allow the building of a private road to the Zeballos iron mine. It allowed the river to cascade over the ball field and backstop, destroying bleachers and the concession stand. According to Stan Jones, chairman of the Zeballos Village Commission, the baseball field was completely wiped out and could not be rebuilt.

December 3, 1965

(Storm surge/tidal flooding).

Source: *The Campbell River Courier*, December 8, 1965.

Details: Following a very dry fall, on December 3, Campbell River reported a record wet day with 1.08 in. (27.4 mm) of rain *1) During the first week of December, a combination of high winds and high tides all week played havoc with beaches, boats and harbour installations. On December 11, a 15 ft.-tide was expected. On December 3, the Campbell River to Quadra Island ferry service was suspended till 3 p.m. due to the insecure pilings at the Campbell River ferry wharf.

Early December 8, Pacific Western Airlines' flights were behind schedule because of the winds up to 40 mph (64.4 km/h) at the airport. Fallers and buckers at both Elk River Timber Co. and MacMillan-Bloedel Ltd. operations lost a number of days of work as the operations were shut down because of the high winds.

*1) Up till November 30, Campbell River had recorded only 48.23 in. (1,225.0 mm) of precipitation. The all-time low was set in 1959 with 56.72 in. (1,440.7 mm) (*The Campbell River Courier*, December 8, 1965).

December 25, 1965

Source: *The Campbell River Courier Islander*, December 19, 2000.

Details: On December 25, Campbell River received a record snowfall of 53 mm.

January 5-13, 1966

(Rain-on-snow).

Source: *The Daily News*, January 6, 7, 10 and 14, 1966; *The Chilliwack Progress*, January 5 and 12, 1966; *The Campbell River Courier*, January 5, 1966; *Victoria Daily Times*, January 6 and 7; December 20, 1966.

Details: A coldspell, which turned into a blizzard, hit the Fraser Valley with 50-mph. (80 km/h) winds. Since December 22, the weather pattern had brought abnormally low temperatures and snow conditions. For the period of December till January 5, the weather station operated by H.M. Eddy & sons at Vedder Canal recorded a total of 67.1 in. (170.4 cm) of snow. *1) Due to near-blizzard conditions, schools in Chilliwack closed at least two days. On January 10, schools reopened. Though Highway 401 remained open, travelers were urged to stay off the road if possible due to heavy drifting. On January 5, an 8.5-in. (21.3 cm) snowfall followed by freezing rain and blizzard-like conditions closed Highway 401 later closed when it became impassable. Some farmers used sleighs pulled by teams of horses to haul their milk into the FVMPA's Sardis utility plant.

On January 5, a roller skating rink and a church hall in south central Vancouver collapsed under the heavy wet snow. Less than 20 minutes had elapsed since 35 skaters hurried out of the building. Four persons were still inside the suburban rink and seven more shoveling snow on the roof were uninjured. Overnight January 5-6, the roof of the Holy Trinity Anglican Church's parish hall collapsed under the weight of rain-drenched snow. The 17-year old building in south central Vancouver, which recently had undergone a \$14,000 renovation was empty at the time. On January 8 at the Chilliwack Fairground, the roof of the sheep and swine barn partially collapsed under the heavy snow load. Part of the roof and the west wall of the building, built at a cost of about \$18,000 around 1946-47, buckled.

On January 10 at the base of the hill of the Hope Slide Silvertip Development Ltd., some 30 in. (75 cm) of packed snow were recorded. Between December 24-January 15, Chilliwack's Public Works incurred a large snow plowing and removal bill. An estimated 35,700 ft.³ (1,010 m³) of snow was removed at 17 cent/yd., while 1.5 tons of salt was used. Since December 23, 75.6 in. (192 cm) of snow had fallen.

Snowdrifts 10 ft. (3 m) high closed the Trans-Canada Highway. The highway was cut by a 150-ft. (45 m) wide snow slide 12 mi. (19.2 km) northeast of Vancouver, stranding motorists in the lower Fraser Canyon. Bus passengers were transferred at Ashcroft to a CNR train after the Hope to Princeton and Fraser Canyon highways were closed to traffic. At least 15 snow slides came down on the Trans-Canada Highway through the Fraser Canyon. The Fraser Canyon section of the highway reopened late on January 8 after a two-day closure and the Rogers Pass section reopened late on January 9 after a four-day closure.

On January 8, two Department of Northern Affairs employees were killed near the summit of Rogers Pass. They were caught by a snow slide while working to clear a path through a previous slide. The bodies were recovered on January 9.

On January 7, trains were trapped by snow slides. A CPR train with 150 passengers was stalled for 17 hours. A 100-ft. (30 m) long and 10-ft. (3 m) deep slide in the Fraser Canyon trapped some 200 passengers on a CNR train. In Kamloops, some 300 passengers were stranded on two eastbound trains. Passengers were transferred by taxi from the CNR Junction in Kamloops having to spend two days in hotels.

On January 13, floods and slides closed British Columbia highways in three locations. In Glacier National Park, a slide 1,000 ft. (300 m) long and 20 ft. (6 m) deep blocked the Rogers Pass section of the Trans-Canada Highway. The summit of the Salmo to Creston highway was blocked by a series of slides after a 12-in. (30 cm) snowfall turned into rain.

On Vancouver Island, in some places the snowfall totaled over 70 in. (1.78 m) during the coldspell. On January 5, the telephone lines between Victoria-Duncan-Nanaimo went down due to the heavy snow. The B.C. Telephone Co. had a dozen crews making repairs on broken landlines. At Ladysmith, damaged power lines caused a short blackout. In Duncan, schools closed on January 4, while schools in the Lake Cowichan and Ladysmith districts were closed from January 7 till January 10.

At Duncan, the snowfall put 1,200 loggers temporarily out of work. Heavy snow was blamed for the collapse on January 6. Of a 1,000-gal. (4,500 L) water tower on the dairy farm of R. Devries, Hartl Road, Shawnigan Lake. Mayo Lumber Co., south of Nanaimo, estimated damage caused by the snow at the mill site at \$200,000. On the night of January 5, the roof on the 80 ft. (24 m) long green chain shed collapsed, halting production for at least five days. At Cedar, a barn and a lean-to collapsed, killing three heifer cows. Two boats stored in an old barn on Jingle Pot Road near Nanaimo were damaged.

Overnight January 6-7, more than 1 in. (25 mm) of rain helped melting snow in Campbell River and Nanaimo streets. A sharp rise occurred in rivers and creeks from Duncan to Campbell River. Nanaimo River, which normally flows at 1,000 cfs (28.3 m³/s) was moving at 7,000 cfs (198.2 m³/s). The Cowichan and Campbell rivers were also rising. Three other rivers caused flooding due to heavy rain. The Cowichan, Kokspah (Koksilah) rivers near Duncan and the Chemainus River, 15 mi. (24 km) north flooded their banks on January 13. *2) In the Duncan area, some basements were flooded.

*1) During December, the station recorded a total of 54.8 in. (139.2 cm), a record in 15 years of weather recording, breaking the record of 44.7 in. (113.5 cm) set in 1965. The Experimental Farm at Agassiz recorded 37.40 in. (95.0 cm), the highest record since 1896 when 40 in. (100 cm) fell (*The Chilliwack Progress*).

*2) The Lake Cowichan Chamber of Commerce asked Colin Cameron, MP Cowichan-Newcastle, to implement a plan to divert floodwaters through the head of Cowichan Lake. It would entail directing the floodwaters west to the Nitinat River and out to the Pacific. According to Ross Scott, president of the chamber, "Eons ago, Cowichan Lake used to run that way, and some years ago there was a trench running out to the Nitinat. The scheme was apparently not implemented because it was said to be too costly but when flooding puts 1,000 men out of work, that's a lot of money too, not to mention property damage." (*Victoria Daily Times*).

April 19, 1966

(Dam burst/flooding).

Source: *The Vancouver Sun*, April 20, 1966.

Details: On April 19, a collapsing beaver dam caused flooding and washing out more than 200 ft. (60 m) of paved highway 40 mi. (64 km) south of Nelson. The provincial highway between Salmo and the U.S. border was carried away in three places. Millions of gallons of water poured out of Rosebud Lake, rushing through a ravine for a distance of 1 mi. (1.6 km) before smashing the road with boulders, gravel and trees. The beaver dam, 10 ft. (3 m) high and 35 ft. (10.5 m) wide, had been blocking the lake water at its outlet "for as long as anyone can remember." The structure had been holding back the millions of tons of water for at least 20 years. Water level in the lake dropped 10 ft. (3 m) after the dam gave way and reduced the lake outlet to a trickle.

November 20-25, 1966

Source: *Victoria Daily Times*, November 25, 1966; *The Vancouver Sun*, November 21 and 26, 1966.

Details: On November 20, a self-propelled PGE passenger car derailed about 4 mi. (6.4 km) south of Pemberton after hitting rock fallen on the tracks. The train was delayed for two hours between 7-9 p.m.

Early on November 25, rockslides blocked the PGE line between Horseshoe Bay-Squamish. Heavy rain caused an earth and rockslide onto the rail line near Porteau. A short time later it was followed by a second slide at the same spot. About 300 ft. (90 m) of track was reported covered. Passengers were taken around the slide by bus. The railway hoped to have the line restored at 6 p.m. that same day.

December 13-16, 1966

(Rain-on-snow, dam burst and tidal flooding).

Discharge (m³/s): Max. daily: December 13: Capil.: 168; Chem.: 244E; Kok.: 148; Nan. C.: 430; max. instant.: December 13: Capil.: 260.

Source: *The New Westminster Columbian*, December 16, 1966; *The Daily Colonist*, December 16, 21 and 24, 1966; *The Victoria Daily Times*, December 14 and 20, 1966; *The Vancouver Sun*, December 13 and 19, 1966; September 2, 1982; Environment Canada 1991.

Details: Overnight December 12-13 after continuous rainfall for more than a month, the Koksilah, Cowichan and Chemainus rivers burst their banks. Early on December 13, heavy rain and high tides increased flooding in two Vancouver Island areas. On December 13, two families near the Clem-Clem-Alutz bridge, where the Koksilah and Cowichan rivers join before discharging into Cowichan Bay, were evacuated. The flooding in the Clem-Clem area in the Koksilah Flats between the two rivers was the worst hit flood area. Twelve homes with about 50 people were cut off by floodwaters.

On the north side of Duncan, municipal work crews had two 600-gal/min (2,700 L/min) capacity pumps working late on December 12 and on December 13 to keep Somenos Creek floodwaters out of houses on Beverly Street. Late on December 15, a small dam burst causing the Cowichan River, which runs through the Cowichan Indian Reserve, to flood a residential area of the reserve. Seventy-four people were affected by the flooding. According to public works chairman of the Indian band Abraham Joe who had helped build the new dam, "it was constructed in the wrong

way, and it would burst before high water.” According to him, further flooding on the reserve appeared inevitable.

On December 13, heavy rains and high tides also caused flooding in the Albernis. Kitsucksus Creek “crept to the backdoors of several houses” and the Somass River threatened to spill over River Road near downtown Alberni.

On December 16, more than 2 in. (50 mm) of rain fell in New Westminster, bringing the monthly total so far to 9.43 in. (239.5 mm). “Six weeks of incessant rainfall” flooded many road and basements near Cloverdale and elsewhere (*The Vancouver Sun*). On December 19, Vancouver airport recorded an all-time record of 39 consecutive days of rain (measuring from a trace to a downpour) since November 11. *1) Burnaby reported 2.03 in. (51.6 mm) of rain in 24 hours. A mudslide in Surrey, between Crescent and White Rock, delayed the GN passenger train for four hours. Vancouver-bound passengers were transferred to buses. The slide, which came down a steep bank during the night of December 15, covered the tracks to a depth of 10 ft. (3 m) for a distance of 100 ft. (30 m).

During the evening of December 15, heavy runoff flooded the low-lying area of Scott Road near Patullo bridge in Surrey, closing the road for several hours. Some 25 vehicles were stalled on the road. For several hours around 10:30 p.m., the water was over 1 ft. (30 cm) deep till the outgoing tide reduced the water on the road. Due to the rise of Brunette Creek, some businesses in the low-lying area of Braid Street, including Esser Engineering Works, Rubbertar Roofing Ltd., Canada Western Cordage and Peter Parry Wholesale Distributors, were flooded. *2)

Overnight December 15-16 at the lower end of Braid Street, water reached up to a depth of 3 ft. (90 cm). A delegation of business owners urged the city to dike the creek. Minor flooding occurred in the Old Yale Road area. The rushing water undermined the intersection of Stewart Avenue-LeBleu Street. An overflowed culvert washed out the gravel shoulder, which had to be barricaded. On Schoolhouse Street, between Brunette Avenue and the Lougheed Highway, a low-lying area subject to flooding, was under 2 ft. (60 cm) of water. Johnson Street, at the foot of a wooded hill in the east end of the municipality, had to be sandbagged.

In Port Coquitlam, flooding occurred in the low-lying Red Bridge area to a depth of 18 in. (45 cm). The two-lane Red Bridge on Pitt Road over the Coquitlam River had to be closed to traffic. Though water damage in Port Coquitlam was slight, Pitt River Road had to be closed to traffic. The road, which crosses the Coquitlam River over the Red Bridge, was flooded for several city blocks. A few homes fronting the road that were raised following the 1961 flood suffered no damage.

At the height of the downpour around 2:30 p.m. on December 15, three major areas of Burnaby were flooded, cutting off major roads. In the Fraser Delta area, Byrne Road and Meadow Avenue were under 18 in. (45 cm) of water. In the central valley, Willingdon and Gilmore were inundated with about 1.5 ft. (45 cm) of water overflowing from Still Creek. Willingdon had to be closed as it was impassable at Still Creek. The heavy downpour caused an estimated 4,000 ac. (1,600 ha) near Delta to flood. In Surrey in the Serpentine Valley, floodwaters of the Serpentine River closed the Clover Valley Road north of Fraser way and Coast Meridian Road north of 66th Avenue.

Lake Cowichan village was the hardest hit by the flooding. On December 16, the Cowichan River rose 6 in. (15 cm) in 24 hours. *3) Lake Cowichan caused flooding and flooded basements. In the Lake Cowichan village, the main street was cut in two places. The business section was flooded, several stores closed and a school closed. The village post office was temporarily relocated to the United Church hall. Near Duncan, two more families were evacuated from the Mission Road section of the Cowichan Indian Reserve. Five of the six families were now evacuated. On December 18, the Cowichan River came to within 3 in. (7.5 cm) of overflowing its banks. Between December 19-20, the Cowichan River went down 1 ft. (30 cm). On December 20 and 21, mill workers in the Lake Cowichan area went back to work when mills resumed operation. Cowichan Lake water levels dropped 1 ft. (30 cm) after having been up 13 ft. (3.9 m) from the summer level. On December 21, only a few roads remained closed in the Duncan area.

In Alberni, 25 people were marooned in their homes on Lakeshore Drive near Sproat Lake as water 2 ft. (60 cm) deep flooded access roads in the area.

The impact of the flooding on fish stocks was as yet unknown. The first indication of damage to fish would be the fry count in the spring.

In Youbou, many residents had trouble with gravel and sediment blocking up their water supply. Others in Youbou and Lake Cowichan had furnaces disconnected and sewage problems. The basement of the B.C. Forest Products mill at Youbou was covered with 8 in. (20 cm) of water.

*1) The monthly December average for New Westminster is 8.44 in. (214.4 mm) of rain (*The New Westminster Columbian*, December 16, 1966). The previous record at Vancouver airport was in October and November 1963 with 38 consecutive days of rain (*The Vancouver Sun*).

*2) On August 30, 1982, Leonhard Esser, president of Esser Engineering Works, won a \$1 million out-of-court settlement from eight public and private organisations he claimed were responsible for numerous floods on the Brunette River in New Westminster. Esser claimed he had suffered an estimated \$800,000 in "out of pocket losses" due to flooding of his plant since 1964. Named in his suit were the drainage district, B.C. government, the City of New Westminster, Canadian Forest Products Ltd., New Westminster Industrial Park Ltd., Lamford Cedar Ltd., Canadian Pacific Railways and the Burlington Northern Railway. The settlement also ensured a \$1.4 million facelift of the river would continue this fall to correct the longstanding flood problems along the lower end of the waterway where it empties in the Fraser River. During the previous several years, filling and other activities increasingly restricted the river channel below Braid. Due to the lack of funds, improvements were never initiated. Under the agreement reached, the channel would be widened from the current maximum of 20 m to a new width of 30 m., while the river's depth would be increased to nearly 4 m from the current 2-m depth. A diversion channel would also be built to take the river's overflow directly to the Fraser River, about 1,600 m below Braid Street. The work would be completed before the end of 1982 (*The Vancouver Sun*, September 1982). (See also January 14-20, 1968 and December 12-18, 1979 events).

*3) According to Gil Ewen of Cowichan Indian Agency, some \$2,000 work of flood control had been done in the area during the previous summer. Though there was a provision for more control work next year, the rivers changing course and fisheries department restrictions about taking gravel out of the riverbed, Ewen deemed it impossible to bank the river up. "The only way to really control the flooding is by a series of dams higher up the rivers and that would require a tremendous amount of money (*Victoria Daily Times*).

January 18-19, 1967

Source: *Victoria Daily Times*, January 19 and 21, 1967; *The Province*, January 20, 1967.

Details: On January 19, torrential rain and heavy snow caused flooding and telephone breakdowns. Vancouver recorded 1.87 in. (47.5 mm) of rain but throughout the Lower Mainland only isolated instances of flooding were reported. In the Fraser Valley, heavy wet snow disrupted telephone services, at one time cutting off some 600 subscribers. The snow building up on telephone lines, caused some to break. Areas affected included Agassiz, Chilliwack, Hope, Princeton and Boston Bar. Long distance lines between Princeton, Penticton and Boston Bar were interrupted.

Greater Victoria recorded well over 1.5 in. (37.5 mm) of rain, causing flooded roads and basements. By January 20, Patricia Bay airport recorded a total of 5.48 in. (139.2 mm), almost 2 in. (50 mm) above the January average. Electric power was out in Port Renfrew and in Sidney streets were under water. In Saanich, hardest hit of Victoria area municipalities, flooding caused several roads to be closed and many flooded basements.

Worst hit areas were Gordon Head, Ferndale, Braeford, Mount Douglas crossroads and Shelburne, under 2 ft. (60 cm) of water in some parts. A spokesman for the Saanich municipal works

department described the flooding as the “worst since 1956.” Between 8 a.m. and 10:30 a.m., calls were coming into Saanich municipal hall at more than one a minute. By noon, about 300 had been received. Fifty men worked from 6 a.m. till 4:30 p.m. and an emergency shift stayed on duty overnight January 19-20.

Five Saanich roads, including Gordon Head at Ruby were closed. Conjecture was that recent work on nearby University Gordon Head campus might have abetted the flooding hazard on the road. Also closed were portions of Tyndall; Interurban at Marigold and Quale; Blenkinsop between Mount Douglas and Simon; Hastings at Granville and Holland and Shelbourne near Cedar Hill. In the Saanich Burns Road area, a city sewer was reported backing up. In front of the B.C. Telephone Building, water penetrated a large underground telephone cable, cutting service to some city telephones.

On the West Coast Road and in Port Renfrew, falling trees and branches knocked down some hydro-lines. At Fifth and Ocean streets near the ferry slip in Sidney, a “lake” of water had collected. Parts of the Victoria airport parking lot were inundated with over 1 ft. (30 cm) of water.

Though the Cowichan district had 5 in. (125 mm) of rain in three days, there was no combination of high tides and snow melting to bring a repetition of the December floods. Cowichan Lake rose 14 in. (35 cm) in a 48-hour period but a wide safety margin remained.

On January 20, Tzouhalem Road at Koksilah Flats was temporarily closed when floodwater ran over it about 6 in. (15 cm) deep.

June 2, 1967

(Flash flood).

Source: *The Province*, June 6, 1967; *Revelstoke Review*, June 8, 1967

Details: During the night of June 2, warm wind and high temperatures followed by heavy rain caused flash floods on streams in the Revelstoke district. The Trans-Canada, Big Bend and the Revelstoke to Nakusp highways and the CPR were all affected. A flooding Eagle River caused a number of washouts and left a bridge at Craigellachie dangling. On June 2 at 11 p.m., a mudslide 12 mi. (19.2 km) west of Revelstoke derailed a CPR freight train. Three diesel units and 28 boxcars left the tracks at a point where Eagle River separates the railway and highway. At noon on June 5, railway traffic was restored.

Major highway washouts occurred at Griffin Lake, Victor Lake and Clanwilliam. In addition, smaller problems in the same general area closed the highway for about seven hours. Eastbound traffic stretched from Griffin Lake, 17 mi. (27.2 km) almost to Sicamous, 45 mi. (72 km) away.

The Big Bend washout left Mica Creek temporarily isolated. A Bailey bridge was strung across Downie Creek and minor washouts were cleared. The creek at Halcyon tied up the Revelstoke-Nakusp highway. South of Revelstoke also some washouts occurred.

The Illecillewaet River rose normally and no washouts occurred along its route east of Revelstoke. In Revelstoke itself, part of the Pearson Avenue culvert, which takes Long Creek into the Columbia River at 3rd Street, collapsed and eroded the bank.

Eagle River (Creek?), which empties into Shuswap Lake and swollen by torrential rain, topped its banks and flooded Malakwa and low-lying farms downriver. Five head of cattle were reported drowned on farms between Malakwa-Sicamous, southwest of Revelstoke. These were the first victims claimed by the spring runoff from a record snowpack. Since June 4, the river dropped about 2 ft. (60 cm). Malakwa was dry again and water was receding from the farms.

The Columbia River was rising slowly but cooler weather on June 5 and 6 reduced the runoff. With cooler weather between June 4-5, the Columbia River dropped 1 ft. (30 cm) at Revelstoke and the Kootenay River at Wardner went down 6 in. (15 cm). However, at Trail the Columbia River rose 1.3 ft. (39 cm). On June 6, the Fraser River at Mission was expected to reach 20 ft. and approach 21 ft. by June 7.

June 15-22, 1967

(Spring runoff/flooding).

Source: *The Vancouver Sun*, June 15, 1967; *The Province*, June 23, 1967.

Details: By mid June, Fraser River floodwaters started to seep through dikes, flooding farmlands and residential areas of Agassiz, Chilliwack district, Dewdney and Matsqui. An Agassiz farmer had already lost 6 ac. (2.4 ha.) of corn and 9 ac. (3.6 ha) of oats outside the dike.

On June 15 at 8 a.m., the Fraser River at Mission had dropped slightly to 20.50 ft. and also dropped at Hope. Though the immediate threat of a major flood was over, the danger of saturation of dikes during an expected long high runoff remained. On the same day, the Columbia River at Trail showed its third decline in as many days. At 8 a.m. it was at 39.18 ft., down from 39.53 ft. on June 12.

On June 22, a private dike broke, flooding a large section of land at the O.W. Nordman in northwest Langley. The farm was situated between the main West Langley dike and the Fraser River. *1) As the dike was not wide enough for a truck, it could not be repaired while being flooded. The high water also closed down most of the mills on the Fraser in the Mission-Haney area, throwing several hundred men out of work.

By June 23, some 55% of the record snowpack remained in the Fraser River watershed but at high levels where rapid melting was unlikely. The high tide ban on shipping in the Fraser's South Channel below New Westminster was still in effect. Light seepage was general in the valley but no major flooding problem had occurred. Dyke inspector Weighen predicted the Fraser River level at Mission to go over the 23-ft. mark and crest around June 24-25.

A major threat of flooding remained at Trail where for the first time a part of one of the city's main streets was flooded. On June 22, about an inch (2.5 cm) of water covered the lowest part of Bay Avenue. *2) Floodwaters had seeped into the basements of an estimated 35 homes and 50 businesses in the riverfront area. On June 22, the Columbia River (at Trail) reached the 42.06 -ft. level, less than 0.5 ft. (15 cm) below the peak level predicted for June 27; and upstream the river was still rising. In the Columbia watershed, 65% of the snowpack still had not melted.

*1) After having been flooded in 1948 and again in 1952, Nordman had invested \$5,000 in building the dike (*The Province*, June 23, 1967).

*2) Here in the area of the movie theatre, in 1961 flood waters had crept up to the level of the hole in the box office window (*The Province*, June 23, 1967).

July 1967

Source: Broscoe and Thompson 1969; Evans, unpublished data.

Details: In July 1967, a debris flow occurred in the St. Elias Mountains at Steele Creek. *1) The event, which happened following 55 mm of rain in a period of 36 hours, was witnessed (Broscoe and Thompson 1969). The flow had a duration of about two hours and occurred in a series of pulses, moving onto a fan with fronts of 1.8-2.4 m. The debris flow was described as viscous, rock-charged mud and rafted boulders of up to 4 m in longest dimension. Broscoe and Thompson (1969) note the rapid removal of finer material from the debris by subsequent rain and runoff, leaving a lag deposit similar to alluvial gravel. (Evans, unpublished data).

*1) In the St. Elias Mountains, debris flows may be related to permafrost degradation where retrogressive thaw slides provide source material for debris flows (Sharp 1942; Harris and Gustaffson 1988; Evans and Clague 1989).

October 6-13, 1967

(Flash floods).

Discharge (m³/s): Max. daily: October 7: Capil.: 192; October 9: L. Qual.: 46.7; October 11: Stamp

A.: 357E; Wan.: 1,990; max. instant.: October 10: Capil.: 248; October 11: Wan.: 2,090.

Source: *The British Columbian*, October 7, 10 and 11, 1967; *The Province*, October 11, 14 and 16, 1967; *The Daily Colonist*, October 8 and 12, 1967; *Nanaimo Daily Free Press*, October 7 and 10, 1967; Environment Canada 1991.

Details: Early October heavy rain and warm temperatures caused flooding on the Lower Mainland and Vancouver Island. Between October 1-11, Vancouver recorded 5.29 in. (134.4 mm) of rain, well above the average of 4.62 in. (117.3 mm) for the entire month. By October 12, 5.93 in. (150.6 mm) had fallen. The SFU meteorological station on top of Burnaby Mountain measured more than 6 in. (150 mm) between 6 a.m. on October 6-early October 10. In the 16 hours ending 8 a.m. on October 7, 2.33 in. (59.2 mm) of rain fell and another 1.75 in. (44.5 mm) in the following 24 hours. CFB Comox recorded 1.29 in. (32.8 mm) of rain in 24 hours.

On the night of October 7 in Surrey, Scott Road near the Patullo bridge flooded with more than 1 ft. (30 cm) of water. In the Connaught area of New Westminster, in areas where there were no storm sewers, some basements flooded. *1) On October 11, creeks on the North Shore were still running high. In North Vancouver, Mackay Creek caused property damage. A creek flooded basements in the 4600 block Pheasant Place in Capilano Highlands and washed away sections of property.

In the Tofino area, almost 11 in. (280 mm) of rain fell in a 72-hour period on October 6-8. On October 6, a two-day near-record rainfall of 5.29 in. (134.4 mm) in 24 hours caused flooding on the highway to Tofino in several spots. The worst flooding occurred about 5 mi. (8 km) from the Tofino-Ucluelet junction. Late on February 6, Kennedy River flooded the Port Alberni to Tofino highway, which was closed for several hours when more than 6 ft. (1.8 m) of water ran across the road. The road was reopened on November 7. Kennedy Lake rose about 8-9 ft. (2.4-2.7 m) above its normal level. *2) Late on October 9, full traffic was restored.

On the west coast of Vancouver Island, some logging roads were washed out forcing logging camps and Kennedy Lake mining operation to close. The Brynor open-pit iron mine near Tofino had to suspend operations. In Port Alberni, streets and basements in some areas were flooded. Runoff problems occurred in the newly paved Roger Road area and around 6th Avenue North, between Redford and Bute Streets. A mudslide between Tofino-Ucluelet near Long Beach cut off the Wickaninnish Inn and 12 houses south of the inn. The mudslide blocked the highway at the south end of Long Beach. Around October 7-8, thousands of yards of “muddy soup” came down from a cliff at the entrance to Long Beach. “Very large” debris flowed around some of the Long Beach buildings. It was expected to be cleared of the debris by early October 12. The cliff at the entrance of Long Beach, weakened by the abnormally heavy rains continued to collapse.

The heavy rains left the Gold River road and the Port Hardy road in the Vernon Camp area impassable.

On October 13, “unusually heavy” (a term reserved for near-catastrophe) runoff caused storm sewers to back up and the evacuation of dozens of families in Vancouver. Throughout New Westminster, overloaded culverts caused flooded basements. The heavy rain was caused by a storm centre that moved from southern Vancouver Island over the mainland south of Vancouver dumping 0.31 in. (7.9 mm) at the airport in six hours. Much more rain fell downtown, as usual. The downtown stations recorded 1.51 in. (38.4 mm) in the 24-hour period ending October 14 at 8 a.m. Most of this fell on October 13 between 4 p.m.-6 p.m., during the downpour. This brought the October rainfall at the airport to date at 6.09 in. (154.7 mm).

The flash floods were some of the worst to hit the city. According to Phil Herring of the city engineering department, his men answered more than 500 distress calls from stranded motorists and persons whose basement or ground level suites were flooded. Hardest hit was the Kitsilano area where overloaded storm sewers flooded homes with 7-8 ft. (2.1-2.4 m) of water. Most seriously effected areas were those in a northwesterly swath from Fraser and Marine Drive to the West End and Kitsilano. City streets flooded as gutters overflowed and manhole covers popped up “It’s the

worst flooding anyone around here can remember,” Herring said. Between 4 p.m.-6 p.m., traffic was totally chaotic, especially after the Stanley Park Causeway flooded.

However, gale-force winds, which lashed Victoria with gusts up to 58 mph (93.3 km/h), did not reach Vancouver late on October 13, as expected. The flash floods chased a B.C. Telephone Co. cable splicer out of a work trench leaving some 1,500 telephones in the area out of service overnight October 13-14. After Cornwall was inundated shortly after 4:30 p.m., southbound traffic on the Burrard bridge was rerouted to First and Second avenues.

Vancouver’s “Friday-the-thirteenth-deluge” kept city cleanup crews at work for 24 hours. Major pumping had to be done in at least 70 buildings, most of them in the 2000 blocks York and Cornwall in lower Kitsilano. Other trouble spots were the 900 (?) blocks West 27th and West 14th along a small creek flowing into False Creek. In an underground parking lot of the Driftwood Apartments on York floods that came within 6 in. (15 cm) of the garage roof damaged vehicles. North and West Vancouver and New Westminster, districts with steep streets, escaped flood damage. Coquitlam reported the “usual rash” of plugged culverts.

*1) In the balance of the city, the new system of storm sewers, completed the previous year carried the heavy flow of water without damage (*The British Columbian*).

*2) According to author and historian George Nicholson, who lived and worked in the area for 30 years, this lake is one of the main causes of flooding. Over 50 streams feed into the lake and the narrow 50-ft. (15 m) wide outlet is just too small to accommodate the amount of water (*The Daily Colonist*).

October 30-November 1, 1967

(Rain-on-snow?).

Source: *The Vancouver Sun*, October 31; November 1, 1967; *The Province*, October 31; November 1, 4 and 6, 1967; *The News of Williams Lake and the Cariboo*, November 1, 1967.

Details: On October 31, record rainfalls and abnormally warm weather caused widespread flooding. The downpour followed days of heavy rain, which undermined already sodden hillsides. On October 30, Port Hardy recorded 3.17 in. (80.5 mm) of rain. *1) The freezing level was between 8,000-10,000 ft. (2,400-3,000 m) and at the higher levels none of the precipitation fell as snow. At Lytton, where the high was 54° F (12.2° C) in the afternoon, the temperature rose to 72° F (22.2° C) at midnight. Washouts severed rail and highway links.

Hope reported 2.02 in. (51.3 mm) of rain in a few hours. In Hope, about half a dozen of basements were flooded after the Coquihalla River overflowed its banks. Two Hope district schools were closed on October 31 when the Coquihalla River threatened a bridge, which 35 pupils crossed by bus from the Kawkawa Lake district. West of Hope, a slide blocked the westbound lane of the Trans-Canada Highway and the Silver-Skagit River spilled its banks. The Silver-Skagit road, which runs from the Trans-Canada Highway west of Hope to Ross Lake, 40 mi. (64 km) south was closed due to high water in the Silver-Skagit River.

Washouts occurred on the Hope to Princeton Highway and a number of side roads. Early on October 31, Hope RCMP closed this highway after two creeks flooded the highway near the big slide 13 mi. (20.8 km) east of Hope. A section between the big slide and Sumallo Lodge washed out when a culvert was unable to handle the runoff. Traffic resumed on November 1. Mudslides delayed traffic on the Trans-Canada Highway west of Hope and in the Fraser Canyon. Tons of mud that slid down in the morning and blocked the eastbound lane of the highway at Flood was cleared away later in the day.

The storm dumped wet snow on parts of the Cariboo and Chilcotin, precipitating a rockslide in the Williams Lake area and interrupting telephone and power services. Boulders weighing up to a ton tumbled down Signal Point Mountain, smashing three cars and narrowly missing a small house. A small landslide came down with it damaging several cars and homes. On October 31 between

2:30-9 a.m., power was cut in 100 Mile House, largely due to snow on the lines. In Likely, a similar power outage lasted longer.

The flooding Nekite River, reported to be backing up behind mudslides threatened a floating logging camp at Smith Inlet, 250 mi. (400 km) north of Vancouver. When a steep hillside behind the camp threatened to give way the Gordon Stevens-Nalos logging camp at the head of Smith Inlet was partially evacuated. On the night of October 30, a dozen children from the logging camp with a population of 33 were put on a floathouse with several of their mothers and towed out of danger and anchored in safe waters overnight by the fisheries department patrol vessel *Laurier*. A second fisheries vessel, the *Falcon Rock* was standing by. Mudslides threatened to sweep the camp into the inlet. The evacuees returned next day.

Early on October 31, a 150 ft. (45 m) section of track washed out at Creekside, cutting the PGE rail line between Alta Lake-Pemberton. Large quantities of fill were required to shore up the track. Repairs were completed late on November 4.

At Britannia Beach, floodwaters swept away the water main supplying the town when Britannia Creek spilled over its banks and cut a new channel down the mountain. The flood all but destroyed the home of the Jim Brazeau family. Floors were covered with 3 ft. (90 cm) of mud and all the furniture was ruined. One other house (belonging to Ulrich Buthghe) was damaged and the townsite was covered with 6 in. (15 cm) of mud. At the height of the flood the six-room elementary school and more than 30 homes were evacuated. At one point, 2 ft. (60 cm) of water covered the Squamish Highway. The rain-swollen creek cut a new channel and poured through the village. Basements were flooded up to a depth of 5 ft. (1.5 m). It was feared that a high-pressure water pipeline above the six-room Britannia Beach elementary school would burst. The school's six teachers and 172 pupils were evacuated when floodwaters began to undermine the 36-in. (90 cm) pipeline that carries water to a power generator. Operations at the Anaconda Company (Canada) Ltd. plant were suspended. Employees were put to work shoring up the creek banks. By noon, floodwaters were receding. *2)

*1) The record 24-hour rainfall for Port Hardy was 3.88 in. (98.6 mm) set in November 1939. (*The Province*, October 31, 1967). Rainfall at the Vancouver airport in October totaled 11.26 in. (286.0 mm), 0.16 in. (4.1 mm) above the record set in November 1954 (*The Vancouver Sun*).

*2) The flooding came three days after the 46th anniversary of the disastrous 1921 flood that took 37 lives and destroyed half the homes in the village of Britannia Beach.

December 21-22, 1967

(Rain-on-snow).

Source: *The Vancouver Sun*, December 22 and 23, 1967; *The Province*, December 23, 1967.

Details: On December 21, a snowstorm delayed nearly all air traffic in and out of Vancouver. In Nanaimo, the first snowstorm of the year prompted (School) District 68 to close the schools at 1:30 p.m. on December 21.

On December 22, rain caused widespread flooding and hazardous roads. On December 22, Vancouver recorded 1.07 in. (27.2 mm) of rain. The big thaw brought flooding to many buildings in Greater Vancouver.

Though the rain melted virtually all snow in the Vancouver metropolitan area, snow continued to fall in the northern Interior. Freezing rain turned section of the Fraser Canyon and Hope to Princeton highways into "ribbons of ice." Eleven Greyhound buses failed to reach Vancouver as scheduled, leaving hundreds of passengers stranded. According to a bus depot spokesman, the Fraser Canyon was "like a junkyard – cars are stranded all over the place."

A snowslide 7 mi. (11.2 km) north of Horseshoe Bay blocked the Squamish Highway for more than two hours. Late on December 22, part of the 5-ft. (1.5 m) high slide was cleared allowing single-lane traffic.

January 12-20, 1968

(Rain-on-snow).

Discharge (m³/s): Max. daily: January 19: Chem.: 456; Kok.: 182; L. Qual.: 154; Nan. C.: 600; January 20: Sproat: 365; January 22: CR/CR: 580; January 23: BC/BB: 703; Sall.: 118; January 24: Wan.: 2,720 (extreme record); max. instant: January 19: Nan. C.: 660; January 20: L. Qual.: 170; January 22: CR/CR: 617; January 23: BC/BB: 828; Sall.: 142; Wan.: 2,920 (extreme record).

Source: *The Province*, January 15, 1968; *The Vancouver Sun*, January 15, 1968; *The New Westminster Columbian*, January 18, 19 and 20, 1968; *The Surrey Columbian*, January 19, 1968; *The Daily News*, January 22, 23 and 24, 1968; *Chilliwack Progress*, January 17 and 24, 1968; Environment Canada 1991.

Details: On January 13, a moist southwest flow caused temperatures in Vancouver to soar to 56° F (13.3° C). On January 14, the sudden thaw in nearly all parts of British Columbia caused flooding and snowslides. A band of moisture brought more than 48 hours of continuous rain. Freezing levels went as high as 4,000 ft. (1,200 m) causing snow to melt at lower elevations. On January 12-13, Chilliwack had recorded 2.97 in. (75.4 mm) of rain, including 1 in. (2.5 cm) of snow.

Vancouver Island was the worst hit after the incessant rains caused extensive flood damage in the Duncan, Nanaimo and Cowichan valley areas. In Duncan's new Centennial Heights subdivision floodwaters swept through 17 homes after ditches and drains overflowed in an area normally well above the flooding mark. In Nanaimo, many basements were flooded. On Gordon Street, the month-old Overwaitea store sustained the worst damage. Floodwaters cut the roads in North Cowichan, the Ozouhalem Indian Reserve and Cowichan Bay.

On January 14 at Sayward, a bridge over Stowe River (Creek) washed out and was under 5 ft. (1.5 m) of water. A mile (1.6 km) north of Sayward, the Kelsey Bay highway was under 2 ft. (60 cm) of water. A temporary structure put up to replace the two-lane wooden bridge allowed the passage of only cars and small trucks. About 20 mi. (32 km) north of Campbell River, dirt and gravel from a landslide blocked the main highway for a distance of 500 yd. (450 m). The slide also brought down the telephone lines down in the area. Both road and lines were back in service late on December 14. Flooding also closed the Alberni-Tofino highway. It was cut near Alberni where a small bridge was flooded. The road to Gold River was open to light traffic only.

On January 12, a series of slides closed the Fraser Canyon Highway between Hope-Lytton. On January 14, this section was reopened.

On the afternoon December 14, a section of Highway 99 between Whistler Mountain-Pemberton closed after 3.5 ft. (1.05 m) of water flooded the road near Tisdall. The Pemberton Highway was closed at the junction with Highway 99 where 0.25 mi. (400 m) was under 4 ft. (1.2 m) of water. On the outskirts of Pemberton, floodwaters caused the evacuation of the residents of two houses

On January 14 around 6:30 a.m., a thaw-induced debris flow came down at Popkum, 12 mi. (19.2 km) east of Chilliwack. It destroyed a two-level frame house at the base of a mountain 300 yd. (270 m) from the Trans-Canada Highway on the Cattermole Timber Co. property. The slide killed one person and injured three others. The victim, who had been sleeping in the basement of the house, was buried under a brick wall and 12 ft. (3.6 m) of "muck and rubble." Nine people escaped from the ruins of the house.

On January 18-19, a "Pineapple Express" brought record-breaking rainfall to the Lower Mainland and Vancouver Island. It was described as "the century's heaviest prolonged rainfall in British Columbia." Vancouver International Airport recorded 5 in. (127.0 mm) of rain in the 24 hour period ending 8 a.m. on January 19, making it the highest since 1898. Chilliwack recorded 3.67 in. (93.2 mm) on January 19 or a total of 5.9 in. (149.9 mm) for the three days of January 19-21. New Westminster recorded 3.6 in. (91.4 mm) of rain between 7 a.m. on January 12-7 a.m. on January 18. For the 24-hour period ending 7 a.m. on January 19, New Westminster recorded 4.87 in. (123.7 mm) of rain. *1) During the next 24 hours another 2.11 in. (53.6 mm) of rain fell in New Westminster

where precipitation from January 16-21 totaled 7.29 in. (185.2 mm). According to records kept by C.F. Minthorne, an all-time record was set for this date. Also maximum temperature records were broken. Vancouver International Airport recorded a temperature of 58° F (14.4° C) on January 20, and New Westminster 52° F (11.1° C) on January 21. With a temperature of 62° F (16.7° C) on January 20, Comox beat its old record by 5 degrees F.

The storm left one man dead and damages estimated in the hundreds of thousands of dollars. Overnight January 18-19, many roads in the Lower Mainland were closed due to flooding and washouts. One of the worst hit areas was Coquitlam, where the business district of Maillardville suffered heavy flood damage. The huge culverts beneath Brunette Avenue were unable to handle the amount of water that was rushing down a ravine watercourse parallel to Schoolhouse Street in Coquitlam. At the foot of Schoolhouse Street, floodwaters spread a block east and west on Brunette, carrying mud, gravel and rocks as large as grapefruit. Portions of Nelson Street and Schoolhouse Road were lost. The grounds of Millside School and private lawns for a one-block distance east and west were littered with debris. At the foot of Nelson Street a 5 ft. (1.5 m) culvert was plugged, forcing the entire flow across the Brunette pavement. On January 20, the 5-ft. (1.5 m) culvert under Brunette Avenue could still not be cleared. Brunette Avenue was threatened as the rushing water was undermining the blacktop. In a ravine adjacent to the Montgomery School, a raised footpath for students washed out on January 19, after a slide blocked a 5-ft. culvert beneath it. At Fraser Mills, 15 mi. (24 km) east of Vancouver, the Crown-Zellerbach lumber mill was flooded. Employees used rowboats to get to work as parts of the plant were under 3 ft. (90 cm) of water. The Como Lake level rose several feet, flooding Gatensbury Street and stalling several cars. Daker Avenue, in the east end of the municipality, pavement was cut near Dewdney Trunk Road. In the gravel pit area adjacent to the Coquitlam River, Pipeline Road was cut. Riverfront residents reported no rise in the river level, as the BC Hydro dam remained closed. *2) On January 19, much of the farmland in the east end, behind the dikes and below the level of the Pitt River, was still flooded. In Burnaby in the Willingdon Street-Port Mann Freeway area, Still Creek overflowed its banks and backed up. Willingdon Avenue, north of the Freeway overpass, was reopened on January 20. The washed out section of Government Road would not be repaired for the next few days. On January 19, about 50 ft. (15 m) of road washed out, causing about \$2,500 damage. That same day several other streets, including Kingsway near Central Park and a portion of Marine Drive, were still flooded. Late on January 21, the extensive flooding of the Fry's Corner area on the Fraser Valley highway was sufficiently cleared to re-open the highway.

In numerous areas of Surrey, basements were flooded. Scott Road near Patullo bridge-King George Highway, one of Surrey's perennial trouble spots, was under 2 ft. (60 cm) of water. With the high tide preventing runoff into the Fraser River, Scott Road in the vicinity of Old Yale Road, was flooded with 3 ft. of water at 8 a.m. on January 19. Six families were evacuated from the low area between Scott Road and the Fraser River on January 19. A total of 25 people were moved to higher ground. Scott Road was expected to re-open later on January 20. A dike washout on 64th Avenue east of 152nd Street forced a continued closure of 64th Avenue. The closed section of Bose Road east of 152nd Street suffered washout damage. Several acres of land, including residential property on Tannery and Timberland Roads were under at least 2 ft. (60 cm) of water.

In the Bear Creek area of Surrey, the low-lying area of the King George Highway was flooded. The No. 10 Highway between Johnson Road and Pacific Highway was also under water and closed. Early on January 20, the No. 10 Highway and later that day 160th Street, south of Highway 401, reopened. Heavy flood damage occurred in the municipality of Coquitlam on the north side of the Fraser River. Several principal roads were damaged and mud, rocks and other debris left scattered over private property.

In New Westminster, the industrial area of Braid Street was still flooded on January 19. In Delta many homes were completely surrounded by water, which was up to 4 ft. (1.2 m) deep in places. On January 22, in both Surrey and Delta agricultural areas and low-lying spots in ditches

were still flooded. In New Westminster, a 1,200-line telephone cable was damaged by water late on January 19, interrupting service to some 1,800 homes and buildings in the Sapperton area.

The unusually heavy rain caused widespread flooding in the Chilliwack district. Extensive flooding, reaching its peak early on January 19 occurred in fields, basements and gardens. Illegal pumping of storm water into sanitary sewers plugged the sewers beyond capacity. On the afternoon of January 20, a washout occurred at Majuba Hill. Severe flooding made Gillanders Road impassable. Between McDonald Road and Fairfield Island Hall, the Hope River eroded its bank and edges of the road.

A major slide at Wahleach severed the Trans-Canada Highway. The slide, which came down on January 20 at 2 p.m., also cut rail, power and telephone services. Triggered high on the mountainside, it brought down an estimated 24,000 tons of rock, mud and debris onto the highway on either side of the Wahleach generating station. The slide spilled over the CNR track below the highway. It knocked out one 12,000-V circuit, and then, a few minutes later, another circuit was hit. A temporary power blackout resulted from Chilliwack to Boston Bar. Department of Highways crews, using 16 pieces of equipment, worked through the afternoon and night to clear the highway. It was reopened to traffic next morning at 7 a.m. The slide also cut the telephone landline between Chilliwack-Hope. B.C. Telephone linemen managed to restore first circuits on January 21 at 1:30 p.m. and full service was back to normal by mid-afternoon.

On Vancouver Island, hardest hit by the rain, hundreds of basements were reported flooded. On January 21, health officials in two flood-stricken sections of Vancouver Island warned thousands of residents against consumption of unpurified water following three days of steady rains. At Campbell River, about 15,000 people were asked to boil all water shortly after the town's water supply line burst in two separate places. In the Cowichan Valley, several thousand residents were urged to boil water suspected of having been polluted by floodwaters from Cowichan Lake and the Cowichan River. In Duncan, several homes in a housing subdivision were evacuated following the collapse of the subdivision's sewage system.

The Island Highway north of Courtenay was under several feet of water and closed. The highway between Alberni-Tofino was closed due to a series of bad washouts. At Elk Falls, 5 mi. (8 km) north of Campbell River, one man drowned in a plugged culvert. While trying to clear the culvert, the commercial diver became trapped by debris and water pressure.

On January 20, a slide west of Hope near Jones Hill temporarily severed a section of the CNR line. Late on January 21, a mud and rockslide in the Fraser Canyon closed the CNR rail line. The line was not expected to be reopened till January 24. More than 800 ft. (240 m) of track was ripped out. Late on January 21, a 70-car CNR freight train hit a rock and mudslide in the Fraser Canyon, about 120 mi. (192 km) east of Vancouver. The slide was about 35 ft. (10.5 m) long and 25 ft. (7.5 m) deep in places. Two diesel units and 12 cars, each containing 100 tons of potash derailed. Some rail cars were overturned in a tunnel, making the site difficult to be reached with clearing equipment. There were no injuries. CNR trains used CPR tracks between Vancouver-Spences Bridge until the line was cleared, probably later on January 22.

The CPR main line immediately east of Port Coquitlam was blocked by two 120-ft. (36 m) slides. On January 19, CPR's westbound *Canadian* was halted at Kamloops. Passengers were airlifted between Vancouver-Kamloops. On January 20, a new slide came down from the north slope of Burnaby Mountain, burying the tracks along Burrard Inlet. The slide covered the tracks for a distance of 150 ft. (45 m) to a depth of 30 ft. (9 m). On January 20, a 600-ft. (180 m) long slide came down over the Trans-Canada Highway and CNR tracks near Chilliwack. Crews worked 17 hours to clear the way for rail and highway traffic. On the same day, a creek east of Hope ripped away 20 ft. (6 m) of the Southern Trans-Provincial Highway. A Bailey bridge was constructed over the gap, reopening the road on January 21.

*1) This figure is only exceeded by the downpour of 5.1 in. (129.5 mm) of rain in November 1898 (*The New Westminster Columbian*, January 19, 1968).

*2) In previous years, floodgates of the BC Hydro dam at the head of the Coquitlam River had been opened during heavy rains to prevent water from rushing over the top. As a result downstream flooding often carried away automobiles and homes, threatening lives of residents (*The New Westminster Columbian*, January 19, 1968).

June 1-5, 1968

(Rain-on-snow and spring runoff/flooding).

Source: *The Province*, June 4, 1968; *Revelstoke Review*, June 6 and 13, 1968; B.C. Ministry of Energy, Mines and Petroleum Resources 1993.

Details: Early June, the Kootenays experienced “one of the worst floods in memory.” More than 20 homes were evacuated and property damage ran into tens of thousand dollars. A combination of heavy rain and melting snow cut roads and railways from Revelstoke to the U.S. border, 150 mi. (240 km) to the south. *1) Highway 6, running north into Slocan Valley, suffered extensive flooding at Slocan Park and at Enterprise, where bridge footings were eroded. Two Kootenay Lake ferries, which normally do not operate at night, were kept in service until the morning of June 3. This was to give eastbound traffic a route out of Nelson after floodwaters washed out several bridges and sections of Highway 6 to Salmo.

Early on June 2, St. Leon Creek overflowed its banks at St. Leon on Upper Arrow Lake. All the roads washed out and a 50-year old summer cabin collapsed 10 ft. (3 m) down into the torrent. The occupant, an elderly woman, escaped. The occupants of the nearby Gates of St. Leon Lodge were evacuated after it was surrounded by water.

On the late afternoon of June 2, a bridge between Albert Canyon-Illecillewaet washed out. Two spans totaling a length of 87 ft. (26.1 m) of the bridge over the Illecillewaet River collapsed. The abutments remained in place. East and west of Revelstoke, the Trans-Canada Highway washed out. Washouts occurred at Summit Lake and at the Enchanted Forest, east of Revelstoke. On June 3, Revelstoke’s city water supply was temporarily cut off when a large amount of gravel piled up against the screen at the intake at the Greely Creek dam. While repairs were carried out, an alternate supply was drawn from Hamilton Creek.

At Albert Canyon, 20 mi. (32 km) east of Revelstoke, a big 75-ft. (22.5 m) deep washout occurred on the CPR main line. A bridge and 100 ft. (30 m) of track were taken out. The railway hoped to have the line open by late on June 3.

On the afternoon of June 5, heavy rain caused a debris flow at Camp Creek, west of Revelstoke. *2) It covered the Trans-Canada Highway, killing four members of a Victoria family, occupants of a car travelling on the highway. A six-year old girl miraculously survived the massive landslide consisting of tons of rock, mud and water. Later that same evening, two more slides came down, adding to the difficulty of clearing the highway. The first slide was over 3,000 ft. (900 m) long, up to 600 ft. (180 m) wide and about 20 ft. (6 m) deep. The bridge over the creek was completely carried away into nearby Griffin Lake, the west-end of which was full of floating debris emptied into it by the slide. The Camp Creek debris torrent involved 76,000 m³ of debris (B.C. Ministry of Energy, Mines and Petroleum Resources 1993). By June 8, the highway was open for one-lane traffic and was reopened for two-lane traffic on June 10.

Nelson was the hardest hit when Cottonwood Creek flooded a number of homes and a service station. Duhamel Creek went on the rampage and caused damage to homes and property. Though the highway to Balfour suffered extensive erosion at this point, it was kept open to one-way traffic. The road between Nakusp-Galena Bay was washed out by three creeks and was still closed late on June 3. Barrett Creek washed out a section of the Nelson to Salmo highway and a CPR rail bridge. The highway would remain closed until a temporary bridge was installed. During most of June 3, the Sheep Creek bridge on the Southern Trans-Canada Highway was closed due to erosion. When creek levels dropped, it reopened late on June 3.

One of four children hurled from a wooden bridge into a flooded creek at Kinnaird, 7 mi. (11.2 km) south of Castlegar when a log hit the bridge. The seven-year old girl, swept away in the fast flowing Pass Creek was missing and presumed drowned. Two boys aged three and five were still missing near Port Edward since May 28, feared swept away by tidal waters.

*1) One year previous almost to the hour, a flash flood and steady rain caused a transportation problem around Revelstoke when roads and bridges washed out (*Revelstoke Review*, June 6, 1968).

*2) On June 23, 1973, Camp Creek cut the highway again.

August 26, 1968

Source: *Revelstoke Review*, August 29, 1968.

Details: On August 26, a rockfall at Victor Lake, 10 mi. (16 km) west of Revelstoke killed one passenger of a CPR train, which was struck by some rocks. Early in the morning, a six-ton boulder crashed through the CPR *Canadian* day coach passing between the big bluff and Victor Lake killing the 20-year old woman. It came down from 500 ft. (150 m) above the railway tracks. The resulting derailment tore up some 800 ft. (240 m) of track. The 320 passengers were bused to Calgary.

September 16-17, 1968

Source: *The Province*, September 17, 1968; *The Vancouver Sun*, September 17, 1968.

Details: Overnight September 16-17, heavy rain occurred in the Lower Mainland. Worst was hit was the North Shore, where a gauge at Cleveland Dam recorded 4.09 in. (103.9 mm) of rain in 24 hours. During the same period, 3.09 in. (78.5 mm) was reported from Mount Seymour. The Vancouver Airport recorded 1.52 in. (38.6 mm). *1) The heaviest rainfall was reported from Tofino with 4.26 in. (108.2 mm) in the 24 hours ending 5 a.m. on September 17 and 4.17 in. (105.9 mm) in the 24 hours ending September 16 at 11 p.m. *2)

In North Vancouver, a plugged culvert near St. George's and 26th caused a basement at East 25th to flood to a depth of 6 ft. (1.8 m). As the water poured down a lane, other nearby homes were also flooded. In the Deep Cove area, some stores in the Dollarton shopping centre were flooded. The 3100 block Dollarton Highway was under 3 in. (7.5 cm) of water. In Lynn Valley, homes were flooded and the pavement was undermined at Borthwick and Mountain Highway.

In West Vancouver, between 75-100 homeowners reported flooding, mostly in the British Properties area. Peak period for all trouble calls was between midnight and 3 a.m.

The Squamish Highway washed out at Stoney Creek 2.5 mi. (4 km) south of Squamish. The area was still under construction. The previous week rocks knocked out a temporary bridge. On September 16, the rains washed out a temporary road and culvert built around the bridge. Traffic was delayed for up to two hours. Shortly after 9 p.m., the road was open again.

Late on September 16 and early September 17, the rain and low-lying fog caused the cancellation of about 15 Air Canada flights between Vancouver-Victoria. Gale-force winds in the wake of the storm caused two 165-ft. (49.5 m) empty gravel barges, moored to a buoy at Kitsilano, to break free and to be blown around on the rocky beach near Crystal Pool.

*1) The September record is 2.2 in. (55.9 mm), set in 1959 with 2.45 in. (62.2 mm) recorded in New Westminster (*The Vancouver Sun*).

*2) Both figures exceed the previous Tofino record for September, 3.25 in. (82.6 mm) set in 1967 (*The Vancouver Sun*).

October 23, 1968

Source: *The Vancouver Sun*, October 24, 1968.

Details: On October 23 at about 5:30 p.m., Stoney Creek spilled its banks, flooding and washing out a section of the Squamish Highway and PGE track 2.5 mi. (4 km) south of Squamish. About 30 ft. (9 m) of rail track washed out. The highway and rail line were closed. Though freight traffic was temporarily halted, passengers were transferred around the washout. By noon next day, the rail line was back in service. The highway was expected to reopen around noon on October 24, more than 17 hours after it washed out.

October 29, 1968

Source: *The Vancouver Sun*, October 30, 1968.

Details: On October 29, heavy rain caused the closure of two highways. On Vancouver Island, floodwaters of the Salmon River cut the Island Highway. BC Ferries' northbound *Queen of Prince Rupert* was forced to sail empty from Kelsey Bay. The highway reopened late that same day.

A washout 7 mi. (11.2 km) south of Pemberton closed Highway 99. Repairs were expected to be completed late on October 29.

November 24, 1968

Source: *The Citizen*, November 26, 1968; *The Fernie Free Press*, November 28, 1968; *The Vancouver Sun*, September 12, 1972; Evans, unpublished data.

Details: On November 24 at 11 a.m., a massive slide occurred from the coal mine waste dump of Sparwood Ridge, 10 km west of the Alberta border. *1) The slide, caused by excessive seepage buried part of Highway 3 near Sparwood, 3 mi. (4.8 km) west of Natal and killed a husband and wife and their small dog. The victims were travelling in a car, which was buried and crushed by the massive slide. *2) Several persons witnessed the slide, which carried waste, trees, huge rocks and mud with it. It cascaded in a slightly different direction onto and across Highway 3. An estimated 500,000 tons of "overburden" material dumped on the north side of Sparwood Ridge slid down the steep mountain. A portion of it covered a 1,000-ft. (300 m) section the highway of up to 30 ft. (9 m) deep. Traffic was rerouted over the Elk Valley Road and a recently opened Kaiser truck road. High up the mountain, two streams cascaded through the blackened slide area. It is believed an underground stream fed by recent heavy rain may have loosened up the piles of mine waste. Heavy machinery from Kaiser Coal and contractors in the area started clearing the slide from both ends. The car was not located until 9:30 the next day. Late on November 27, the road was cleared. Additional clean-up work was completed later that day. Till the next spring only a temporary road surface would be available.

*1) Flowslides in waste dumps in the east Kootenay coalfields have resulted in eight deaths between 1968-1996 (Evans, unpublished data). Only three weeks earlier, the strip mine waste pile had been inspected and pronounced safe (*The Fernie Free Press*, November 28, 1968).

*2) In a September 11, 1972, British Columbia Supreme Court judgement, two mining companies were criticised for disregard of safety measures in spoil dumping that resulted in the fatal slide. Mr. Justice T.R. Berger stated that the plaintiff, Emil Anderson Construction Ltd. and its subsidiary Floods Mining and Aggregate Ltd., and the defendant Kaiser Coal Ltd. were equally responsible. It was only after the 1966 Aberfan disaster in Wales that mining companies and engineers concerned themselves with the safety of spoil dumps, Berger said. According to the judgement, the gravely silt on which the overburden was dumped provided an unstable foundation. The other principal cause of the slide was an increase in water pressure, which further reduced the stability.

December 31, 1968-January 1, 1969

Source: *The Sun*, January 2, 1969; Egginton, pers. comm.

Details: Between December 31-January 1, snowfall was reported in the Sea-to-Sky Corridor area. On January 1, the snow at the Vancouver International Airport turned into rain. Following the snowfall in the morning of December 31, the hourly observations reported freezing rain and drizzle, which continued into the morning of January 1 (Egginton, pers comm.).

On January 1, four persons were rescued unharmed after their car was buried under 10 ft. (3 m) of snow of one of three snowslides came down onto Highway 99 in the Cheakamus Canyon. In a matter of minutes, highways department grader operator and drivers of other cars that were missed by the snow rescued them. At 9 p.m., the Pemberton-Squamish was closed after the slides blocked more than 400 ft. (1,200 m) of highway. Crews worked throughout the night in gale-force winds in a clearing operation. On January 2 at 10 a.m., the highway reopened to one-lane traffic.

February 7-9, 1969

Source: *The Vancouver Sun*, February 8 and 10, 1969; March 5, 1969; *The Daily News*, February 10, 1969; Won 1971 (pp. 34-35); Eisbacher 1983 (p. 22).

Details: Torrential rains and gales hit the west coast of Vancouver Island. On February 8, winds as high as 83 mph (135.2 km/h) were reported from Cape St. James dumping almost 4 in. (101.6 mm) of rain. Comox, on the east coast of Vancouver Island recorded 2.5 in. (63.5 mm) of rain and winds up to 65 mph (104.6 km/h). During the height of the storm, Trial Island, just off Victoria, reported winds in excess of 80 mph (128.7 km/h). Ferry sailings across the Strait of Georgia were delayed or cancelled (Won 1971).

On February 9, freeze-thaw conditions caused a rockfall along Highway 99 near Porteau Cove, 10 km north of Lions Bay. A slab of rock landed on a moving car. The 1-ton boulder, measuring 4.5 ft. (1.35 m) tumbled 80 ft. (24 m) down and killed three people. *1) The highway from Lions Bay to Britannia Beach, which was partially blocked, was closed.

Due to repeated freeze-thaw cycles other slides occurred at the same location on February 17 and March 4, 1969 (Eisbacher 1983).

On February 13, a slide near Brunswick Point, 5 km north of Lions Bay, closed Highway 99. The rock fall had a volume of 6,000 m³ (Eisbacher 1983). The massive slide blocked the highway till February 17. Shortly before it was scheduled to be reopened, another rockslide closed the road for two more days. (*The Vancouver Sun*, March 5, 1969).

Snowslides also closed the Cheakamus Canyon on the Squamish to Pemberton highway north of Alice Lake. Several cars were trapped in the canyon slides. *2) According to Mount Whistler Lodge manager Harry Wiese, on February 7 and 8, snowslides prevented skiers getting to the mountain.

On February 9, snowslides also held up traffic on the Hope to Princeton highway and at Hell's Gate in the Fraser Canyon.

*) This was the first fatal rockfall in eight years.

*2) After years of pressure from municipal governments, Chambers of Commerce and private citizens of Pemberton, Squamish and Whistler, in January 1981 the provincial government announced the reconstruction of nearly 2 mi. (3.2 km) of the treacherous highway through the Cheakamus Canyon. Highways Minister Alex Fraser and MLA Allan Williams announced a \$5.5 million plan for the reconstruction of 2.45 km of Highway 99 through Cheakamus Canyon. The plan involved the removal of an estimated 311,000 yd.³ (237,800 m³) of rock, some river diversion as well as the usual upgrading, paving, shouldering and draining. (*Citizen Shopper*, January 22, 1981).

February 28-March 4, 1969

Source: *The Daily News*, February 28, 1969 *The Vancouver Sun*, March 5, 1969; *The Province*, March 3 and 6, 1969; Environment Canada 1991; *PEP Talk*. Provincial Emergency Program, June 1990

Details: On February 28, an approximately 150-ft. (45 m) long and 15-ft. (4.5 m) deep rockslide on the CNR line 2 mi. (3.2 km) north of Hope caused the derailment of an 84-car eastbound freight train. The leading diesel engine somersaulted down a 50-ft. (15 m) embankment. It crashed through the ice to land right side up in the Fraser River. The second one landed on the river bank and seven boxcars also derailed. Though fire spread through several boxcars, there were no injuries. Passengers were taken around the slide by bus. On March 3, traffic was back to normal.

On March 4, heavy rains in the Porteau Cove area caused another debris slide on the Squamish highway. It came down at 8:30 p.m., 1.5 mi. (2.4 km) north of Horseshoe Bay. Some boulders measured up to 10 ft. (3 m) high. As the rocks, mud and trees blocked the highway, a detour had to be built at Porteau.

On March 5, Highways Minister Black said that despite the latest blockage of the road by a rockfall late on March 3, the Squamish Highway was safe for traffic. He made the comment on a claim by Squamish Mayor Pat Brennan that the road was unsafe because of the recent slides. The rockfall near Horseshoe Bay had been cleared and the highway would stay open, said Black.

PEP Talk of June 1990 shows a photograph of “Volunteers working under Civil Defence Organisation help maintain dikes during Duncan flooding in 1969.” (exact date unknown). On March 3, the Duncan River below Lardeau River recorded a maximum instantaneous discharge of 855 m³/s and a maximum daily discharge of 617 m³/s. Both discharges are all-time highs for the period of record (Environment Canada 1991).

March 24, 1969

(Fatal landslide).

Source: *Kelowna Daily Courier*, March 25, 1969.

Details: On March 24, a debris flow near Slokan in the Crescent Valley 20 mi. (32 km) west of Kelowna blocked a road and destroyed part of the CPR track. The debris flow killed a Ministry of Highways worker in his truck. The mudslide caught his truck and pushed it down a 200-ft. (60 m) bank into the Slokan River.

April 23, 1969

(Flash flood).

Source: *The Province*, April 24, 1969; *The Sun*, April 24 and 25, 1969; *Victoria Daily Times*, May 6, 1969.

Details: On April 23, warm weather, 74° F (23.3° C), followed by an all-night thunderstorm and continuous rain caused Trail Creek to burst its bank. A torrent from a blocked culvert in the north end of the city surged down hitting Trail with a flash flood. At about 4 p.m., water from Trail, Stony and Gorge creeks started flowing into Trail, the mine-smelting city of 12,000 people. In the days prior to the flood, temperatures had climbed above 70° F (21.1° C). Rocks and other debris blocked creek culverts. A culvert that carries the creek into the Columbia River was believed blocked by a large boulder brought down by high water. A 12-block square area containing about 75% of the stores and buildings in the business district was flooded up to 5 ft. (1.5 m) deep. Rescuers used rowboats to take shoppers to safety. Police evacuated about 200 people from homes in one area. The floodwaters left an estimated 240 families temporarily homeless. Many cars were left almost completely submerged in water up to 3 ft. (90 cm) deep. During the night in an effort to drain the area of floodwaters from Trail Creek, Civil Defence workers blasted two 20-ft. (6 m) holes in the huge dike designed to protect Trail from the Columbia River. Engineers from Cominco eventually blasted four holes in the Esplanade retaining wall.

An early damage estimate was put at \$1 million. *1) Mayor F.E. DeVito declared a state of emergency. For fear of looting, DeVito imposed a midnight curfew. Premier W.A.C. Bennett asked Prime Minister Pierre Trudeau to declare Trail a disaster area and to contribute federal funds. Bennett

also noted that the newly formed provincial major disaster fund would be used to aid Trail residents. The money would be available “not to industries but to people.” *2)

A task force of about 850 volunteers, RCMP and firemen was engaged in rescue and salvage operations. Cleanup operations included removing up to 5 ft. (1.5 m) of mud, rock and sand and tearing up the pavement on Rossland, which had been heaved and buckled by the floodwaters. On Groutage Avenue, a three-storey apartment block had toppled over and landed on its side almost intact. The foundation of the building, which faces the Columbia River, was washed away. The residents had been evacuated before the building toppled. Cars that had been parked next to the building dropped into a large hole washed out by the floodwaters. Further down the street, were also damaged by water undermining foundations. At least four cars were swept into the Columbia River and vanished. At the height of the flood, water was poring through the main street “at a rate of 15 to 20 mi. (24-32 km/h) an hour.”

West of Trail, the Trans-Canada Highway was blocked by mudslides and the route south was blocked by water.

*1) The preliminary report of some 20 assessors indicated the total flood loss in Trail at \$3 million. This was double the amount of loss sustained in Alberni five years earlier. Then 100% of compensation was received. Much of the assistance came from the federal government and public subscriptions (*Victoria Daily Times*, May 6, 1969).

*2) The \$25 million provincial disaster fund had been augmented by about \$60,000 remaining in the fund set up in 1964 to aid Port Alberni’s tidal wave damage (*The Vancouver Sun*, April 25, 1969).

May 3-4, 1969

Source: *The Province*, May 5, 1969.

Details: On May 3-4, seven U.S. families living along Nigger Bar Creek were evacuated for fear the dam at the Trail’s water reservoir would burst. *1) A 1-ft. (30 cm) section of the dam, which was soggy, had a slight overflow.

*1) If the dam would have burst, nobody on the Canadian side would have been endangered. Nigger Bar Creek flows in south direction from Violin Lake, Trail’s water reservoir about 5 mi. (8 km) from Trail and 7 mi. (11.2 km) from the U.S. border. The dam is about 100 ft. (30 m) long, 5-10 ft. (1.5-3 m) high and contains approximately 240 million gal. (1,080 million L) of water. (*The Province*, May 5, 1969).

September 12, 1969

(Dam burst/flooding).

Source: *The Vancouver Sun*, September 12, 1969; *Nelson Daily News*, September 13, 1969; *The Province*, September 15, 1969.

Details: On September 12 at about 5 a.m., the reclaiming dam at the Phoenix Mine, 4 mi. (6.4 km) east of Greenwood breached and caused flooding in Greenwood’s main street. Water behind the dam owned by the Granby Mining Co. Ltd. ranged to a depth of 50 ft. (15 m). Enough water escaped to lower the level in the pond by about 1 ft. (30 cm). Apparently there was no sign of a hole in the rock-fill dam. Rather than a breach, the water leaked through a rock fill. Water poured down the street and into Boundary Creek until the dirt it carried with it caused it to back up and to enter into the buildings. Some of the stores flooded were on Copper Street, which backs on Greenwood Street. Being at a much lower elevation, floodwaters entered their upper floors at the back forcing their way through ceilings onto the main floors. Pavement was torn up and the Trans-Canada Highway temporarily blocked. At one time, water was 4-5 ft. (1.2-1.5 m) deep on the main street. It tore holes 10 ft. (3 m) across the street. At least six stores and one home were damaged. The damage was estimated at over \$100,000. Though the damage was extensive, it was confined to a small area. One

resident noted that he was awakened by a “waterfall sound” and found the street under several feet of water.

September 16-18, 1969

Discharge (m³/s): Max. daily: September 19: 98.3; September 22: Capil.: 105; max. instant.: September 22: Capil.: 196.

Source: *The Daily News*, September 19, 1969; *The Province*, September 19, 20 and 23, 1969; *The Sunday Sun*, September 20, 1969; *The Burnaby Columbian*, September 18, 19 and 22, 1969; Russell 1972; Eisbacher 1983 (p. 19); Jackson et al. 1985 (p. 4-18); Reid, Collins Associates Limited 1969; Environment Canada 1991; Egginton, pers comm.

Details: On September 16 and 17, heavy rain caused severe floods on some of the very steep creeks, which drain into Howe Sound in the Lions Bay area. *1) During the abnormal localised rainstorm, the Squamish highway washed out in two places. In the early morning of September 18, floodwaters cut the Squamish highway in two places and PGE tracks after two bridges were knocked out. Luxury homes that dot the area were flooded. *2)

On September 18 at 1:45 a.m., a boulder flow of several thousand cubic metres came down Charles Creek, a high-gradient (52%) torrent 4 km north of Horseshoe Bay. *3) The first debris torrent known here destroyed all four bridges between the highway and the Howe Sound shore. A major debris jam developed behind the highway bridge, causing it to collapse (Jackson et al 1985). The wooden highway trestle of the bridge over Charles Creek was completely carried away. Material was deposited at the bridge rather than the bridge being undermined. The concrete foundation piers had not been underscoured. About 400 yd. (360 m) upstream from the highway there is a 50-ft. (15 m) waterfall. Downstream of the waterfall, there was evidence of temporary damming due to piling up of debris and riverbed material. The dam, which formed about 200 ft. (60 m) upstream of the waterfall, had been about 20 ft. (6 m) high before bursting. The other dam, situated just downstream of the waterfall, had been about 10 ft. (3 m) high. The apparent peak flow at the outfall was estimated at 3,000-4,000 cfs (84.9-113.2 m³/s). Near the peak of the flood these dams burst and caused washing out the road and railway bridges below, partly by the rush of the onrushing water and debris, and partly by the lateral thrust of the timber trestling of the bridge due to piling of debris just upstream of the bridge (Reid, Collins and Associates Limited 1969). The torrent also dislodged the 30-ft. (9 m) PGE railroad bridge after sections of the highway bridge above it crashed down the raging creek. The PGE line was expected to reopen on September 19.

Two cars plunged into the gaping hole, but the four occupants survived. One car and its driver disappeared along this stretch of road, and were presumably carried to sea by the debris flow (Eisbacher 1983). By September 20, Squamish RCMP had found no trace of a 25-year old West Vancouver man missing since early on September 18, around the time the Strachan Creek bridge collapsed and the Newman Creek bridge was buried.

During the storm of September 18, several other torrents in the area spilled bedload into the sea. On September 17, a surge of debris and water on Harvey Creek washed out the water supply intake, and threatened five houses along the creek bed. The creek overtopped its banks in several places below the highway and extensively eroded its banks. The debris flow in Harvey Creek (gradient 23%), near Lions Bay damaged several homes on the delta cone. *3) The debris consisted of trees and boulders derived from a high-level point source in unconsolidated deposits. Some residents of Lions Bay were forced to leave their homes as swollen Harvey Creek threatened to flood them. Early on September 18, Harvey Creek running wild tore 12 ft. (3.6 m) of land from Mrs. Pat Dickson's property and threatened the foundations of her \$50,000 home. A few feet below in an exposed bend directly in the path of the creek, the house of Edward Kurvits was threatened.

Russell (1972) estimated the peak of the debris flood at more than 100 m³/sec. Very rough estimates from high water marks indicated a peak discharge of about 115 m³/s (4,000 cfs) on Harvey Creek and flows of about the same size (110 m³/s) on Newman and Strachan No. 2 (Charles) creeks.

However, there was no evidence of unusually high flows in Lone Tree Creek nor the creeks north of Harvey Creek or south of Strachan Creek (Russell 1972). *4)

Newman Creek blocked the highway with tons of debris. The highway bridge was buried under 3 m of mud, rock and stumps. Approximately 5,000 yd.³ (3,823 m³) of material was deposited against the bridge. Water gnawed at the lower part of a house and tore away 12-ft. (3.6 m) of land. Above the houses a new subdivision property, which was to be sold as lots, was partly buried in debris and a water intake pool wrecked (*The Province*, September 19, 1969). The peak flow at the outfall was estimated at 3,000 cfs (84.9 m³/s).

Crews worked 24 hours a day on the bridge replacement at Strachan (Charles) Creek and clearing rubble from Newman Creek bridge. Components for an 80-(?) foot (24 m) Bailey bridge for Strachan Creek had to come from all over the province. The Newman Creek bridge was reopened to traffic early on September 19. Highway department officials were hopeful to have the bridge at Strachan Creek replaced and the Squamish highway reopened by September 23.

*1) Record monthly precipitation occurred in the area for September 1969. Point Atkinson, Gambier Harbour, and Hollyburn Ridge had their wettest September on their 1968-1998, 1962-2002, and 1954-1995, respective records. It was the second wettest September in the 1924-1974 record for Tunnel Camp and the third wettest for Britannia Beach in its 1913-2000 record. (Egginton, pers comm).

*2) The community of Lions Bay began to be developed in 1957 during construction of Highway 99. Following completion of the railway and the highway in 1958, a number of residential subdivisions appeared, the principal being the now incorporated Village of Lions Bay (Jackson et al. 1985).

*3) Charles Creek is also referred to as Strachan-2 Creek or under its name residents use, Strachan Creek.

*4) According to an editorial, logging seemed directly responsible for the floods. A large clear-cut, stretching across most of the catchment area, may have intensified runoff that mobilised the main pulse of debris (Eisbacher 1983). Before 1968, Lions Bay residents asserted that Harvey Creek rose slowly after heavy rains and the water was mostly clear. After logging, the stream rose rapidly after rain and was muddied with debris. Also, creek levels were discernibly lower in mid-summer than they were before (*The Province*, September 23, 1969). Reid, Collins Associated Limited (1969) agreed that logging disturbance, bridge construction in the development area and the stream obstruction and deflection was attributed to land slippage in the upper reaches of the drainage. The slippage in the upper reaches and obstruction and deflection in the lower reaches were significant secondary causes (Reid, Collins and Associates Limited 1969).

December 10-14, 1969

(Storm surge/tidal flooding).

Discharge (m³/s): Max. daily: December 13: Kok.: 104; Nan. C.: 223; December 14: L. Qual.: 30.0; max. instant.: December 13: Nan. C.: 337;

Source: *Nanaimo Daily Free Press*, December 12, 1969; Environment Canada 1991.

Details: On December 11, a combination of high rain, high winds and high tides caused extensive damage in the Lower Mainland and eastern Vancouver Island regions. For the 36-hour period ending 6 a.m. on December 12, the Nanaimo Cassidy weather office recorded 3.15 in. (80 mm) of rain. In Nanaimo, low-lying parts near River Road were under 2 ft. (60 cm) of water. On December 12, Lantzville was hit by tidal flooding. The winds, which peaked on December 11 at 70 mph. (112 km/h), caused widespread power outages. Pounding waves damaged a resort at Metchosin, smashing

beach cabins and flooding the main residence's first floor. Near Nanaimo, the Yellow Point and ABC resorts also sustained damage.

December 26-29, 1969

Source: *The Daily News*, December 27 and 30, 1969.

Details: On December 26-27, a storm brought snow to southern British Columbia. Victoria recorded 6 in. (15 cm) and Vancouver 2 in. (5 cm). Snowslides closed the Southern Trans-Canada Highway between Salmo-Creston for at one day.

On December 30, the cold weather continued in the "snow-clogged Fraser Valley, strangled for almost two weeks by heavy drifting." In many areas of the province, schools closed; thousands of men were laid off outdoor work. On December 29, at least two deaths were linked to the cold weather. In the Matsqui area, a snowplow worked for 12 hours to clear drifted snow for 2 mi. (3.2 km) of road.

Late 1960s

Source: Evans, unpublished data.

Details: In the late 1960s, a massive debris avalanche occurred at Anglemont Estates on Shuswap Lake. By 1984, development of the slopes adjacent to the debris avalanche scar had taken place.

Ca. 1970

Source: Clague and Evans 1994 (p. 8).

Details: Around 1970, a landslide blocked the Kennedy River. The dam, which consisted of pre-Quaternary rocks, did not fail (Clague and Evans 1994).

September 23-24, 1970

Source: *The Kelowna Daily Courier*, September 28, 1970 *Victoria Times*, November 15, 1971; *Summerland Review*, September 24; October 1, 1992.

Details: During the night of September 23-24, an earthfall occurred in glaciolacustrine silt near Summerland in the Okanagan Valley. *1) The irrigation-induced event killed one man and injured his wife who had been trapped up to her chest in powder-like clay. The slide off the 200-ft. (60 m) high cliff had swept through their two-storey house. Though two walls of the main floor were swept away, the house remained standing. Earth and debris covered Lakeshore Drive along Okanagan Lake for a distance of 450 ft. (135 m). The slide spread 250 ft. (75 m) from the cliff towards the lake. A light truck was swept across the road, landing in the bedroom of another house. The occupant of the opposite house, which was extensively damaged, was not hurt. She described the slide as, "it sounded like an earthquake; there was dust everywhere." The entire house was pushed 10 ft. (3 m) towards the lake. Also damaged was a brand new house ready to be moved into the next week. The occupants of a hotel, which was seriously damaged, were evacuated.

The portion of the bank that slid down had been a point jutting about 50 ft. (15 m) out from the rest of the bank. A road foreman estimated the volume of the slide at 9,000 tons. The highway was expected to be cleared the next day.

*1) In 1982 in the same area, a slide did not cause property damage but the mudslide on September 16, 1992 caused \$200,000 damage. (*Summerland Review*, September 24; October 1, 1992).

December 5-6, 1970

(Rain-on-snow).

Source: *The Vancouver Sun*, December 7, 1970.

Details: Heavy rainfall melted snow and caused flooding throughout the Vancouver region. Vancouver recorded 1.86 in. (47.2 mm), close to a third of its average December total, and Abbotsford 2.56 in. (65.0 mm) of rain.

A snowslide near Boston Bar blocked the highway through the Fraser Canyon.

December 10-11, 1970

Discharge (m³/s): Max. daily: December 12: Cowich.: 107; max. instant.: December 12: Cowich.: 113.

Source: *The Vancouver Sun*, December 12, 1970; *The Campbell River Upper Islander*, December 16, 1970; *The Daily News*, December 11, 1970; Environment Canada 1991.

Details: Overnight December 10-11, an active weather system brought heavy rain and strong winds to the south coast of British Columbia. Winds up to 60 mph (96 km/h) and torrential rains hit Vancouver Island. Several ferry crossings between Tsawwassen-Swartz Bay were cancelled because of heavy seas. In the Victoria area, several minor power failures occurred. In Campbell River, several basements flooded due to backed up storm sewers and residents were forced from their homes. The heavy rain threatened a portion of the Island Highway just south of Campbell River until sandbags reinforced the pavement.

The storm also hampered the search for two Russian seamen missing on Muchalat Mountain near Gold River since December 7. Their bodies were found on December 11 about 100 yards (90 m) apart in Boulder Creek near the base of the mountain.

January 18-19, 1971

(Rain-on-snow and tidal flooding).

Source: *Victoria Daily Times*, January 19, 1971.

Details: Overnight January 18-19, a combination of high tides, high water level and warm temperatures causing a quick runoff of melting snow resulted the three rivers in the Cowichan Valley to flood. Traffic on Cowichan Bay Road (Koksilah River), Trunk Road at Duncan (Cowichan River) and Pensen's Corner at Crofton (Chemainus River) was detoured. All these roads were flooded at the bridges. According to Duncan RCMP at 3 a.m. on January 19, the water in Cowichan Bay was up to car doors.

According to North Cowichan municipal engineer John Sansom, the flooding was caused by the combination of a prolonged high tide and warm winds melting snow. The subsequent runoff, which could not get away, caused the flooding. At Beverly Street, pumps were used to keep the street drains working. *1)

In Duncan, the water level at the city pump house came up 2 ft. (60 cm) overnight but no flooding occurred. *2) On January 19 at 9:30 a.m., the morning high tide was 11.2 ft. (3.36 m). With the snow melted at the 1,500-1,600 ft. (450-480 m) level, the Cowichan River had no problem handling the runoff. *3)

*1) Mainly due to seepage, twenty homes in the Beverly Street subdivision flooded annually (*Victoria Times*, January 19, 1971). Poor drainage caused annual flooding in the Prevost (Duncan) and Beverly (North Cowichan) streets.

*2) During the previous year, the public works department had extended its secondary dikes down the river to the city's bad flood area at Campbell and Lee streets (*Victoria Times*, January 19, 1971).

*3) In 1968, was the last time the Cowichan Valley had experienced serious flooding.

January 23-25, 1971

Source: *The Hope Standard*, January 27; February 3, 1971.

Details: On January 23-24, the Hope-Princeton area received 3 ft. (90 cm) of snow. On January 23, the highway closed for six hours. Conditions were so bad that the snowplows and graders had to turn back. According to the Department of Highways, "It was snowing so hard, that they couldn't even

see the road.” On January 23, snow came down as far as 10 mi. (16 km) from Hope. On the afternoon of January 25, snow came down in Hope.

Early on January 29, three crewmen escaped when their locomotive of a 108-car train plunged 25 ft. (7.5 m) into the Fraser River. At 1:10 a.m. the train had hit a rockslide on the tracks 12 mi. (19.2 km) east of Lytton. Two diesel units and three empty freight cars left the track but only the lead engine ended up in the river. A crane was brought in to lift the half-submerged diesel engine out of the water. The track was reopened late on January 29.

February 12 and 15, 1971

Source: *Victoria Daily Times*, February 13, 1971; *The Hope Standard*, February 17, 1971; *The Vancouver Sun*, March 9 and 25, 1971.

Details: On February 12, a small landslide at 5094 Lochside, Saanich, buried a man to his waist for 15 minutes. Heavy rain has loosened the earth on the outside of a 60-ft. (18 m) bluff under which the victim had been doing excavation work. Saanich firemen freed the man at noon.

On February 15, a 40 ft.-(12 m) rock and mudslide at Boothroyd near Boston Bar derailed a CNR train. About 70 ft. (21 m) of track was ripped out by the slide. Four diesel locomotives and four cars of the 90-car freight train plunged 200 ft. (60 m) down a sheer rock face. Two other cars derailed but remained upright on top of the cliff. Three crewmembers in the lead diesel locomotive were killed. Their bodies were never recovered. A follow-up article in *The Vancouver Sun* states the men were “believed killed.” The engineer, fireman helper, and trainman were reported missing and presumed drowned. *1)

*1) At the time of the accident, the slide detection equipment was inoperative. It had been out of service since December 18, 1970. Severe winter weather caused many of these fences to become inoperative. Due to heavy snow in the Boston Bar area, repair crews had been unable to get at this fence. The Canadian Transport Commission later stated that even a properly functioning slide detector warning system could not have prevented the fatal accident. The investigation showed that special emergency brakes were applied by the crew only 73 ft. (21.9 m) before hitting the slide *The Vancouver Sun*, March 25, 1971). The detector consists of a series of wires running along each side of the track. Debris falling on the wires automatically pulls a plug and then activates a warning light. This should appear about 1 mi. (1.6 km) ahead of the slide and continue to flash every two seconds until the line is clear (*The Vancouver Sun*, March 9, 1971).

May 12-13, 1971

(Spring runoff/flooding).

Source: *The Vancouver Sun*, May 14, 1971; *Daily Colonist*, May 15, 1971.

Details: Early on May 13, flooding virtually cut off about 100 residents of Anglemont, north of Salmon Arm. Debris in the rain-swollen Ross Creek swept away part of the debris- and log-jammed bridge 3 mi. (4.8 km) west of Anglemont, cutting the only road link with the outside. To prevent widespread flooding, Highway Department workers dismantled the remains of the wooden bridge. Residents appealed to the highways department to divert the Sicamous ferry, a two-hour trip, so they could get their vehicles out until the Ross Creek bridge would be replaced.

In the Nelson area, rain turned rivers and creek into boiling torrents. On May 13, on Highway 3A the main bridge over Duhamel Creek 6 mi. (9.6 km) washed out. At Salmo, the elementary school was evacuated when the Salmo River washed out the approaches to a bridge.

On the night of May 12, a 300-ft. (90 m) mudslide between Nakusp-Fauquier knocked out telephone lines to Burton on the Arrow Lakes. It also undermined Highway 3A at Seventeen Mile, causing trees to fall on telephone lines, temporarily cutting service to Balfour and Duncan Lake.

One man drowned in the Similkameen River near Cawston, about 30 mi. (48 km) south of Penticton after he and his horse foundered.

May 17, 1971

Source: *The Vancouver Sun*, May 18, 1971.

Details: On May 17, a PGE employee was killed when his speeder jumped the track and plunged over an embankment 1 mi. (1.6 km) north of Horseshoe Bay. The speeder was believed to have hit either a plank or a rock.

June 4, 1971

Source: *The Vancouver Sun*, June 4, 1971.

Details: On June 4 at about 1:15 a.m., a slide came down 9 mi. (14.4 km) north of Lytton. Two people were killed and five others injured when three vehicles drove into the hole created by the slide. The gaping fissure left after the rain-saturated clay bank collapsed and swept the road away was 40 ft. (12 m) deep. Traffic was rerouted via a long detour. Highway crews expected to have an alternate route open later on June 4.

October 3, 1971

(Dam burst/flooding).

Source: *The Vancouver Sun*, October 4, 1971.

Details: On October 3, the Capilano River swollen by recent rains cut through earth dike in Capilano Park. It halted the construction on a \$1.2 million federal fisheries fish hatchery project below Cleveland Dam. At about 8 a.m., the water started rising at about 1 ft. (30 cm) an hour. At about noon, the water in the channel started gushing through the north end of the dike. Project superintendent of the primary contractor Ben Creviston said a 1,000-Gallon (4,500 L) oil tank was "taken away just like a cork." About 16 workmen were sent home. To allow an excavation on the other side to fill with water, pumps were shut down. It was hoped that this would allow water pressure to equalise and prevent the complete erosion of the dike. The excavation rapidly filled with muddy water to a depth of some 16 ft. (4.8 m), flooding a quantity of equipment, including a truck and drill rig, a compressor and six pumps.

According to fisheries department regional director Rod Hourston, the mishap was "a real disappointment." If the project of 10 rearing pools and a waste control installation could not be completed by April 1972, the fate of a million young salmon would be in doubt. The hatchery had 200 Coho salmon ready to spawn.

November 13, 1971

Source: *Victoria Times*, November 15, 1971.

Details: Early on November 13, a debris and rockslide came down from a steep silt bank along Okanagan Lake north of Penticton. The slide blocked Highway 97 up to 20 feet (6 m) deep in spots. There were no injuries. It took department of highways crews all morning to clear the two-lane thoroughfare. *1)

*1) It was the largest slide in the area since 1970, when a man lost his life when a slide buried his house at Summerland.

December 7-8, 1971

Source: *Victoria Times*, December 8 and 9, 1971; February 16, 1972.

Details: Overnight December 7-8, snow, torrential rains and gale-force winds hit Victoria and parts of Vancouver Island. The fast moving storm tapered off as it moved into the Fraser Valley. By the morning of December 8, 6 in. (15 cm) of snow had fallen at the Vancouver airport. On Vancouver Island, the snow snarled traffic, cancelled commercial flights and caused power outages. Trees falling on power lines caused outages early on December 8 in Sooke, Saseenos, Colwood and Langford. Residents were without power between 6 a.m.-10 a.m. Power outages occurred late on December 7 in Victoria in an area within Government, Douglas, Herald and Bay streets. Parts of

Blanchard, Queens and Victoria West were also affected. Power interruptions also occurred in the Ardmore-Saanich Road areas, on McTavish Road near the airport and at Brentwood. During the storm on December 8, the Saanich public works department handled about 300 complaints about flooded basements and driveways. Flooded drains, basements and backed up septic tanks, caused the biggest problems. Interurban was a real trouble spot.

The overnight snowfall ranged from 5 in. (12.5 cm) in Ladysmith to over 16 in. (40 cm) on the Old Lake Cowichan Road. Up-Island communities reported snow up to 1 ft. (30 cm) deep. Heavy snowpacks were reported on the Malahat and the new Cowichan Highway. Greater Victoria escaped relatively unscathed with only a few inches of snow. Meanwhile over 700 loggers who had been idled by the snow were expected to return to work as the weather cleared.

December 17, 1971

Source: *The Province*, December 18, 1971; *The Hope Standard*, December 22, 1971.

Details: On December 17, lower temperatures produced 2 in. (50 mm) of rainfall in the Hope area. Some roadways in the lower Fraser Valley were partially flooded.

On December 17 at 5 a.m., a snowslide came down from a bluff near Flood, 9 mi. (14.4 km) west of Hope. The Trans-Canada Highway was blocked for seven hours by the 200-ft. (60 m) wide slide, which was up to 10 ft. (3 m) high in places. It caused a traffic back up for miles until it was cleared at noon. The slide also temporarily blocked the CNR mainline but was easily cleared.

Later on December 17, Highway 3, 9 mi. (14.4 km) east of Hope was blocked for more than three hours by trucks that jack-knifed on slippery pavement. On December 17, snowslides blocked traffic on the southern Trans-Canada Highway between Salmo-Creston twice.

June 1971-September 1973

(Glacial outburst flood/debris flow).

Source: Blown and Church 1985; Clague et al. 1985; Evans and Clague 1994 (p. 118); Clague and Evans 1994 (p. 14); Trenhaile 1998 (p. 83).

Details: Sometime between June 1971-September 1973, Klattasine Lake in the Klattasine Basin in the southern Coast Mountains drained suddenly. The rapid debris flow was triggered by the sudden release of about 1.7 million m³ of water from moraine-dammed Klattasine Lake, a tributary of Homathko River just downstream from Waddington Canyon. The escaping waters breached the moraine. Large quantities of sediment were mobilised in the valley below the lake. The generated debris flow traveled in one or more surges 8 km to the mouth of Klattasine Creek. There the flow deposited a sheet of coarse bouldery debris up to 20 m thick that temporarily stemmed the flow of Homathko River (Clague and Evans 1994).

The moraine, which blocked the outflow from the 1,640-m elevation lake, was breached to bedrock, thereby releasing the water stored in the lake. The released flood, which created a debris flow that scoured the bottom 10 m of both sides of the Klattasine Creek valley. Fresh scars and eroded surfaces along the path of the flood indicated that it picked up glacial and colluvial deposits as it traveled down the tributary and Klattasine Creek. Organic deposits in a meadow on the second step below the source lake were scoured out, creating a pond. It deposited a fan extending across the Homathko River and some distance down the channel.

Clague et al. (1985) have estimated, from surveys conducted by BC Hydro personnel, that about 2 million m³ of debris from Klattasine Creek was deposited in the confluence area of Klattasine and Homathko rivers. The fan deposits contain boulders to about 4 m diameter and a large number of logs and other forest debris. Small alders growing on the fan in 1985 suggest renewed disturbance since 1973.

In a later paper, Evans and Clague (1994) estimate that the moraine breached by the escaping waters mobilised an estimated volume of 2-4 million m³. This sediment traveled in one or more surges 8 km to the mouth of Klattasine Creek. Here, the flow deposited a sheet of coarse

bouldery debris up to 20 m thick that temporarily stemmed the flow of Homathko River. Local historians report the Homathko River flow to have stopped for four days. Prior to the debris flow, Homathko River was navigable for some 600 m upstream into Waddington Canyon, suggesting that sediments delivered from Klattasine Creek already had blocked and controlled the level of the much larger river. *1) (Blown and Church 1985).

*1) Since the historic Waddington Road remained intact on an adjacent riverine flat, such flooding would have predated the late 19th century (W.H. Mathews, pers. comm. In: Blown and Church 1985). Mature forest on old debris fan deposits suggest that prior flows were more than 300 years old (Clague et al. 1985).

1972

Source: Ministry of Energy, Mines and Petroleum Resources 1993.

Details: In 1972, the Thuya Creek landslide near Little Fort removed much of the roadway of a highway.

January 20-24, 1972

(Ice storm and rain-on-snow).

Source: *The Vancouver Sun*, January 21 and 22, 1972; *The Chilliwack Progress*, January 26, 1972; *Victoria Times*, January 21 and 24, 1972; *The Daily Colonist* January 23, 1972; *The Daily News*, January 25, 1972; *Times Colonist*, October 1, 1986; February 12, 1987; Wilson and Wilson 1998 (pp. 182-184).

Details: On January 20, British Columbia was hit by “one of the worst winter storms in history.” The “silver thaw” of 1972 almost hit the same date as the great ice storm of 1935 (January 21, 1935). Weather conditions created a combined total of 2.5 in. (6.25 cm) of ice during most of January 20. On January 21, *The Vancouver Sun*'s headline read “Snow storm isolates southern B.C.” It was probably the greatest weather disaster BC Hydro had ever faced. The storm cut off the main power supply to the Lower Mainland and Vancouver Island, causing a critical shortage of electricity. Both the 500,000-V transmission lines from the Peace River power station and the two 360,000-V lines from the Bridge River generating station were knocked out.

The Upper Fraser Valley and Squamish-Pemberton areas were hit by the worst ice storm in at least 20 years. The severe icing, snowslides and fallen trees also closed the Squamish to Pemberton highway. Near Squamish, the 500,000-V Peace River transmission line was damaged. East of Agassiz, snow downed eighteen transmission towers across Seabird Island. During severe icing conditions several line towers were toppled on January 20. East of Agassiz, the ice brought down four towers on the Peace River powerline. Transmission towers, carrying 27,500,000-V from the Peace River area, came down on Seabird Island at a replacement cost of \$50,000 each. Labour cost in the Chilliwack area alone for repairing distribution lines was well over \$150,000. Following the destruction of the main transmission lines on Seabird Island, power had to be imported from the south. Extensive damage to the second transmission line from the Peace River power project kept that line out of service indefinitely.

The BC Hydro and Power Authority was worried about the power supply to the Lower Mainland and Vancouver Island areas. BC Hydro appealed to companies and householders to conserve power during peak periods. The Lower Mainland and Vancouver Island customers operated largely on power borrowed from U.S. utilities. Power was routed from the Bonneville power system in the U.S. and two thermal power generating stations were brought into service on the Lower Mainland. In the upper valley at Chilliwack, Sardis, Rosedale, Agassiz, Harrison, Cultus Lake and other points, schools were closed and businesses shut down when the power went off. The Chilliwack and Sardis areas were completely blacked out. The power situation remained critical for a week but the public and bulk customers responded by reducing their electricity. Eight days after the storm, links with the Peace were partially restored (Wilson and

Wilson 1998). Damage to BC Hydro facilities on account of the ice storm that hit the Chilliwack-Agassiz area was estimated at well over \$1.5 million.

BC Tel had 210 men from many areas in the Lower Mainland working on restoring telephone service. By January 26, still an estimated 900-950 homes in the Chilliwack area were without service. During the peak of the storm, about 4,000 customers had been without service and some 1,200 customers without cablevision service as a result of the storm.

By January 21, a 45-mph (72 km/h) warm "chinook" wind with higher gusts started blowing out of the south. Late on January 23, power was restored to most areas in the Chilliwack-Agassiz-Rosedale-Cultus Lake area. Chilliwack dairymen were hard hit by the power failure. A few days later, high winds knocked some services out again. Facing a second round of blackouts, milk dumping and machine inactivity was reported. The "silver thaw," the worst since 1935, also hit the Fraser Valley farms from Abbotsford to Hope. The freezing rainstorms overnight January 23-24, knocked down trees and powerlines and made roads treacherous to drive. RCMP described the overall situation in the upper valley as "grim."

On Vancouver Island, rain caused a previous heavy snowfall to melt. On January 18, heavy rain and melting snow caused Cowichan and Koksilah rivers to flood their banks. On January 20, three vehicles had to be pulled out of flooded portions of the Cowichan Bay Road. Traffic was diverted to the alternate Cowichan Bay route. Cowichan Bay Road was closed after floodwaters from Koksilah River covered the road up to 4.5 ft. (1.35 m) for almost 1 mi. (1.6 km). Though bridges on Trunk and Old Koksilah roads were flooded, these were not closed. Along Beverly Street, lawns and driveways were also under water. On Prevost Street, all lawns and driveways were flooded up to 27 in. (67.5 cm). *1) Residents of 10 homes blamed the city for the lack of protection from flooding. One resident noted, "We have no ditch drainage, blacktop on the road and no sidewalks." As it is near the flooding Somenos Creek, the street has extremely poor drainage.

The recent heavy rainfall in the Colwood area caused water to back up through inadequate ditches into Fisher's Pond at the back of Martin Shire's car repair shop, 2752 Sooke Road. The back of this property, land reclaimed by landfill, was gradually sinking. Though the water had dropped 4 in. (10 cm) it was still 1 ft. (30 cm) deep. The estimated damage to several motors and generators on the shop floor was estimated at \$3,000. According to Shire, larger 40-in. (100 cm) culverts would be needed to replace the 24-in. (60 cm) culvert under Sooke Road and the 14-in. (35 cm) one under Glen Lake Road *2)

The heavy snow and subsequent slides cut the road and rail links with the rest of Canada. The only exception was a single lane on the Hope to Princeton highway. For towns in the Fraser Canyon between Hope-Boston Bar the only communication with the outside was via ham radio. The Hope and Yale phone links were also knocked out. According to a highway's official, at Boston Bar the snow came down overnight January 21-22 at a rate of 5 in. (12.5 cm) an hour. Drifts on the Trans-Canada Highway between Boston Bar-Hope reached 50 ft. (15 m). Cars and trucks were strung out along the highway for 10 mi. (16 km) south of Boston Bar. Highway crews and RCMP shuttled over 100 people into Boston Bar. Five people were rescued from the Sailor Bar tunnel, 5 mi. (8 km) north of Yale. A slide 50 ft. (15 m) deep and up to 1.5 mi. (2.4 km) long trapped them. This slide, which blocked both ends of the tunnel, came down at 11:30 a.m. on January 24. At Hope, dozens of transport trucks were parked, waiting for the Hope to Princeton highway to reopen. One driver estimated more than 70 transports were stalled. Many of the drivers left the vehicles and caught a bus back to Vancouver.

Slides on the CNR rail line were "coming down as fast as they could be cleared." Near North Bend close to Yale, the CPR line was blocked by a series of slides along a 29-mi. (46.4 km) stretch. East and west of Revelstoke, three large snowslides blocked the CPR line. The area received more than 3 ft. (90 cm) of snow on January 20 and 21. Passengers on CPR's transcontinental *Canadian* train were delayed for over 48 hours. Being snowbound in the canyon delayed the train repeatedly for up to 20 hours at a time. CNR had two westbound trains with some 700 passengers stuck at Kamloops and an eastbound train with 293 people waiting in Vancouver.

A mudslide blocked the Burlington Northern line at Ocean Park near White Rock.

On January 25, colder temperatures stabilised the unsteady snowpack, lessening the threat of slides. On that date the Trans-Canada Highway through the Fraser Canyon and the Rogers pass was still closed.

*1) After heavy rainfall drainage from Glen Lake backs up into Fisher's Pond through a ditch from Sooke Road to near Hazelwood Road. In 1967, after similar flooding occurred, Shire wrote to the Capital Regional Board and his local MLA asking for a ditch to be built, 400 yd. (360 m) long connecting the Bilston Creek improvement ditch along Hazelwood and Penwood roads to join the ditch coming from Laxton Road (*The Daily Colonist*, January 23, 1972).

Metchosin had been neglected in past Bilston Creek floodplain studies because the creek merges with Metchosin Creek just inside municipal boundaries and no studies of Metchosin Creek had been commissioned. In 1986, Metchosin councillors decided to join with Colwood, Langford and the Capital Regional District in a Bilston Creek study to make sure consultants consider the problems on the creek inside Metchosin (*Times Colonist*, October 1, 1986). See also: *Times Colonist*, February 12, 1987.

February 15-16, 1972

Source: *Victoria Times*, February 16, 1972; *The Vancouver Sun*, March 2, 1972.

Details: Overnight February 15-16, "one of the worst storms of the winter" hit Greater Victoria and Vancouver Island. At the height of the storm just before midnight, southwesterly winds were blowing at 45 mph (72.4 km/h) with gusts up to 65 mph (104.6 km/h). In the 24 hours ending 4 a.m. on February 16, Victoria recorded almost 1 in. (25 mm) of rain. About half that amount fell in a six-hour period starting 10 p.m. on February 15, causing flooding problems.

Overnight rain-swollen Bowker Creek weakened the old Richmond Road bridge. The rushing water scoured out the creek bed undermining the old piers on both sides of the bridge. A huge chunk of masonry was swept several yards downstream. A 20-ft. (6 m) section of the road cracked open and subsided several feet. As the whole bridge structure sagged, a 4-in. (10 cm) BC Hydro gas line was fractured and posed a threat to local residents. As city engineers started erecting a temporary girder bridge traffic was rerouted. There was some speculation that the structure could have been weakened in recent months by trucks used on a condominium construction site on the east side of Richmond a few yards from the bridge. *1)

Elsewhere, the storm caused flooded basements and power outages. Henderson near the Uplands Golf Club was badly affected by flooding. Saanich public works reported many complaints about flooded basements and driveways. But according to an official, the general situation was "nowhere near as bad" as the December 8, 1971 storm.

The high winds blew trees on hydro and telephone lines also disrupting services in the Cowichan valley. Power cuts occurred overnight in the Mount Newton Cross Road district of central Saanich, Sidney, Swartz Bay, Deep Cove, Sooke, Sassenos, Port Renfrew and Jordan River.

The heavy rain caused the Koksilah River to back up and flood the Cowichan Bay Road.

The area between Scott Road, King George Highway, 110th Avenue and Old Yale Road suffered reoccurring flooding. Dan Dowes, owner of Bamford Boats Ltd., Scott Road and Jack Morham of 12428-110th Avenue told Surrey municipal council though the heavy flood season for this year had not yet started, they had already been flooded out nine times so far during the current year. Dow noted that with 10-18 in. (25-45 cm) of water four or five days at the time on the floor of his premises he was unable to carry out his business on the South Westminster flats. *2)

*1) Although the Victoria-Saanich boundary runs down the middle of Richmond, under an agreement between the municipalities the city has responsibility for the road (*Victoria Times*, February 16, 1972).

*2) The responsibility for the flooding problem was disputed between the municipality and the dyking commission. Mayor Bill VanderZalm was expecting verification from Victoria about a \$40,000 scheme to repair the dikes in this area.

February 19, 1972

Source: *The Province*, February 24, 1972.

Details: On February 19, a freight train derailed at Fisherman's Cove. Following the derailment the line was cleared. On the night of February 22 at about 11 p.m., a two self-powered unit PGE passenger train derailed 6 mi. (9.6 km) north of the derailment on February 19. The front wheels of the first unit jumped the tracks after nosing into a slide that had fallen a few minutes previously. A patrol unit a few minutes ahead of the southbound train running about two hours late had passed the spot before the slide came down. According to a PGE spokesman, it was raining in the area at the time and weather conditions caused the slide.

Following the second derailment in a week, PGE defended its record. The PGE spokesman said that despite its rugged terrain the railroad still had less frequent derailments than many others did in North America. He reiterated that the PGE had a good track record borne out by the fact that it is insured for only \$100,000 deductible compared to \$1 million for most railroads.

February 27, 1972

Source: *The Vancouver Sun*, February 28, 1972; *The Daily News*, February 28 and 29, March 1, 3, 6, 7 and 29, 1972.

Details: On February 27, southern British Columbia was hit by "one of the worst storms of the winter." Vancouver Island bore the brunt of the storm with 80-mph (128 km/h) at times. Winds in the Lower Mainland averaged 40 mph (64 km/h). In the Victoria area, at least 25 powerpoles came down. Power blackouts occurred in Nanaimo, Ladysmith, Victoria and Qualicum, as well as Surrey, Burnaby, Port Coquitlam, Squamish and the Lower Fraser Valley. Transportation and communications were disrupted on Vancouver Island and the Lower Mainland. A falling tree killed a motorist near Ladysmith while slides marooned 20 others.

Rising temperatures caused new slides, briefly trapping motorists and closing the Fraser Canyon highway. Starting February 27, about 15 slides came down across the Trans-Canada Highway in the Fraser Canyon. Telephone service was disrupted in the area and rail traffic on the CNR line stalled by snow, which buried the track 22 mi. (35.2 km) west of Kamloops.

March 5, 1972

(Fatal avalanche).

Source: *The Vancouver Sun*, March 6, 7, 8 and 11, 1972; *The Province*, March 10, 1972; Stethem and Schaerer 1979 (pp. 69-70).

Details: In the 24 hours ending 10 p.m. on March 5, Hope received a near-record 4.14 in. (105.2 mm) of rain. A record 3 in. (75 mm) fell on Abbotsford but only 0.87 in. (22.1 mm) was recorded in Vancouver.

On March 5 about 1:30 p.m., an avalanche in the Coast Mountains killed three occupants of a half-ton truck en route to the Giant Mascot Mine about 7 mi. (11.2 km) north of Hope. Earlier that morning, a bus carrying the crew to the mine returned to Hope when an avalanche at km. 5.5 blocked the mine access road. A bulldozer cleared the road and a pick up truck with three men followed it. The truck waited in safe areas while the bulldozer worked on the snow deposits. During one of the moves between safe spots the truck was hit by an avalanche at km 6.3, burying it completely. The bulldozer operator who observed the incident was unable to turn around his machine on the narrow road. As he did not carry a snow shovel, he had to walk to the mine for about 1 km to get help. About two hours after the avalanche struck, the bodies were recovered. The truck was heavily damaged and the occupants, who were completely encased in snow, had died of carbon monoxide poisoning. The

snow had packed so tightly around the driver that he had been unable to turn off the ignition. According to Herb Swain of Hope Search and Rescue Group, the slide was “pure snow about 18 or 20 ft. (5.4-6 m) deep. If you stood on the truck’s roof and held a shovel as high as you could, you’d just about be at the top of the slide.”

Heavy snowfall followed by high temperatures with rain caused the avalanche. About 70 cm of fresh snow was observed at the mine and heavy rain fell on March 5. Kawkawa Lake near Hope recorded 80 mm of rain and a maximum temperature of 4 ° C. The avalanche started about 100 m above the road at an elevation of about 700 m, removing about 100 cm of deep snow on the surface of the snow cover. The total depth of the snow cover was greater than 2 m. The average incline of the track was 40 degrees. The wet avalanche snow covered only about 20 m of the road to a depth up to 10 m. The snow bank at the edge of the road had stopped much of the snow, contributing to the deep deposit (Stethem and Schaerer 1979).

The slide was one of several in the Hope area as almost 3 in. (75 mm) of rain fell in a 24-hour period up to 7 p.m. on March 5. Earlier that day, both the Trans-Canada Highway and the CNR line through the Fraser Canyon were closed. Early on March 5, slides blocked the CNR tracks about 20 mi. (32 km) west of Boston Bar. The line was reopened early on March 6. The west bound CNR *Super Continental* was turned around in Kamloops. Passengers were airlifted. On March 5 around 11 a.m., slides blocked the highway between Boston Bar-Yale. It would remain closed “indefinitely.” Most of March 6, traffic through the Fraser Canyon was restricted to one lane until 4 p.m. in aftermath of the weekend snowslides. Both CNR and CPR managed to reopen their lines on March 6. Both east and westbound CNR passengers were still flown to and from Kamloops on that day.

On the night of March 6, a rockslide on the Jackass Mountain section of the Trans-Canada Highway hit a southbound camper truck. The vehicle with its three occupants was picked up by the tumbling rock and carried about 30 ft. (9 m) on top of the slide. Miraculously, nobody was hurt and the truck was only slightly damaged. The slide spread rock 8 ft. (2.4 m) deep across the highway. Within an hour at 10 p.m., a second, larger slide came down at the same location. Rain and wet snow were falling when the slides came down.

On March 7 at 1:30 a.m., a second slide came down onto the Trans-Canada Highway 12 mi. (19.2 km) north of Boston Bar on the west side of Jackass Mountain. It crushed a highway department truck, missing the driver by 10 ft. (3 m). It measured a length of 300 ft. (90 m) and a depth of 40 ft. (12 m). According to geologist Bruce McLeod, with an estimated volume of 30,000 tons it was the “biggest since the Hope Slide.” “It looked like a waterfall. The funny thing was, I didn’t hear a thing.”

It took Highway crews till the evening of March 10 to clear the giant slide at Jackass Mountain. They had to work carefully because of the loose rock. Using three bulldozers and two front-end loaders all the rock, about 15,000 yd.³ (11,500 m³) had to be trucked several miles and dumped. During the clearing more rocks were coming down from the 300-ft. (90 m) cliff above the highway. The slide did not affect the CNR line between the road and the Fraser River.

March 17, 1972

Source: *The Province*, March 18, 1972.

Details: On March 17, slides blocked traffic in the Rogers Pass and the Hope to Princeton highway. East of Revelstoke, an avalanche damaged a snowshed, blocking the CPR line at least till noon on March 18. Trains were rerouted over CNR tracks. On March 18, the blocked highways were reopened. A new slide blocked the CPR line.

March 20, 1972

Source: *The Province*, March 22; April 19, 1972; *The Fernie Free Press*, March 22, 1972; *The Vancouver Sun*, March 24; April 19, 1972; Harrison 1973.

Details: On March 20 at 1 p.m., a thaw-induced debris flow of coal waste dump 3.5 km southeast of Michel killed three Blairmore brothers. A fourth man, buried to his waist in mud escaped with

numerous injuries. The victims, members of a CPR maintenance crew, were having lunch beside the CPR track when the slide of mud, water, rocks and trees struck along the CPR tracks. The men were swept over a bank into a gully. A nearby parked D-6 Cat was carried about 150 ft. (45 m) down. The first body was recovered on March 21 after a 24-hour search. Digging for the bodies of his two brothers continued until nightfall on March 21. Because of continuing danger of new slides rescue operations were interrupted until daybreak next day. The slide, which was 250 ft. (75 m) wide and about 4 ft. (1.2 m) deep twisted about 300 ft. (90 m) of track.

During a coroner's inquest into the cause of the slide, it was recommended that CPR have a supervisor in attendance at all times when heavy equipment is required to keep the tracks cleared. The cause of the slide was blamed on adverse weather conditions and excessive moisture (*The Province*, April 19, 1972). The probable cause was the unusually heavy spring runoff from melting snow causing water trapped by mine refuse to gather in old mining pits. Water may have backed up behind the mine refuse and then released (Harrison 1973). *1) According to the coroner's jury, water had filled an abandoned pit about 500 yd. (450 m) above the section of CPR mainline (*The Vancouver Sun*, April 19, 1972).

On the afternoon of March 21, two families at Sparwood were evacuated when a slide came down within 100 ft. (30 m) from their Elk Valley Road homes. *2) The slide, 75 yd. (67.5 m) wide and in places several feet deep, came down about 0.25 mi. (400 m) from the Elk Valley turnoff. The Crows Nest Industries logging road was covered and partially carried away. The CPR tracks to Kaiser's coal preparation plant were undermined.

*1) No mining had been done in the area since the early 1950s. Kaiser Resources crews had previously diverted water from the pits but one of the pits still contained about 15 ft. (4.5 m) of water (*The Fernie Free Press*, March 22, 1972).

*2) About two years earlier, a slide occurred in the same area causing temporary evacuation of some families (*The Fernie Free Press*).

Late March-early April, 1972

Source: *The Vancouver Sun*, March 28; April 4, 1972; *Kamloops Daily Sentinel*, March 29, 1972; *The Daily News* (Nelson), April 4, 1972.

Details: Late March near Vavenby, about 90 mi. (144 km) northeast of Kamloops, a mudslide apparently loosened by recent rains and melting snow plunged from a clay bank above the tracks onto the CN mainline. It covered a 400-ft. (120 m) stretch to a depth of 10 ft. (3 m). As it came around a curve, a westbound CNR Supercontinental passenger train hit the slide. Three diesel units, and the mail and express baggage cars derailed but none of the passenger cars left the tracks. One diesel unit came to a stop 100 ft. (30 m) down an embankment with the front of it touching the North Thompson River and burst into flames. Two crewmembers were injured. The line was expected to be cleared later on March 28. The remainder of the train was pulled back to Avola. Six Greyhound buses ordered from Cache Creek carried 243 passengers to their destinations as far as Vancouver.

On April 1, some 200 tons of clay dislodged from a high clay bank above the Columbia River near Edgewater in the East Kootenay. It came down onto the tracks of the Windermere subdivision of the Kootenay Central Railway. Three boys noticed the slide by dust rising near the railroad track. They flagged down an oncoming southbound freight train, which lead diesel buried itself about 10 ft. (3 m) into the clay and mud. The slide, 125 ft. (37.5 m) long and up to 15 ft. (4.5 m) deep, displaced 150 ft. (45 m) of track. It took two bulldozers and two front-end loaders 12 hours to clear.

April 8, 1972

(Fatal avalanche).

Source: Stethem and Schaerer 1979 (pp. 71-75).

Details: On April 8, an avalanche on Whistler Mountain killed four skiers. At 6:10 p.m. two skiers were reported missing while at 7:30 p.m. two more skiers were reported missing. At 2:40 p.m. the four skiers had last been seen at the top of the Alpine T-bar. Despite an intensive search, which included three helicopters and two RCMP search dogs, the victims were not found till the afternoon of April 10. The bodies were all buried about 1.2 m below the snow surface, face down, heads downhill, in a line across the hill, separated from each other by about 2 m. They were located by one of the search dogs, once again proving a dog to be the most effective in finding buried victims.

The avalanche, which was unobserved was probably caused by a short heavy snowfall accompanied by extremely strong wind. In the afternoon a snow squall dropped 10 cm of snow in one hour on the alpine region, obscuring all old tracks above the treeline. The skiers themselves probably triggered the avalanche. It had fractured at an altitude of approximately 1,870 m, with an estimated depth of 1 m in the wind deposited snow. The dry soft slab ran in an unconfined manner with a width of approximately 50 m over 80 m vertically. The slope with a northwest aspect had an approximately 35-degree inclination in the starting zone. The deposit had a maximum depth of 1.5 m and was of a uniform consistency, only just firm enough to allow walking over the surface.

Prior to April 8, the following avalanches were observed. On April 5, medium sized occurrences took place on northwest to northeast indicator slopes, closing the alpine region in the morning due to high winds. On April 6, medium sized occurrences were noted on northern indicator slopes. Attempts to control the Alpine T-bar area were abandoned. On April 7, medium sized controlled avalanches occurred on northern and northeastern slopes. On a northeastern slope that had infrequent occurrences a large controlled avalanche occurred (Stethem and Schaerer 1979).

May 12-16, 1972

(Spring runoff/flooding).

Source: *The Vancouver Sun*, May 13 and 16, 1972; *The Daily Colonist*, May 14, 1972.

Details: In the middle of May, hot weather in the interior caused an early snowmelt and runoff. The Fraser River continued its sharp rise reaching 15.49 ft. (4.65 m) at the Mission bridge on May 16. This was 2 ft. (60 cm) higher than the level for the same date in 1948. The river's runoff volume in May was close to the May 1 to May 15 levels in 1948. *1) On May 15, cooler temperatures were reported from the interior.

Overnight May 12-13, melting snow caused the Similkameen and Tulameen rivers to rise 15 in. (37.5 cm). Flooding closed three highways. Early on May 13, Highway 5A between Princeton-Merritt closed due to and overflowing culvert spilling water and debris on the road. Also closed were the Osprey Lake Road to Summerland and the road from Princeton to Coalmont.

*1) The 1972 Fraser River runoff was somewhat faster than the pattern of the disastrous flood of 1948. In 1948, the river rose steadily from a May 15 level of 11.94 ft. (3.58 m) to go over the 20-ft. (6 m) mark on May 26. It remained above the 20-ft. mark at Mission for the next 32 consecutive days (*The Vancouver Sun*, May 13 and 16, 1972).

May 26, 1972

Source: *The Province*, May 29, 1972.

Details: On May 26, a mudslide 26 mi. (41.6 km) east of Hope closed the Hope to Princeton highway. The 4-ft. (1.2 m) deep slide covered a 100-ft. (30 m) stretch of highway. On May 28, the highway was reopened to two-lane traffic.

May 29-June 17, 1972

(Spring runoff/flooding).

Source: *The Vancouver Sun*, May 30 and 31; June 2, 3, 13, 14, 15, 16 and 17; August 8; December 28, 1972; February 17, 1983; *The Chilliwack Progress*, June 7, 14 and 21, 1972; *The Daily Colonist*, June 11, 1972; *The Daily News*, June 16, 1972; *Kamloops Daily Sentinel*, May 29, 30 and 31; June 1,

2, 3, 5, 6, 7, 8, 9, 12, 13, 14 and 15, 1972; *Victoria Times*, February 15, 1973; *Revelstoke Review*, June 15, 1972; *Alberni Valley Times*, December 17, 1979; Andrews 1993 (pp. 48-51); Environment Canada 1991; Fraser Basin Management Board 1994 (p. 35 and 54); B.C. Water Resources Service, 1972 Annual Report, pp. Y13-Y14.

Details: During the first two weeks of June, a significantly high spring runoff caused the “Fraser Valley’s worst flood scare in 22 years.” Fraser River at Mission peaked at 7.1 m. The dyking systems were generally effective in preventing large-scale damage. The total bill for flood damage in the Interior and West Vancouver was expected to be between \$6-7 million (*The Vancouver Sun*, August 8, 1972). The Fraser River flood damage for 1972 eventually amounted to some \$10 million, or \$33 million in 1991 dollars. The bulk of this damage was caused in upstream communities like Prince George and Kamloops, and the Surrey area of the lower Fraser Valley (Andrews 1993). *1)

The maximum daily discharge of the Fraser River at Hope was 457,000 cfs (12,941 m³/s), which is the second highest on record. It was only surpassed by the recorded peakflow at Hope in 1948 of 536,000 cfs (15,178 m³/s) and an estimated discharge of 620,000 cfs (17,557 m³/s) in 1894 (B.C. Water Resources Service).

The scale of the June 1972 runoff can be measured by the fact the height in the Thompson River system actually exceeded the 1948 level. At Prince George the Fraser River peaked just under the 1948 peak. The closure of the spillways on the Kenny Dam and the curtailed flow from the Bridge River system are believed to have made the difference. Peak flow on the Fraser River at Hope is thought to have occurred early on June 16 when at 8 a.m. with a discharge of 459,000 cfs (12,998 m³/s).

On May 29, the Thompson River at Kamloops continued to rise. On May 31, the river rose 1.2 ft. (36 cm) in 24 hours. It reached 1,128.1 ft. on the gauge at Riverside Park, 0.9 ft. (27 cm) below the flood alert stage. By May 31, an estimated 20-21% of the Thompson River runoff (snowmelt) had occurred. If the warm weather continued, the remaining runoff was expected to come down within the next seven days. According to the water rights branch, when 25% of the snowpack is gone, usually the runoff could be considered to have reached its peak. In Matsqui, several homes outside the dyked area at Glen Valley began to flood, but the dykes themselves were in good condition.

Late on May 30, the Fraser River at Mission reached 19.85 ft. (5.96 m) and at Prince George just over 28 ft. (8.4 m). On May 30, after the Fraser River rose 19 in. (47.5 cm) in two days, foot patrols began a 24-hour watch on the Fraser River dyking system. On May 31 at 8 a.m., the water level at the Mission gauge reached 20.4 ft.

One of the hardest hit areas was the Similkameen Valley and its tributaries, where recorded flows were exceeded and losses were significant. On the night of May 30, Hedley (Twenty Mile) Creek went on the rampage. Three homes at Hedley were swept away and smashed under a bridge. Several other houses were in immediate danger. Twenty Mile Creek, normally a 20-ft. (6 m) wide stream that runs into the Similkameen River, turned into a 200-ft. (60 m) wide torrent. To protect a concrete bridge on Highway 3 and the business section of Hedley, highway crews built up the banks of Hedley Creek. The Southern Trans-Provincial Highway closed between Hedley-Keremeos downstream on May 30 but reopened next day. The three houses on Hedley Creek in the settlement of Hedley were completely destroyed, including total erosion of the properties. Major erosion also occurred on Allison Creek and Summers Creek. Orchards and farmlands in the Similkameen Valley were inundated, resulting in the loss of land and crops. The high discharge of the Similkameen River at the confluence with the Okanogan River in the State of Washington created an anticipated reversal of flow in Osoyoos Lake, with resultant flooding at Osoyoos and adjacent shoreline (B.C. Water Resources Service).

On May 31, the Paul Creek bridge shifted another 3 ft. on the south shore. A logjam had built up against two pilings of the 600-ft. (180 m) bridge. B.C. Telephone crews strung another emergency line across the Similkameen River 12 mi. (19.2 km) west of Keremeos after floating

snags swept away the first emergency line on May 30. Highway 3, 14 mi. (22.4 km) west of Keremeos reopened but floodwaters from Keremeos Creek 2 mi. (3.2 km) north of Keremeos closed a section of the Keremeos-Penticton highway on May 31. Many farmers in the Keremeos-Cawston area lost their potato, onion and other vegetable crops. At Cawston, floodwaters covered the highway and railway tracks.

On June 1, with colder temperatures and a drop in the freezing levels from over 11,000-7,000 ft. (3,300-2,100 m), floodwaters at Princeton and Keremeos dropped slightly. The Similkameen River stopped rising and the Tulameen River dropped 6 in. (15 cm). High winds in the area were expected to evaporate some of the near-record snowpack.

In Keremeos, dikes at the west end of the village seeped badly and developed holes. Over 350 people worked for 20 hours just managing to hold back the floodwaters. If the dike would break, the entire business section of the village of 800 people would flood. Late on May 30, the Highways Department started building a new dike at the west end of the village. The Similkameen River, which is joined by the Tulameen River at Princeton, continued to rise. Heavy damage occurred along the 60-mi. (96 km) stretch along the Similkameen River between Princeton-Cawston. In many areas, the usual 100 to 200-ft. (30-60 m) wide river channel was up to 0.5 mi. (800 m) wide. Cawston, Hedley and Princeton, towns along the Similkameen River, were threatened. In Princeton, 18 families were evacuated and a number of trailers were removed from the village's Coop Trailer lot. The banks of the Tulameen River, which was rising at 1 ft. (30 cm) an hour, was being reinforced with sandbags. Heavy flooding was reported from outlying areas. About 20 summer homes were flooded and one home evacuated.

On May 30, a number of residents at the outskirts of Hedley, approximately 30 residents in the Cawston area and about 17 Keremeos homes situated between the old dyke and the new one were evacuated. According to the RCMP, dozens of small creeks and other waterways were in flood. At Cawston, water was lapping at the highway and partially covered the railway tracks. Schools closed on May 29, and on May 30 Hedley was without drinking water. A number of waterlines crossing Twenty Mile (Hedley) Creek were wiped out. Asp Creek was threatening to overflow. The Okanagan Telephone Co. reported their telephone lines down, cutting long-distance service to Keremeos. The Paul Creek railway bridge over the Similkameen River, about 11 mi. (17.6 km) west of Keremeos, shifted about 3 ft. (90 cm) on the south shore. At Osoyoos, minor flooding commenced when Osoyoos Lake slowly backed up due to the Similkameen River rising. *2)

According to the June 1 snow surveys, less than half the Thompson and Fraser River snowpacks had run off. On June 1, the Thompson River at Kamloops continued to rise bringing it to 1,129.1 ft. at the Riverside Park gauge or 1,128.5 ft. on the Overlanders Bridge scale used by the water rights branch. This brought water levels closer to the 1967 high water mark and the flood alert stage. Water levels at the North Thompson River at Clearwater and Barriere increased by similar amounts. As it appeared the Thompson River would reach the 1948 level in the next four days, Brocklehurst Mayor Al Thompson called on the provincial government to invoke the Flood Act. Floodwaters broke through in a couple of places along the Brocklehurst dike and were coming within 18 in. (45 cm) of the top along most of the structure. On June 1, about 40 homes in the valley were evacuated as the river reached within inches from the Yellowhead Highway in places. Many basements were flooded and several cabins of a church camp were floated off their foundations. A 50-head herd of cattle was marooned near Clearwater. Near Cahilty, a small community in the upper Heffley Creek area, bridges washed out, including one on the main road on Cahilty Creek. The Department of Highways built a temporary footbridge across the creek. Meadows and seeded fields in the area were flooded.

On June 2, during the third consecutive day the Thompson River rose over 1 ft. (30 cm) in 24 hours, it reached 1,130.2 ft. In the North Thompson valley, the river continued to rise at Barriere and Clearwater at a slightly lower rate than the previous three days. On the morning of June 2, the freezing level at Kamloops dropped to 8,000 ft. (2,400 m) and about 6,000 ft. (1,800 m) further up the North Thompson. At Brocklehurst, sandbags closed the dike, which broke near Strauss Street,

while other Brocklehurst dikes were reinforced. North of the Duncan Lake dam, the tiny community of Howser was marooned as floodwaters cut off access roads. North of Howser, waters from the swollen Lardeau River blocked access roads while Cooper Creek closed the bridge south of Howser. Further south, the small railroad community of Procter on Kootenay Lake 20 mi. (32 km) east of Nelson was cut off when a bridge was closed to highway traffic. Though the railway tracks at Procter were flooded, rail traffic was still moving. In the east Kootenay district, tributaries of the Kootenay River were flooding and threatening the communities of Cranbrook and Kimberley. Flood threat on the Similkameen River eased somewhat.

On June 2 at Kamloops, Riverside Park was closed to all vehicular traffic. The main concession stand and Centennial Pool at the park had been closed one day earlier. On June 2, a number of subdivisions in Kamloops flooded. In one area, 150 houses and 52 mobile homes flooded due to dike failure. On June 2 at 4 p.m., the new Oak Hills subdivision at Westsyde flooded with 5 ft. (1.5 m) of water when the earthfill dyke developed a 150-ft. (45 m) break. *3) Within minutes, the rushing water covered some 50 ac. (20 ha), upsetting trailers and damaging homes. Damage estimates ranged from \$2-5 million. Some 65 trailers valued at between \$10,000-15,000 each sustained most of the damage. Another 100+ homes valued at \$20,000 and up also received extensive damage. Another 50-100 homes sustained lesser amounts of damage. Residents of Oak Hills were not allowed to return to their homes yet before a health officer inspected these. Late on June 4 after 37 hours, temporary dike repairs were completed. Six pumps were used to pump out an estimated 300 million Gal. (1,350 million L) of water. Filling the 23-ft. (6.9 m) deep trench through the area was a very slow process. During the first several hours, work progressed at only 1 ft. per hour. Due to renewed potential flood danger, residents of the subdivision were again evacuated on June 9. Major seepage occurred at the location of the break.

On June 3 in Savona, 28 mi. (44.8 km) west of Kamloops, at least 10 homes and more mobile homes were flooded. Some Savona residents were forced to evacuate as some homes had up to 3 ft. of water in their basements. Kamloops Lake continued to rise. Between June 2 at 2:30 p.m.-June 3 at 8 a.m., it rose 6.5 in. (16.3 cm). The area from the Savona Hotel to the bridge at the entrance of Thompson River was flooded. Overnight June 2-3, the Thompson River at Barriere and Clearwater dropped. Freezing levels at Kamloops remained at 8,000 ft and about 6,500 ft. (1,950 m) up the valley. With a warming trend on June 3, freezing levels rose to 10,000 ft. (3,000 m) to reach 11,000 ft. (3,300 m) before day end. In Brocklehurst, sandbagging along the Tranquille Highway near Crestline Avenue continued. Minor flooding occurred along the South Thompson River. Dikes were reinforced along River Street at the tennis courts and exhibition park grounds.

On June 3-4, minor flooding occurred down the South Thompson in the Dallas area. As the river continued to rise, it threatened some homes along River Street in Kamloops. Up the North Thompson, water levels started to recede. Due to high water, ferry service at Little Fort was suspended for about a week. According to ferry operator Bill Belchan, conditions on the river, which peaked at Little Fort around June 1-2, had been the "worst since 1948."

Around June 5, while the South Thompson was still rising, the North Thompson started to drop. The North Thompson was going down faster than the South Thompson was rising. From a peak on June 3-4 at the Overlanders Bridge gauge, the river receded 1.4 ft. (42 cm) to 1,129 ft.

With the return of cooler temperatures, an early peak of 22.3 ft. at the Mission gauge on June 5 dropped. At Prince George it dropped from an early high of 31.75 on June 2. The North Thompson at McLure also had a peak on June 2 with 17.13 ft. On June 4, the discharge at Hope was 417,000 cfs (11,808 m³/s).

On June 6, flooding was reported from Chase in the Shuswap Lake area. With the lake level about three points up at Salmon Arm, minor flooding occurred at some summer homes along the lakeshore. On June 7, the rising water of Shuswap Lake flooded the mill yard of Federal Co-operative's sawmill at Canoe, forcing a temporary shutdown and layoff of employees. The lake had been rising at about 3 in. (7.5 cm) a day. To reduce wake damage in Sicamous Channel, a 3-mph (4.8 km/h) speed limit was imposed. In Squilax, a number of mobile homes were moved to higher

ground. Floodwaters of Little River, which flows into Little Shuswap Lake, surrounded a home. High water on the North Thompson and Barriere rivers forced the evacuation of several people or relocation of trailers.

Though not expected to peak as high as on June 3-4, rivers started to rise again. With warm heavy rains in the Interior during the second week of June, the Fraser River started to rise again on June 8, reaching 22.58 on June 11. Between June 11-14, the upper Fraser River reached a second peak. On June 12, the Fraser River at McBride recorded a maximum daily discharge of 1,390 m³/s (Environment Canada 1991).

Overnight June 8-9, the North Thompson River at Barriere rose 1 ft. (30 cm) to 1,241.6. At Kamloops the river reached 1,129.1 ft. at the Overlanders Bridge gauge. In order to reduce some of the water pressure, the dike for Kamloops' sewage lagoon at Mission Flats, which was not in use at the time was broken on purpose. In North Kamloops, more than 30 trailers in the Woodland Trailer Park were moved when the river there rose to within less than 1 ft. of the dike. Though the former Hook Ranches property approved for development remained dry, a second about 2-ft. high dike was built behind the main one in the area.

On June 10, residents of Sicamous fled to higher ground. Shuswap and Mara lakes flooded the entire downtown area and some sections of the Oak Hills subdivision with up to 8 in. (20 cm) of water. Many backroads to farms were reported washed out. On June 10, the area about 1.5 mi. (2.4 km) along Riverside Road flooded forcing some 25 families to evacuate overnight. On June 10, the area was still flooded by seepage from the fast flowing river. Overnight June 10-11, the North Thompson River rose 7.2 in. (18.3 cm).

The South Thompson River continued to rise and at Salmon Arm and Shuswap floodwaters started to crest. Overnight June 11-12, Shuswap Lake rose 3.5 in. (8.8 cm), worsening the flood situation at Sicamous. Steady heavy rain throughout the Thompson valleys added to the dangerous situation. On June 10, a number of Sicamous residents were evacuated after parts of the community flooded with water up to 3 ft. (90 cm). Evacuation continued on June 12 with over 40 homes vacated to date. Shuswap and Mara lakes rose to at least 4 ft. (1.2 m) above normal high water. According to unofficial figures from the highways department, lakes and rivers in the Sicamous area came to within 6 in. (15 cm) of the 1948 flood level. Shuswap River continued to rise to Enderby. Sections of the CPR branch line to the Okanagan were flooded, cutting rail service around June 10.

On June 12, the North and South Thompson rivers continued to rise within inches of 1948 levels. At 9 a.m., the river at the Overlanders Bridge came to within 0.8 in. (2 cm) of the 1,138.8 mark in 1948. The massive pumping operation at Oak Hills was halted in order to allow seepage along the dike to continue in order to maintain equal pressure and level with the North Thompson. The same method was used at River Street. On the North Thompson River, the lower half of Birch Island was closed to vehicular traffic. On June 12, floodwaters closed the North Thompson highway indefinitely. Around Kamloops, many homes were evacuated. Water levels were higher than those during the 1948 flood. Shuswap and Mara lakes overflowed their banks in several locations. Around June 10-11, more than 20 families were evacuated. The business area was reported several feet under water. At Salmon Arm, Shuswap Lake flooded its banks in several places.

The Columbia River flooded its banks. At Athalmer, south of Golden, about 10 families were evacuated. At Mica Creek, north of Revelstoke, high water temporarily halted work on the Mica Dam. The Columbia River also caused flooding in the Revelstoke area. On June 16, the Columbia River at International Boundary recorded a maximum instantaneous discharge of 10,700 m³/s and a maximum daily discharge of 10,600 m³/s.

Just after midnight on June 14 at Kamloops, the river peaked at 1,138.83 ft., surpassing the 1948 crest by 3 in. (7.5 cm). *4) Another 1-ft. rise was expected over the next 24-48 hours. But at Blue River, about 140 mi. (224 km) upstream from Kamloops, the river dropped 1 ft. It was expected that it could take two days before a drop in water levels would be felt at Kamloops. On June 14 at 1 a.m., the Thompson River crested at the Overlanders bridge gauge at the highest level this century at 1,132.5 ft. By 7 a.m., it had dropped to 1,132.2 ft. *5) On June 15, the Thompson River near Spences

Bridge recorded a maximum instantaneous and maximum daily discharge of 4,130 m³/s, reaching an all-time high for the period of record.

Despite sandbagging, floodwaters entered the lower floor of Heritage House, Kamloops' \$120,000 Centennial project. As Schubert Drive, which runs parallel to the North Thompson River, was still threatened, crews were reinforcing the dike to above the 1948 level. River Street was the scene of 48 hours of continuous sandbagging. Further east, some riverside homes and farms in Valleyview and Dallas were surrounded by water. Throughout the valley, riverside trailer parks were hastily evacuated. On the south side of the Thompson River, B.C. Interior Sawmills were closed after floodwaters entered the conveyor system. The CNR railway bridge across the South Thompson River was threatened. It was feared floodwaters would back up onto the Indian Reserve. A three-quarter-mile (1.2 km) stretch of highway near Blackpool was flooded. A 3-ft. deep washout 9 mi. (14.4 km) south of Clearwater closed Highway 5 to traffic. The Rivermount Hotel above Little Fort adjacent to the highway was completely surrounded by water. At the Rayleigh Correctional Camp, 10 mi. (16 km) north of Kamloops, the entire lower half of the camp flooded. The river completely covered fence posts and debris piled up against buildings. Birch Island north of Clearwater was flooded up to 3 ft. (90 cm) of water in places. On June 12-13, residents were evacuated. Flooding closed three provincial parks: Shuswap Lake Park at Scotch Creek, Haynes Park at Osoyoos and Gold Pan Park, while travellers were urged not to enter Wells Gray Park near Clearwater. Around June 14, a huge mudslide covered the railway tracks at Albert Canyon, 20 mi. (32 km) east of Revelstoke. Clearing operations were expected to take 48 hours.

By noon on June 14, Red Cross staff workers had registered 246 flood-stricken families. More than 50 rental units had been offered to flood victims along with 204 temporary accommodations. Although a total of 70 families had been placed, most flood victims had been absorbed in the community staying with friends and relatives.

The Spences Bridge gauge on the Thompson River above Lytton continued to rise on June 14 but readings at McLure on the North Thompson indicated that the river had passed its peak. Overnight June 14-15, the North Thompson River at Barriere dropped about 3.5 ft. (1.05 m). At Kamloops, the river dropped only 0.3 ft. (9 cm), believed caused by a backlog of water at the CNR bridge suddenly rushing past the gauge and keeping the level at Kamloops temporarily stable. About 8 in. (20 cm) of water had been held back by the bridge.

On June 15, the North Thompson River at Barriere dropped 2.6 ft. (78 cm). On June 16, at Kamloops the flood danger lessened as the Thompson River level began to fall. The remaining snowpack in the Kamloops watershed was less than that on the same date in 1964 and 1967, the two most recent years of high water. Though water levels at Blackpool dropped 1.4 ft. (42 cm) and 1 ft. (30 cm) at Barriere and Shuswap Lake only rose by 0.06 ft. (2 cm), seepage through dikes and sandbags remained a real problem.

On June 13 at 7 a.m., the Fraser River at Mission dropped to 22.3 ft, from 22.37 ft. on June 12 and 22.5 ft. on June 11. The South Fort George gauge, the scene of heavy flooding a few days earlier, also passed its peak. On June 14 in the Clearwater area, the river dropped about 3 ft. The Fraser River at Prince George was also expected to begin falling soon.

On June 16, the Fraser River was expected to rise to the fourth highest level in the river's recorded history. On that day, the lower Fraser River at Hope peaked with a maximum elevation of 7.1 m, well above the danger level of 6.1 m. According to Ken Kiernan, Recreation Minister and MLA for Chilliwack, the situation would be "OK until beyond 24 feet (7.2 m)," but the real danger was in the possibility of saturated dikes bursting without warning. *6) The Fraser River finally peaked at 23.34 ft. on June 17 at 5:45 a.m. *7) A few hours later, by 9 a.m. levels had slightly dropped to 23.3 ft. The only large urban area threatened by floods remained Chilliwack, where serious filling and sandbagging was needed during the 1948 flood.

On June 16, the Fraser River at Hope recorded a maximum instantaneous discharge of 13,000 m³/s and a maximum daily discharge of 12,900 m³/s (Environment Canada 1991) and a maximum daily water level of 10.141 m. The latter was the second highest all-time reading for the

period of record (Environment Canada 1988). At Hope, high water forced 10 families from their homes in a low-lying undyked area. On June 16, floodwaters surrounded farms near Agassiz. Gauge readings at Hope usually show up at Mission one to one and a half days later. The Fraser River at Mission rose to 23.07 ft. (6.9 m), the highest level in 1972. Though no flooding was reported, seepage was a major concern. Sporadic reports of boils came mainly from the Dewdney and Nicomen Island areas. Sandbagging the affected dikes fought boils.

*1) On June 16, the province announced financial assistance to individuals and municipalities who had experienced property damage through the Provincial Major Disaster Fund. From the City of Kamloops and its adjoining municipalities approximately 330 claims were processed. Over 550 claims were approved from the Similkameen-Osoyoos area. By the end of December, 2,775 claims had been processed and, including expenses, the Province had approved payment from the Fund a total of over \$7,668,500. At the completion of the assistance program, it was estimated that some 2,950 claims would have been processed for a total value of \$8,034.00 (B.C. Water Resources Service). The provincial government's Flood Disaster Relief Fund paid out a total of \$7.7 million (*Victoria Times*). Other sources put the total damage at around \$8 million. The federal government contributed \$2.5 million as its share of the flood damage (*The Vancouver Sun*, December 28, 1972). In 1948, the Fraser Valley suffered about \$13 million flood damage (*The Daily News*, June 16, 1972). The federal government was asked to extend the Fraser Valley Dyking Authority (FVDA) mandate to the tributaries of the Fraser River, including the rivers in the Thompson Valley. The FVDA receives funding for dike construction and maintenance with 10% coming from local government and the remaining 90% shared 50-50 by the provincial and federal governments.

*2) The Similkameen River joins the Okanagan River on the U.S. side of the border just south of Osoyoos Lake.

*3) Prior to development 18 months earlier, the area had flooded each year. Only two weeks earlier, the developers, Cohill Developments had assured several homeowners, that the area dykes were secure. According to Kamloops MLA and former highways minister Phil Gaglardi, the dikes, which should have been ripped, were constructed to cause a whirlpool effect in the corner that gave way. Prior to development, both Thompson Nicola Regional District and the rate payers association opposed the Oak Hills development. The strongest opposition came from those who had seen the area during the 1948 flood (*Kamloops Daily Sentinel*). Following the flooding at Oak Hills, a redesigned dyking system for the area around Oak Hills was proposed. It included the construction of a second dike extending from the existing one, about 200 yd. (180 m) from shore, extending farther down the shoreline. Another dike would surround Westsyde Park to the north and would link with the Oak Hills dike far from shore as well. Thus the backwash, which created the breach in the dike, would be eliminated. Double protection would be added to the weak sections of the mile- (1.6 km) long dyke. The severe flooding in the Fraser Basin in 1972, particularly at Oak Hills in Kamloops, served as an important catalyst for the development of non-structural approaches to floodplain management in British Columbia.

Also, in 1972, the Municipalities Enabling and Validating Act was amended by adding Section 187. This section required that before any local authority could amend or repeal any regional plan, official community plan, or bylaw pertaining to floodplain lands identified in the 1966 Lower Mainland Official Regional Plan, provincial approval had to be obtained (Fraser Basin Management Board 1994). Following the flooding and subsequent damage of 150 homes damaged in the Oak Hills subdivision, the provincial government took action in several new subdivisions being built in flood plains. Plans for the 1,500-home Cinnamon Hills subdivision, for example, were scrapped after water damaged a dike around the area (*The Vancouver Sun*, February 17, 1983).

In 1974, the province amended the Land Registry Act in such a way that all property in a flood plain area could only be subdivided with the permission of the minister. Then in 1976, at the urgent

request of the Department of Municipal Affairs in the city enacted two bylaws related to the flood plain area. Ostensibly, this was done to ensure that damage claims in the vent of flooding were limited (*Alberni Valley Times*, December 17, 1979).

*4) In 1948, the river had crested at 1,131.8 ft. (*Kamloops Daily Sentinel*).

*5) Dam construction south of Revelstoke has averted the serious flood conditions which prevailed there in 1948 (*Revelstoke Review*, June 15, 1972).

*6) The flood level was considered to be within 22-24 ft. (6.6-7.2 m). The danger level drops when the gauge level drops below 20 ft. but seepage problems may exist till the level drops to 16 ft. (*The Vancouver Sun*).

*7) This was the fourth highest reading in recorded history and highest since 1950 when it peaked at 24.19 ft. Only higher levels were reached in 1894 (25.8 ft.), 1948 (24.73) and 1950 (24.19). The 1972 Fraser River freshet was the second highest during the period of record from 1912 to present (1994) (Fraser Basin Management Board 1994).

June 7, 1972

Source: *The Vancouver Sun*, June 8, 1972.

Details: On June 7, a debris flow near Mica Creek knocked out 50 ft. (15 m) of highway between Mica Creek-Revelstoke. The mudslide buried the section of highway 12 ft. (3.6 m) and killed a logger working below the road. The victim was buried under 6 ft. (1.8 m) of mud. A second man was narrowly missed by the slide. It appeared to have come from the top of a mountain and was probably caused by the large amount of snow during the winter. The slide debris, which reached the Columbia River, filled a culvert and washed out the fill under the road. The highway was expected to be closed till June 9.

June 23, 1972

Source: *The Vancouver Sun*, June 24, 1972; *The Hope Standard*, June 28, 1972.

Details: On June 23, Hope recorded 1.23 in. (31.2 mm) of rain. Late on June 23 following three days of rain, a 6-ft. (1.8 m) rock and mudslide came down at Luluwysin Creek about 25 mi. (40 km) north of Lytton. It blocked Highway 25 between Lytton and Lillooet, which was expected to be closed till June 25.

July 11-12, 1972

Source: *The Columbian*, July 12 and 13, 1972; *The Chilliwack Progress*, July 12 and 19, 1972; *The Vancouver Sun*, July 12; October 18, 1972; *The Province*, July 13, 1972; Environment Canada 1988; Schaefer 1973; Schaefer 1983; Eisbacher 1983 (p. 17); B.C. Water Resources Service, 1972 Annual Report (p. Y14).

Details: On July 12, an unprecedented rainstorm caused widespread damage to homes along Vancouver's north shore and inundated farm crops in the lowlands between Chilliwack and the sea. Individuals affected by this storm were granted financial help through the Provincial Major Disaster Fund. 1972 (B.C. Water Resources Service).

On July 11 to 12, a rainfall "unequaled" deluged the Lower Fraser Valley and Vancouver Island "for that month during this century." The frontal storm occurred under a strong southwesterly flow of warm moist air. It was associated with a stalled low-pressure zone over the Pacific. A high-altitude zonal flow of westerly winds is quite unusual for this time of the year, often happening in spring and fall. The flow carried weather systems clear across the Pacific from southern Japan. The storm continued for 30 hours and produced two to three times the average July rain allotment.

Whereas the average rainfall for July in the Lower Mainland was 1.04 in. (26.4 mm), the total rainfall during the first 11 days in July 1972 was 1.86 in. (47.2 mm).

At most stations, rainfall on July exceeded the normal value for the entire month. *1) Chilliwack recorded 86.1 mm in 48 hours. In the 24-hour period ending 5 a.m. on July 12, Abbotsford reported 1.43 in. (36.3 mm) breaking the 1936 record set in July 1936 with 1.21 in. (30.7 mm). Rainfall of 2.03 in. (51.6 mm) at the Vancouver airport surpassed the record 1.45 in. (36.8 mm) that fell in a 24-hour period in July 1961. The total rainfall in Vancouver and Abbotsford by 5 p.m. on July 12 was 3.20 in. (81.3 mm) and 5.52 in. (138.6 mm), respectively, breaking the previous records of 3.14 in. (79.8 mm) and 4.21 in. (106.9 mm) set in 1964. Abbotsford, Tofino and Estevan Point also set 24-hour records with 3.21 in. (81.5 mm), 4.97 in. (126.2 mm) and 3.76 in. (95.5 mm), respectively.

Storm totals ranged from under 2 in. (50 mm) at Delta Tsawwassen Beach, southwest of Vancouver, to over 10 in. (250 mm) on Hollyburn Ridge. Hollyburn Ridge received the greatest accumulation reported and established a new all-time one-day record of 6.09 in. (154.7 mm). The two-day total of 10.29 in. (261.4 mm) was just short of the record 10.80 in. (274.3 mm) set in November 1955. In 24 hours ending 11 a.m. on July 12, the Vancouver International Airport recorded 1.96 in. (49.8 mm) of rain, compared to the previous July one-day record of 1.45 in. (36.8 mm) set in 1961. During the 24 hours ending 5 p.m. on July 12, the airport recorded a total of 2.03 in. (51.6 mm). Between 4 p.m. on July 11-8 a.m. on July 12, the Cleveland and Seymour dams recorded 3.26 in. (82.8 mm) and 3.40 in. (86.4 mm), respectively. Other July records set in the 24 hours ending 5 a.m. on July 12 include Abbotsford with 1.4 in. (35.6 mm), Tofino 4.45 in. (113.0 mm), Estevan Point 4.06 in. (103.1 mm) and Spring Island 2.83 in. (71.9 mm).

The freak summer rainstorm dumped more than 95 mm of rain on the slopes of West Vancouver. Extensive flooding occurred in the Lower Mainland, including the Chilliwack River basin. Hardest hit were the low sections of Scott Road near the King George Highway in Surrey and parts of West Vancouver immediately below the Upper Levels Highway. Floodwaters on Stewardson Way at 3rd Avenue in New Westminster were described as "hubcap-deep." Flooding also occurred at the foot of 13th Street at Stewardson Way.

The storm caused heavy damage to the Upper Levels Highway then under construction (Schaefer 1983). Erosion on the Trans-Canada Highway construction project through West Vancouver plugged culverts and drains, causing hundreds of thousands of dollars in damages (Schaefer 1973). Several torrents overflowed and debris mobilised from a construction site was propelled down Rogers Creek, causing considerable erosional damage to roads and property (Eisbacher 1983). *2)

The most serious flooding occurred in the Rogers, Spencer and Brothers creeks. The trouble began on the slopes above the Upper Levels cleared for road widening after 3.8 in. (96.5 mm) of rain fell in 24 hours ending 11 a.m. on July 12. There were warnings that a section of the highway was acting like a huge dam holding back thousands more tons of rocks and mud threatening to slide down on the Altamont district. Floodwaters gauged a ravine 40-ft. (12 m) wide and 20-ft. (6 m) deep across the Upper Levels Highway, down Gisby. *3) Bob Cole, P Eng. who examined the Rogers Creek Ravine, stated "They should have built a bridge here, not a landfill and culvert." *4) An eyewitness noted, "The creek seemed 100 times bigger and the noise was deafening, it sounded just like thunder."

Early on July 13, the Upper Levels Highway was closed to traffic between Taylor Way-Horseshoe Bay after being cut or blocked in several places. At a point about 5 mi. (8 km) west of Taylor Way, the highway washed out for more than 100 ft. (30 m) to a depth of 30 ft. (9 m). A concrete culvert at Brothers Creek, just west of Taylor Way, washed out and the creek undermined other sections of the culvert. One resident said, "you can't believe what it was like. The water came gushing down Rosebery off Gisby. It was just like the Fraser River." Residents of at least 24 homes on 28th, Gisby, Spencer Court, Rosebery, Palmerston and Mathers in the Altamont area, just below

the Upper Levels were evacuated. Marine Drive, downhill from Altamont, was also threatened as 2 ft. (60 cm) of water poured across it from a blocked culvert.

Brunette Creek overflowed its banks, flooding Hume Park. Dan Bow, operator of Bamford Boat Co. Ltd, 10814-120th Street (New Westminster?) had to shut down after his property flooded. Bow claimed to have lost 50-60 days in 1972 because of flooding when the municipal pump installed in 1948 did not work properly; three new pumps promised were never installed.

Early on July 12, a small slide came down 0.5 mi. (800 m) north of Horseshoe Bay on the Squamish Highway, covering part of the road. While it was being cleared, traffic was reduced to one-lane.

On July 13, the Vedder River near Yarrow recorded a maximum daily water level of 4.157 m (Environment Canada 1988) and the Capilano River was reported at its highest level in 10 years.

*1) July 12 was not only the wettest July day on record for many locations but also made also July the wettest ever. (*The Province*, July 13, 1972).

*2) Several retention basins have since been built in West Vancouver to delay flood runoff from storm sewers (Eisbacher 1983).

*3) In 1956, Gisby bore the brunt of another flash flood (*The Vancouver Sun*, July 12, 1972).

*4) Liberal West Vancouver-Howe Sound MLA Allan Williams, whose home was among those ordered evacuated, requested a full assessment of this highway project. He considered that not enough culverts had been put in to handle heavy rainfall. Williams also wanted an immediate assessment of damage done to homes and financial help for those homes had sustained damage. A preliminary engineering report by engineering consultants Dayton and Knight Ltd., released on October 17, 1972 blamed the highways department construction for the July 7 (12?) flood which damaged about 100 properties in West Vancouver. It recommended the immediate establishment of flood control crews for each of the three highway construction projects underway in the municipality. According to the report, it was believed that the flooding was caused by the highway department construction during which several creek channels and culverts were in the process of being constructed. "The duration and intensity of the July storm and runoff was not anticipated by the highways department and there was nothing the department could do once the flooding had started." The culverts downstream from the highway were generally deemed adequate provided there were no inlet blockages. The engineers recommended separate flood control crews for reconstruction of the western section of the Upper Levels Highway from Horseshoe Bay to Cypress Creek, the eastern section from Cypress Creek to Taylor Way, and the 7-mi. (11.2 km) access road to Cypress Bowl from 28th Street.

Late September 1972

Source: *The Merrittian Weekly*, October 3, 1972; *The Vancouver Sun*, September 28, 1972.

Details: In September following record precipitation in 1971 and 1972, minor slides occurred in Merritt. Foot-wide chasms were created on the back doorsteps of some of the 20 homes of a terrace overlooking the lower part of Merritt. *1) The serious landslip along the Parker Drive portion of the bench centred in the crescent-shaped curve behind the Bill Reid residence. From there it was leading out on both sides to the two homes next door.

According to a preliminary engineering rapport, too much water from a leaking or broken waterline caused the clay to move. Findings indicated excessive moisture over the spring and summer and the high water content of the heavy snows were all contributing factors in the water gathering the way it had. Every effort was being made to find the source of the water, including a topographic survey and drilling. A water witcher brought in followed the underground stream right up from the slip area to a stream at the top of the bench.

*1) A year later, Public Works Minister Bill Hartley announced that the government would provide land and house moving cost to the property owners threatened by the landslide. A study carried out by the Vancouver engineering firm Ripley, Klohn and Leonoff had recommended that millions of pounds of gravel be dumped on the toe of the slide and that pumps be used to keep out surplus water. Costing “hundreds of thousands of dollars” without a guarantee to be successful, the government decided to move the houses instead. The only condition attached to this would be that the terrace site be used for recreation or a green belt (*The Vancouver Sun*, September 28, 1973).

November 3 and 7, 1972

Source: *The Vancouver Sun*, November 7 and 8, 1972; *The Province*, November 9, 1972; *Victoria Times*, December 4, 1972; Thurber Consultants 1983 (Appendix B).

Details: On November 3 at 4 a.m., 27 residents in the Charles Creek area were awakened by what was described as a rumble in the creek. It had been raining, but not excessively heavy for the time of year. It was reported that a “slurry mixture of rocks, small boulders, gravel and some logs” collapsed one of the private local bridges across Charles Creek. It was swept downstream to form a blockage against the railway bridge. With the channel blocked, the slurry mixture poured over the railway and partially buried the Ken James residence on Lot 10 in “tons of relatively small material.” The flow was reported to have continued for three or four hours. The creek changed course and was flowing over the railway bridge to the left and right of the creek. The James residence on the southern part of the fan had the creek flowing right through the house, piling up gravel and boulders up to the windows. The slide caused about \$8,000 damage to the James home, destroying their garage and wrecking two cars. According to *The Vancouver Sun*, it was on November 4 that Strachan (Charles) Creek went on the rampage, forcing the evacuation of the James home below the Squamish highway.

*1) Work crews had the rail line cleared of debris by 2 p.m. on November 4.

Flooding also occurred through several properties on the north of the fan due to the blockage. Water flowed mainly into Lot 10, which is two lots away on the left side of the creek. Water also flowed along the road into Lots 1, 2, 3, 4, 11, 12, 13 and 14. The upper local bridge washed out. Debris was piled up against the railway bridge. Water flowed over the bridge to a depth of 8 ft. (2.4 m). Above the railway bridge, the creek filled in with bedload material consisting of heavy boulders and gravel (Thurber Consultants 1983). *2)

On November 7, heavy rains sent Charles Creek on the rampage a second time in four days. The BC Rail was blocked and homes below the Squamish highway were endangered. Flooding occurred when rocks wedged under the railway bridge across Charles Creek. The bridge was pushed out 3 or 4 ft. (0.9-1.2 m) and rocks were tumbling over the top (*The Sun*, November 7 and 8, 1972; Thurber Consultants 1983). An access road washed out and two houses were damaged. The event followed 75 mm of rain in the preceding 48 hours (VanDine 1985).

Rocks wedging under the railway bridge caused the new flooding. The railway was cleared on November 8. According to a BC Rail spokesman, the blockage under the railway bridge was compounded by the fact that a private bridge serving the homes was washed down the creek with “tons of mud and debris.” The debris was washed down the creek to the homes below. The spokesman noted that the railway acknowledged responsibility for keeping drainage culverts clear.

*1) The area was hit by a similar flooding in September 1969, when the Strachan Creek bridge, a section of rail track and a rail bridge were washed out.

*2) The residents of Strachan (Charles) Creek estimated their property damage up to \$20,000 (*Victoria Times*, December 4, 1972).

November 21, 1972

(Storm surge/tidal flooding).

Source: *The Vancouver Sun*, November 21; December 27, 1972; *The Province*, November 24 and 25, 1972.

Details: Early on November 21, a combination of bad winds and a 15.6-ft. (4.68 m) tide caused the Mud Bay dike just north of the Nicomekl River west of the King George Highway to breach and flood the farm buildings of three dairy farms. Mud Bay Road, also known as 40th Ave., in Surrey was flooded in three places, virtually cutting off car access to one farm. The about 10-ft. (3 m) wide clay dike with a roadway on top stood about 10 ft. above the level land around it.

Floodwaters quickly covered about 150 ac. (60 ha.) to a depth of 18 in. (45 cm). The 40-ft. (12 m) breach caused flooding about 600 ac. (240 ha.) of farmland. The break was apparently caused by a soft spot that gave way under the pressure of the extremely high tide. By noon, the break had widened to 70 ft. (21 m). As strong winds and a high tide pushed more salt water through the cut, a Surrey farmer evacuated his family of six and 80 head of dairy cattle on November 23.

Mayor William VanderZalm termed the situation "very serious." He stated, "If that land remains under salt water for any length of time, it will be knocked out of agricultural production."
*1)

Strong winds delayed repair operations by the Fraser River Piledriving Co. for about eight hours. Nearly 2,000 tons of rock carried in by two barges was used to fill the break. Municipal manager Dan Closkey estimated the repair cost at \$20,000-30,000. Arrangements were being made to have it paid through the Fraser River Flood Control Program with 10% paid by the municipality and 90% by the provincial and federal governments.

On November 24, the 70 to 80-ft. (21-24 m) wide breach in the Nicomekl seawall was plugged. Nine pumps with a total capacity of 100,000 Gal. (450,000 L) were put in place. Next day, the draining of 600-700 ac. (240-280 ha) in the agricultural triangle bounded by the Serpentine and Nicomekl rivers and Highway 499 began.

*1) According to dyking commissioner Ken McDonald, salt water can ruin a farm for up to five years. (see: flood event November 27-December 4, 1951). About a month later on December 26, dikes along the Nicomekl River broke again in two places (*The Vancouver Sun*, December 27, 1972).

December 15-22, 1972

(Rain-on-snow, tidal flooding and dam burst/flooding).

Source: *The Province*, February 13, 1970; *The Vancouver Sun*, December 16 and 18, 1972; *Victoria Times*, December 18, 19 and 22, 1972; *Nanaimo Free Press*, December 20 and 27, 1972; *Cowichan Leader*, December 21 and 28, 1972; Eddy 1979; Thurber Consultants 1983 (Appendix B); Church and Miles 1987 (p. 73).

Details: Between 4 p.m. on December 15-4 a.m. on December 18, Vancouver recorded 2.39 in. (60.7 mm) of rain. Alta Lake and Tofino reported more than 6 in. (15 cm). Revelstoke and Blue River recorded 1 ft. (30 cm) and 13 in. (32.5 cm) of snow, respectively. The heavy precipitation, some of it in snow, occurred across southern British Columbia. The rainstorm, which occurred towards the end of a two-week warm and very wet period caused extensive flooding of basements in greater Vancouver (Eddy 1978). Vancouver International Airport set two monthly records: a rainfall of 11.34 in. (288.0 mm), the average for December being 5.96 in. (151.4 mm); and total precipitation of 11.82 in. (300.2 mm), the average for December being 6.51 in. (165.4 mm). Vancouver PMO established corresponding records with 16.06 in. (407.9 mm); average for December 8.70 in. (221.0 mm), and 16.84 in. (427.7 mm), respectively (Eddy 1978).

Overnight December 15-16 in Vancouver, 1.26 in. (32.0 mm) of rain melted about 6 in. (15 cm) of snow accumulated during the previous 10 days. City work crews responded to more than 50 distress calls following a rainfall of 1.20 in. (30.5 mm) overnight December 15-16. Most of the flooding resulted from partly melted snow blocking highway drains. Delta reported isolated cases of flooding.

In Vancouver, city crews received more than 200 emergency calls on December 16 when 1.79 in. (45.5 mm) of rain fell. In the vicinity of Gore and Prior, water up to 2 ft. (60 cm) covered the roadway. Police blocked westbound traffic on Prior near Gore till the water on the road subsided. Overnight December 16-17, a lane in the 1800 block of Robson was blocked when a storm sewer backed up. Several thousand homes in Kerrisdale and Marpole were without phone service on December 16-17 after flooding in manholes on 41st short-circuited telephone cables. On the night of December 16, a backed-up storm sewer flooded sections of Canada Way in Burnaby with several inches of water.

On December 17, several basements flooded in North Vancouver when a creek (Mosquito) overflowed at the top of Delbrook. Throughout the Lower Mainland, basements and roads were flooded. In North Delta many basements flooded. Though the runoff and back up from high tides pushed the levels of the Serpentine River up, the dikes were adequate to protect the low-lying farms flooded twice in recent months.

Four West Vancouver properties flooded earlier in July were hit again. "Tons of sand, mud and rock" were deposited on the four properties and a driveway was washed out, causing about \$10,000 damage. The flooding started around 4 p.m. on December 16 when a "tremendous quantity" of sand, gravel and rock plugged a culvert at the top of Gisby, below the highway. At 2 a.m. on December 17, another surge ripped through a corner of a further property downstream and deposited a "sea of rock, sand and mud" on another property on Mathers that had just been cleaned up from the July event.

Liberal MLA Allan Williams blamed an inadequate drainage system under the Upper Levels Highway for the damage. He said that some highway fill crumbled away and a 15-ft. (4.5 m) chunk of culvert broke off. "I don't know what they've done up the mountainside, but it's made a new creek. It was gushing with water, cutting through sand banks and the fill the contractor has placed for the highway, depositing masses of material at the mouth of the culvert system." Williams urged the suspension on work on reconstruction of the highway and building of the Cypress Bowl access road.
*1)

Overnight December 15-16, Squamish and the Whistler area reported 4 and 18 in. (10 and 45 cm) of snow, respectively. Heavy snow in the Pemberton district reduced visibility to zero. On December 15, flooding occurred on Harvey Creek in the Howe Sound area. Mudflows occurred on Harvey and Lawson creeks. The highway was blocked and a house was damaged in Lions Bay (Thurber Consultants 1983). For this event, the 24-hour precipitation recorded at Hollyburn Ridge was 56 mm, accompanied by a significant snowmelt (Church and Miles 1987).

Port Alberni recorded 15.1 in. (37.75 cm) of snow till 8 a.m. (on December 16?) Tofino reported 4.34 in. (110.2 mm) of rain. Overnight December 17-18, rainfall (in Victoria?) 1.26 in. (32.1 mm) of rain melted approximately 6 in. (15 cm) of snow that had accumulated in the previous few days. On December 18, a combination of heavy rain, melting snow and high tides at river mouths caused washouts in the Duncan-Cowichan area. On the night of December 18, the Westholme Road between Crofton-Chemainus washed out. The Cowichan and Chemainus rivers overflowed their banks and flooded roads throughout the two valleys. On December 19, washouts closed the Crofton Road, Chemainus Road, Chemainus to Cowichan Bay Road and the Tzouhalem Road from Duncan to Maple Bay.

Runoff from the surrounding mountains could not be drained quickly enough. Some Glenora residents reported up to 6 ft. (1.8 m) of water in their fields. On December 19 in Chemainus, the high school field was under water. Flooding also wiped out three of the village of Cumberland water supply dams in the Comox Valley. A combination of the heavy snow followed by heavy rain and gales wiped out the first and second dam and the new Henderson Lake dam recently installed at a cost of \$10,000. The system temporarily switched over to the older Allan Lake dam. Work on "plugging" the second dam, which started immediately, was estimated at \$2,000-3,000.

On December 22 following a week of heavy rain, flooding in the Cowichan Valley eased. Municipal crews worked around the clock sandbagging roads and pumping flooded basements. On December 22, only Tzouhalem and Cowichan Bay roads remained closed.

*1) In February 1970, Williams already told the Legislature that it should act immediately to prevent flooding that could be caused by the logging of Cypress Bowl. "The creek has been a constant threat and indeed the flooding in West Vancouver. The municipality has gone to great expense to protect against the rampage of the creek. Now, with the trees gone from Cypress Bowl, the possibility of serious erosion taking place and the potential for great flooding is greater." (*The Province*, February 13, 1970).

December 25-26, 1972

(Rain-on-snow? and tidal flooding)

Discharge (m³/s): Max. daily: December 25: Kok.: 183; December 26: L. Qual.: 85E Nan. C.: 453; December 27: Cowich.: 425; max. instant.: December 26: Nan. C.: 688

Source: *The Vancouver Sun*, December 26, 27 and 28, 1972; *Nanaimo Free Press*, December 27, 1972; *Cowichan Leader*, December 28, 1972; *The Daily News*, December 27, 1972; Jackson et al. 1985 (p. 4-19); Melone 1985 (p. 57); Thurber Consultants 1983 (Appendix B); B.C. Water Resources Service, 1972 Annual Report (p. Y14); Environment Canada 1991.

Details: During the Christmas holidays, renewed heavy rains shattered records in Victoria and on the Lower Mainland. In Vancouver, the total of 11.5 in. (292.1 mm) till December 27 was the most rain ever fell at the airport in any month of the year, Nanaimo's total of 10.98 in. (278.9 mm) was no new record. The Cassidy weather station recorded 1.64 and 0.88 in. (41.7 and 22.4 mm) for the 24-hours periods ending 6 a.m. on December 26 and 27, respectively.

The rainstorm of Christmas Day began in the early morning hours on December 25 and lasted from 23-26 hours. During the morning of December 25, a deep low-pressure area was moving northward over the Gulf of Alaska. An associated tongue of warm air aloft with winds from the southwest was lying across the Queen Charlotte Islands. While the deep low continued to move towards the Alaska coast, the frontal wave associated with the tongue of warm air continued eastward across Vancouver Island and the mainland coast. Precipitation ended quite abruptly when this system passed and a weak ridge of high pressure began to build over the area (Melone 1985).

The storm produced the largest 24-hour precipitation on record at Vancouver International Airport (92.9 mm) and at Vancouver's city centre (141.5 mm) (Melone 1985). It broke the 34-year record at the Vancouver International Airport and the 70-year record at Vancouver PMO for the greatest rainfall in a 24 hour floating period, i.e. as measured during any period of 24 consecutive hours. According to John Morris, highways superintendent, the heavy rains were a 1:20 year occurrence. Various other sites in Vancouver and its surroundings also broke either the all-time or the December record for the 24-hour fixed rainfall, i.e. as measured during a fixed climatological day. In the 24 hours ending 10 a.m. on December 25, Vancouver recorded 3.52 in. (89.4 mm), breaking the 3.15 in. (80.0 mm) record for any single day set on November 11, 1955. Overnight, another 0.18 in. (4.6 mm) brought the month's total to 10.82 in. (274.8 mm), 1.24 in. (31.5 mm) more than the record set in December 1966. On December 27 at 4 a.m., with 11.51 in. (292.35 mm) at the airport, Vancouver reached its highest- ever monthly rainfall, breaking the all-time monthly record of 11.26 in. (286.0 mm) set in October 1967. Early on December 25 on Hollyburn Ridge, a higher elevation station overlooking Vancouver, snow changed to rain (Melone 1985).

The storm caused widespread flooding and landslides in the greater Vancouver area. Surrey reported 700 flood calls and Chilliwack 500. Hardest hit was Surrey, where a combination of heavy rainfall and high tides broke two sections of the Nicomekl River dikes east of King George Highway on December 26. At one time during the night of December 26, it was feared that some families would have to be evacuated from an area between 184th and 192nd streets, where the river runs north to south. It was on this stretch that the dikes broke the night before. A feared combination of a 15.6-

ft. (4.7 m) high tide and more heavy rain and wind did not materialise. Municipal crews built a temporary 4-ft. (1.2 m) gravel dike around the breaks, with weak spots on either side sandbagged. Farmers near the mouth of the river at Mud Bay requested sandbags to strengthen the dikes there. Here, the problems were caused by runoff rather than by the river.

Surrey mayor Bill VanderZalm estimated damage to land, sewers, roads and water supplies at “millions of dollars.” He estimated the municipality’s own damage bill at \$500,000. VanderZalm called for immediate provincial aid and a quick start on the construction on a better dyking system for the Nicomekl and Serpentine rivers. VanderZalm noted he was going to ask the provincial government “to stop making studies of the situation and get on with repairs. We are just having disaster after disaster. The water from the hills is increasing year after year and the dikes are just no good anymore.” *1)

In neighbouring Delta, the municipal council also requested provincial help for flood victims. According to municipal engineer J.D. Sansom, damage to homes and farms could run as high as \$200,000. In North Delta, low-lying areas were also affected by flooding due to runoff from the hills. Hardest hit areas in the municipality were from 72nd to 82nd streets in North Delta and the Tsawwassen area. In Delta, large areas of flat farmland were under water. In Richmond, municipal engineer J.E. Brooks said it would take several days to repair the results of the flooding. Basements and the municipal offices were flooded. In New Westminster, the garbage dumping area in Fraser Mills was flooded and the access road washed out. On Christmas Eve, part of a garden slipped into a 100-ft. (30 m) ravine at 8867 Shepherd Way in Delta. After 12 ft. (3.6 m) of the yard eroded, a fence and a small building were left perched precariously on the edge of the ravine.

On December 27, there were new reports of flood damage on the North Shore. Part of the bank above a creek gave way at the John T. Holme home at 94 Deep Dene. Firemen pumped out the swimming pool on the edge of the resulting mudslide. In West Vancouver, the 3000 block Roseberry, washed out on December 25, was sufficiently repaired for use by local traffic. Water service to the western part of the municipality, which was cut for up to 24 hours, was restored. The intake became plugged by debris and floodwaters had taken out a 35-ft. (10.5 m) section of the line.

At the height of the storm early December 26, roads throughout the lower mainland were closed. Damage estimates ranged from \$20,000 in North Vancouver to “hundreds of thousands of dollars” in West Vancouver. Phillip Cloutter of Vancouver had a section of lawn and garden taken out when a 70 ft. (21 m) deep ravine appeared, probably the result of existing underground streams. Heavy runoff blocked catch basins and culverts inundating many basements from West Vancouver through the Lower Fraser Valley. Runoff water partially blocked the Upper Levels Highway in several places and washouts up to 3 ft. (90 cm) deep blocked some intersections in Burnaby and Fraser Valley municipalities. Roads that were closed included Scott Road near the Patullo Bridge, Glover Road and East Columbia in New Westminster. At Horseshoe Bay, Keith Road was closed after it was covered by a 10-ft. deep slide at the junction with the Upper Levels. Ferry traffic was detoured via Nelson Avenue. Traffic on the Upper Levels was restricted to one lane in the several sections where mud slid down the bank onto the road. Flooding on Christmas Day washed out a 6-ft. (1.8 m) deep hole under the surface of Boundary Road about 200 yd. (180 m) north of the Marine Drive-Boundary Road intersection.

In Burnaby, the Lougheed Highway at Gilmore was covered with 18 in. (45 cm) of water. This highway was closed between Coleman and Brunette in Coquitlam after a number of cars bogged down because of soft shoulders created by a washout. Royal Oak near the Oakalla Correctional Centre, Government at Cariboo and Still Creek Road were all closed after Still Creek overflowed. Though rocks and mud obstructed the Barnett Highway, it stayed open to motorists to use at their own risk. In Vancouver, the major problem was at the 3200 block of East Broadway, which was under about 3 ft., of water. In Surrey, 108 Avenue at Old Yale was closed as well as some other less-traveled Surrey streets. New Westminster reported road closures at Front Street and Sixth Avenue, McBride at Cumberland and Brunette Avenue. Columbia Street in front of the B.C. Penitentiary was covered with almost 4 ft. (1.2 m) of water and blocked off. Some flooding occurred

at the Lynn Valley and the Main Street 401 interchanges in North Vancouver city and district. In West Vancouver's Altamont area, Gisby Road, Rosebery and Palmerston avenues were blocked to traffic. Other roads reported closed included Highway 7 between Mission and Agassiz and the 401 interchange at Willingdon Avenue in Burnaby.

By December 27, several highways, including Pacific Highway from Fry's Corner to Cloverdale, Marine Drive at Locarno Beach and a section of the Westminster Highway east of the Deas Thruway, remained closed. At Horseshoe Bay, a detour was still in effect.

Victoria also reported a record rainfall with 2.87 in. (72.9 mm) falling in a 24-hour period. This brought the total there to 10.78 in. (273.8 mm) for the month and 2.37 in. (60.2 mm) over the December record set in 1947. The Victoria International Airport recorded 3.35 in. (85.1 mm) in 24 hours breaking the previous record for 24-hour rainfall of 2.62 in. (66.5 mm) set in 1967.

A high tide on Christmas night caused flooding in North Cowichan and Chemainus. Overnight and on Boxing Day, at least 30 families were flooded out after waters spilled over a tidal creek. Two whole streets in North Cowichan, or about 20 homes were evacuated. In the Chemainus area, about 10 more homes also flooded. The oil tanks ruptured in two of these houses, covering everything inside with 0.5 in. (1.25 cm) of oil. The local mayors wanted their communities declared disaster areas. They estimated the total damage in their areas at more than \$175,000. The damage estimate to homes on Land Street (North Cowichan) alone could be as high as \$150,000. According to Duncan mayor Jim Quaife, most of the flooded homes had 14 in. (35 cm) of water running through the main floor. Some homes on the Cowichan Indian Reserve also sustained some water damage and about 11 people moved out. *2)

On December 27, in North Cowichan the Beverly Street area flooded, forcing more than 50 families to leave their homes. High tides on the Koksilah River grounded a boat and totally demolished a boathouse. The mayors of North Cowichan and Cowichan conferred to have Duncan declared a disaster area. Mayor Quaife recommended proceeding with a proper drainage system. North Cowichan Mayor Gerry Smith said, "It's the worst flooding I've ever seen, and I've been here 50 years." Heather Street in North Chemainus also flooded. Chemainus, Cowichan Bay, the Cowichan Indian Reserve, Centennial Heights and Eagle Heights also suffered from flooding.

The provincial government extended the financial assistance from the Provincial Major Disaster Fund to cover costs of the localised flooding in the Duncan area. By the year's end, approximately 100 claims for private property damage were being appraised (B.C. Water Resources Service).

Road conditions on the Island Highway were poor. Floodwaters up to 5 ft. (1.5 m) deep cut the Chemainus to Crofton road. On December 26, a washout 37 mi. (59.2 km) north of Victoria on the E&N line stalled Dayliner service up island. At Shawnigan Lake, northbound passengers were transferred to buses. In Greater Nanaimo, roads and drainage ditches were also flooded.

At Lions Bay, residents and firemen sandbagged a massive slide that sent boulders running down the hillside into the subdivision. Basements of six homes were inundated with mud and rock. A small slide was caused by Daon Development Limited diverting a small section of a former tributary to Harvey Creek (Lions Brook) into Alberta Creek. *3) Some plugging of culverts and localised flooding occurred (Thurber Consultants 1983).

On December 25, the Rogers Pass on the Trans-Canada Highway closed due to heavy snow. BC Rail and CPR reported minor washouts. A rockslide near Boston Bar derailed the locomotive of a westbound freight train. About 65 passengers on a westbound CPR train arriving at the derailment site were transferred to a CNR train. They were taken across the Fraser River by aerial ferry at Boston Bar and arrived six hours late. Later that day, a mudslide came down west of Port Moody, delaying an eastbound passenger train by 2.5 hours. The Burlington Northern rail line between Seattle-Vancouver was also cut on Christmas Day. Just north of White Rock, slides blocked the line for several hours. Service was restored on December 26.

*1) Plans for a \$15 million program of upgrading the municipality's Fraser, Serpentine and Nicomekl dikes and drainage systems had bogged down over the cost factor. The plans, which would be carried out under the federal-provincial jointly operated Fraser River flood control program, were still being studied in Victoria (*The Vancouver Sun*, December 28, 1972).

*2) The main channel of Cowichan River, where it flows through the Indian Reserve was totally blocked off for some 1,300 ft. (390 m). Ald. John Cannon estimated that as much as 30,000 yd.³ (22,938 m³) of gravel would have to be removed from the river to reduce potential flood risk. The blockage was discovered in the summer of 1973 during the clearing operations to break up a massive logjam. According to Cannon, over the previous 10 years the river bed had been raised by about 10 ft. (3 m) from gravel being washed down from the upper reaches of the river (*Victoria Times*, August 2, 1973).

*3) There is a prior history of debris torrents in Alberta Creek. Sometime between 1932 and 1939, a debris torrent in the creek ran all the way to Howe Sound (Jackson et al. 1985).

January 15-16, 1973

(Mid-winter thaw/flooding).

Source: *The Vancouver Sun*, January 16 and 17, 1973; *Kamloops Daily Sentinel*, January 15, 16 and 17, 1973.

Details: On January 15 around 5 a.m., flooding occurred in the low-lying spots of Georgan Road and Greenacres Road areas in the Westsyde area just north of Kamloops. *1) Hardest hit was the Pahullo Drive area. Without storm sewers or drainage ditches, the frozen soil in the low lying areas was unable to absorb melt water from a thaw caused by temperatures in the 40° F (4.4° C) range and high winds. According to Gerry Hutchison, Kamloops zone Civil Defence coordinator, one area was getting water from a stream that "would fill a 10-in. (25 cm) pipe." Water levels rose as much as 1 ft. (30 cm) in some low-lying areas. Twenty homes were damaged and 100 others were affected.

Overnight January 15-16 with colder temperatures, the flooding eased. On January 17, the last floodwaters were pumped out.

*1) This was the second time this area was hit by mid-winter flooding. During a warm spell in 1968 worse flooding occurred.

February 16, 1973

(Non-fatal avalanche).

Source: Stethem and Schaerer 1979 (pp. 79-81).

Details: On February 16, an avalanche on Whistler Mountain buried a skier. It took place on the north slope of Whistler Peak on the low traverse to Whistler Bowl at 2 p.m. It was observed and reported by people riding the Alpine T-Bar. The avalanche was triggered by the skier on a crust created by above-freezing temperatures with mixed rain and snow on February 16 and below-freezing temperatures overnight. Fresh snow, probably combined with some southerly or southwesterly wind overnight, created the slab. Swept downhill by the moving snow, the skier found himself able to stay on top by using a swimming motion. At the last minute he was dragged down and buried. Twenty minutes later the victim was uncovered from a crouched position with his head about 0.6 m below the surface. The only injury sustained was a slight head cut from a shovel when he was dug out.

The avalanche fractured at an elevation of 1,885 m through a depth of 5-30 cm of fresh snow. It was approximately 45 m wide, and ran approximately 100 m on an open slope, depositing snow to a maximum depth of 2 m. The slope gradient in the release area was about 40° with a north aspect (Stethem and Schaerer 1979).

May 23-25, 1973

(Rain-on-snow).

Source: Thurber Consultants 1983 (Appendix B); Evans, unpublished data.

Details: On May 23, a heavy rainfall combined with snowmelt caused high flows in Harvey Creek. This resulted in erosion of banks and around bridge footings. Near the Korol residence, Lot 33 Cloudview Place, local overtopping occurred. Opposite the Anderson residence, Lot 17 Seaview Place, it also caused a landslide. This slide undermined a house, forcing its owner to relocate it and protect the slope (Thurber Consultants 1983). *1)

On May 25, a flow slide occurred from a coal waste failure on the east side of Natal Ridge, West Kootenay Coal field. The estimated volume of 1.1 million m³ of debris ran out 2.5 km from the dump toe (Evans, unpublished data).

*1) Shortly before the slide, an effort had been made to anchor a neighbouring house. The owner had undertaken some grouting in an attempt to stabilise the high bank (Thurber Consultants 1983).

June 23-26, 1973

Source: *Revelstoke Review*, June 28, 1973; *Daily Colonist*, June 27, 1973.

Details: A full week of continuous rain caused washouts east and west of Revelstoke causing travelling delays to holiday traffic. On June 23, heavy rain caused the creek flowing into Griffin Lake 18 mi. (28.8 km) west of Revelstoke (Camp Creek) cut the highway. *1) It caused long line-ups and left west bound cars stranded in Revelstoke.

Around June 26 (?), heavy rains resulted in mud and gravel to come down onto a 300-ft. (90 m) portion of the Trans-Canada Highway 17 mi. (27.2 km) west of Revelstoke. The highway, which was closed for about 12 hours, initially reopened for single-lane traffic.

*1) At the same location, a large mudslide killed four people on June 5, 1968.

August 1, 1973

Source: *The Province*, August 2, 1973; *The Vancouver Sun*, August 15, 1973.

Details: On August 1, a rockslide into the Chilcotin River that created rapids several hundred feet long did not appear to have blocked salmon runs. The slide was reported to fisheries authorities by a river guide as having created a 30-35 ft. (9-10.5 m) drop downstream over a 200-ft. (60 m) distance at a point about 5 mi. (8 km) from the confluence of the Chilcotin and Fraser rivers.

October 12-13, 1973

Source: *The Vancouver Sun*, October 13, 1973.

Details: Between 11 p.m. on October 12-5 a.m. on October 13, the Vancouver airport recorded 0.65 in. (16.5 mm) of rain. Abbotsford and Victoria recorded 0.92 and 0.81 in. (23.4 and 20.6 mm), respectively. Early on October 13, the heavy rain caused flooded basements in Surrey. Some 15 homes were inundated to a depth of 2-3 in. (5-7.5 cm).

A 50-ft. (15 m) long and about 9-in. (22.5 cm) deep mudslide came down and blocked King Road. The slide, which started on steep cliffs above the road also blocked one of the several routes to the CNR workshops at Port Mann yards.

October 27, 1973

(Flash floods).

Discharge (m³/s): Max. daily: October 28: Squam.: 1,190; max. instant.: 1,470.

Source: *The Province*, October 29 and 30, 1973; *The Colonist*, November 6, 1973; Environment Canada 1991.

Details: On October 27, a flash flood surrounded a logging camp in Toba Inlet, about 45 mi. (72 km) northeast of Campbell River. The Rainbow Mountain Logging camp, which was situated at the

bottom of a waterfall near the mouth of a creek was totally buried in mud. During heavy rains, the creek was blocked by a debris jam lodged near the top of the waterfall. A dam was built behind the jam, diverting the creek down a switch-backing logging road, effectively surrounding the camp. A lone caretaker marooned in the camp, was rescued by helicopter and flown to Campbell River.

Heavy rain overnight October 27-28 caused flash floods between 2-3 a.m. on October 28. The torrential rains washed out a 40-ft. (12 m) of Highway 99 near Brandywine Falls, 30 mi. (48 km) north of Squamish. The break occurred at a washed out culvert and bridge on a new stretch of highway about 1 mi. (1.6 km) north of Brandywine Falls. Scores of people were left stranded at Alta Lake and beyond. During the night of October 28, construction of a temporary Bailey bridge commenced. The highway was not expected to reopen till October 31. Late on October 27, a washout cut the rail line and interrupted service.

November 27, 1973

Source: *Victoria Times*, November 28, 1973; *The Vancouver Sun*, November 28, 1973.

Details: Between 10 p.m. on November 27-4 a.m. on November 28, the Lower Mainland recorded an additional 0.6 in. (15.2 mm) of rain. A minor mudslide occurred at the north end of the Fraser bridge blocking the Burlington Northern railway line for about two hours. Early on November 28, widespread basement flooding was reported in Coquitlam and Delta. The 100 block of Schoolhouse Road was closed because of flooding. In Burnaby, Parker from Howard to Holden closed due to a break in the water main.

During the 24 hours ending 4 a.m. on November 28, the Victoria area received 0.4 in. (10.2 mm) of rain, making it the “wettest day of the year.” On November 28, some excavations between the Trans-Canada Highway-Cowichan Bay were flooded with about 3 ft. (90 cm) of water. The steady rains also caused problems on the Tzouhalem Road east of Duncan where Somenos Creek flooded the road to a depth of 6-8 in. (15-20 cm). Kelvin Creek flooded the Old Koksilah Road. Both roads remained passable.

December 15, 1973

(Rain-on-snow).

Discharge (m³/s): Max. daily: December 15: Zeb.: 328; December 16: Cowich.: 215; Sproat: 183; max. instant.: December 15: Zeb.: 682; December 16: Cowich.: 219.

Source: *The Victoria Express*, December 18, 20 and 22, 1973; April 9, 1974; *North Island Gazette*, November 18, 1987; *The Daily News*, December 17, 1973; Nasmith and Mercer 1979; Scanlon et al. 1976; Environment Canada 1991.

Details: On December 15 at 1:15 p.m., heavy rains caused a debris flow to hit Port Alice on northern Vancouver Island. It cut through the centre of the new townsite. The slide, which destroyed a bridge, damaged 15 houses, leaving 10 families homeless and cut off utilities. One house was pushed 70 ft. (21 m) off its foundations.

The slide, which occurred lasted for about 90 seconds, was 150 ft. (45 m) long and 200 ft. (60 m) wide. *The Victoria Express* reported the slide as about 1 mi. (1.6 km) long and 200 yd. (180 m) wide. According to eyewitnesses, it “sounded like a long, heavy wind coming up,” or “a loud explosion,” depending on where they were (*The Daily News*, December 17, 1973). Dick Fuller, Chairman of the Port Alberni Parks and Recreation Commission, said, “it all started with a loud explosion, then there was a series of bangs, like claps of Thunder.” (*The Victoria Express*).

The flow was triggered by small earth slumps on the steep mountain slopes above the town. The mixture of forest debris, rocks, soil, and water was semi-liquid and moved down a steep narrow gully out onto the fan on which Port Alice is built. *1) The debris came down the northern gully of the two that come down towards the townsite. The volume of the debris was estimated at 22,000 m³. The velocity of the debris as it spread through the town was reported by observers to be a “brisk walking pace” (5 km/h). It broke through a stand of 300-mm diameter trees and moved the first house it reached off its foundation. When the debris came to a rest it blocked the creek channel,

diverting creeks through the town. The flows from the heavy rain washed debris into basements and carports and deposited it on roads and lawns. Though substantial damage occurred, estimated at \$500,000 there was no loss of life (Nasmith and Mercer 1979). A bridge on the road to the Rayonier mill washed out. It was scheduled to be repaired in order to allow the mill to re-open sometime on December 18 (*The Daily News*, December 17, 1973).

Women and children were evacuated to the Rayonier Canada Ltd. bunkhouses at June Landing about 5 mi. (8 km) along Neroutsos Inlet. Mobile homes were brought into Port Alice to accommodate 12 families left homeless. Because private insurance companies do not cover "acts of God," the government compensated all families for personal property losses.

A substantial depth of snow (1-2 m) had accumulated at the upper logging road above the townsite prior to the onset of the storm. About 130 mm of precipitation occurred during the 24 hours preceding the slide. Precipitation occurred initially as snow at the upper logging road. As temperatures rose dramatically this soon turned into rain. The storm continued after the debris flow occurred. Much of the damage to the town was the result of flooding. According to report done by Crippen Engineering Ltd., it rained every day between November 22-December 15. There was extremely heavy rainfall, 4.44-4.75 in. (110-120 mm), during the 24 hours in the slide area. On December 15, the day the slide occurred there was a sharp rise in temperature to 13° C (55° F), leading to a very rapid melting of snow and a heavy runoff of water from melted snow.

According to an engineering report by Crippen Engineering Ltd., the road above Rumble Beach was unable to adequately divert the runoff and the major cause of the slide. To avoid a reoccurrence of the slide it recommended ditches to be constructed along the road. A second report, by the highways department engineer W. Kerr, noted the danger of another mudslide above the site of a proposed trailer park on the village's outer limits. According to Port Alice mayor Alex MacLeod, Rayonier Canada Ltd. was also conducting a study of possible slides (*The Victoria Express*, April 9, 1974).

*1) The present Port Alice townsite, also known as Rumble Beach, was built in 1965 as an "instant town" to replace the old community that had grown up around the pulp mill located about 5 km south of the present town (Nasmith and Mercer 1979).

January 12-15, 1974

(Rain-on-snow and tidal flooding).

Discharge (m³/s): Max. daily: January 14: Kok.: 183E; January 15: L. Qual.: 132E; Nan. C.: 784; Zeb.: 292; January 16: Stamp A.: 544E; January 17: Cowich.: 220; Sproat: 212; max. instant.: January 15: Nan. C.: 903; Zeb.: 492; January 17: Cowich.: 222.

Source: *The Vancouver Sun*, January 12 and 16, 1974; *The Columbian*, January 12, 14, 15 and 16, 1974; *The Province*, January 14 and 15, 1974; *Nanaimo Daily Free Press*, January 14, 15, 16 and 17, 1974; *The Daily News*, January 15, 1974; *Times Colonist*, July 20, 1983; Environment Canada 1991.

Details: On January 12, ending a two-week coldsnap a rainstorm melted about 6 in. (15 cm) of snow on the Lower Mainland. The storm, which hit the Lower Mainland with 6 in. (15 cm) of snow turned to rain, causing havoc with traffic and disrupted airline schedules. Snowfall was also general on southern Vancouver Island, Washington, Okanagan and Kootenays. During January 12-13, Vancouver reported 0.87 in. (22.1 mm) of precipitation, while Victoria and Abbotsford recorded 1.60 and 1.94 in. (40.6 and 49.3 mm), respectively. On January 14, up to 22 in. (55 cm) of new snow fell on northern Vancouver Island roads.

On January 13 in the Haney-Maple Ridge area, over 3,000 phones were temporarily out of order after heavy rain caused a manhole to fill with water at about 6 a.m. Burnaby RCMP closed Canada Way and Royal Oak for about an hour while other roads in Port Moody, New Westminster and some Vancouver roads were closed due to treacherous conditions. In New Westminster, more than 20 early morning accidents were attributable to the snowfall.

The rain changed into a snowstorm when moving through the interior, blocking many roads. Late on January 13, the freezing levels were reported at 4,500 ft. (1,350 m) On January 13 at 2 p.m., the Fraser Canyon was closed while the Rogers Pass was not scheduled to reopen before midnight January 13 at the earliest. Revelstoke reported about 26 in. (66 cm) of snow. Early on January 13, Rogers Pass section of the Trans-Canada Highway remained closed because of heavy snowfall and icing. Some 16 in. (40.6 cm) of snow fell. By early January 15, some 6 ft. (1.8 m) of snow had fallen in the Rogers Pass. The Trans-Canada Highway through the Fraser Canyon was open for six hours on January 13. It was later closed indefinitely due to a massive snow slide at Jackass Mountain, between Lytton-Boston Bar. A semi-trailer truck was trapped beneath the slide. The RCMP believed the driver escaped. It was not known whether other vehicles had been trapped.

During the night of January 14, snowplows reached three cars trapped at Hells Gate by snow slides. For five hours the cars had been trapped in a tunnel 5 mi. (8 km) from Hells Gate. On January 15, a Greyhound bus and a "score" of semi-trailer trucks and up to 100 cars were trapped in the snow-bound Fraser Canyon, which was covered by about 3 ft. (90 cm) of snow. On January 16, about 200 people were still stranded in Boston Bar. Some were trapped for 48 hours between two mountain tunnels 20 mi. (32 km) south of Boston Bar.

During the night of January 14-15, a 130-ft. long snowslide in the Marble Canyon area of Kootenay National Park closed Highway 93. On January 15, heavy snow closed the road west of Alexis Creek in the Chilcotin. According to a highways department official, it would take several days to plow it out.

Telephone service along the highway was out and the CNR mainline near Boston Bar was blocked in several places. According to CPR lineman Hank Allemeersch, the conditions were the "worst he could recall in 26 years." CPR trains were running but many hours late due to snowplow operations. Washouts stranded two westbound CPR trains in the Fraser Canyon. Passengers were flown to Calgary to make connections while CNR continued to fly train passengers between Vancouver-Kamloops.

In the Interior, rain adding to a three-day accumulation of melting snow, flooded and closed down several highways. Near Kamloops, the Trans-Canada Highway was flooded to a depth of 2 ft. (60 cm). Flooding also occurred between Kamloops and Princeton and between Merritt-Spences Bridge, where a mudslide further restricted traffic. On January 16 as snow turned to rain, a block-long section of the Trans-Canada Highway was flooded up to 3 ft. (90 cm) deep. East of the outskirts of Kamloops, another section was closed due to flooding. In Kamloops, where on January 15 the temperature went up to 55° F (12.8° C), basements flooded. Flooding was also reported from Merritt and Spences Bridge. The Merritt sawmill was closed after it flooded with 2 ft. of water in the mill yard. Due to treacherous road conditions all rural schools in Kamloops were closed. On January 16, the Roger Pass remained closed due to slides. Motorists were advised to stay off the Hope to Princeton section of the Trans-Canada Highway because of ice and snow.

A "giant slide" that came down 3 mi. (4.8 km) south of Bridge River knocked down or damaged five hydro towers carrying one of the two transmission lines from the Peace River to the Lower Mainland. One tower was carried 150 ft. (45 m) downhill by the slide near Seton Portage. Bulldozers were working to punch a road through 20-ft. (6 m) snowdrifts to reach the scene.

On January 13, gale warnings were in effect for Georgia Strait. On Vancouver Island, the storm with winds up to 70 mph (112.7 km/h) caused extensive damage and power outages in the Alberni Valley, the Duncan area and the Gulf Islands. Roads were blocked and power and telephone service disrupted. Flooding was reported from the Duncan area where both the Cowichan and Chemainus rivers overflowed their banks. *1) The flooding was the worst at high tides when over 5 ft. (1.5 m) of water covered the Cowichan Road. South of Nanaimo in the Cedar River area, eight families whose homes were threatened by flooding were evacuated. Portions of Cathedral Grove were flooded. Tributaries of Cameron River were eroding their banks.

Homes in the Cedar, Chemainus and Lake Cowichan areas were flooded up to 4 ft. (1.2 m) of water or more. Floodwaters moved cars up to 100 ft. (30 m), some of which disappeared

altogether. Following three days of heavy rain, the Nanaimo River flooded low-lying areas and a number of rural roads, forcing the evacuation of at least 18 persons. In the morning of January 15, floodwaters from the rain and melting snow and an extremely high tide inundated Rains Road, which runs parallel to the Nanaimo River south of Cedar Road. Late on January 15, families trapped by floodwaters evacuated as the river reached “a higher level than any previous flooding in the memory of most residents.” It also spread further as waters covered roadways, fields and nearby land. On January 15, the road to Cedar and Harmac were cut. The Cedar area was flooded on both sides of the river from the Cedar bridge towards the sea. Wilkinson Road was covered with about 2-3 ft. (60-90 cm) of water. The force of the current through trees and fences made rescue operations difficult. On January 16, floodwaters endangered many residences in the Cedar area and Haslam Creek district. According to band member Jerry Brown, the Nanaimo River threatened a number of the Nanaimo Indian Band’s homes. He described the flooding conditions “which have become almost an annual event,” as “the worst I’ve ever seen.” Mike Leach, administrator of the Nanaimo Indian Band assessed the damage at several thousand dollars. Families of six houses were taken out by boat. Closure of the Cedar Road from the Trans-Canada Highway to the bridge meant that rescue workers had to get there by driving the long way around. Floodwaters damaged the Cedar Waterworks system making part of the equipment inoperative and making the system operate with reduced pressure.

Ice, flood and wind conditions stopped operations at both Crown Zellerbach (CZ) and MacMillan-Bloedel (MacBlo) logging divisions on January 15 and 16 CZ operations were shut down because of “terrible” conditions of the flooded loading areas, washed out roads along lower levels and of ice on upper road levels. MacBlo operations at North west Bay area were shut down because of fallen trees and washouts. Their Chemainus and Shawnigan districts were partially shut down for the same reasons as well as flood conditions.

Overnight January 14-15, the Port Alberni area was hit by winds gusting to more than 50 mph (80.5 km/h) accompanied with nearly 2 in. (50 mm) of rain. Damage to the \$2 million Alberni District Secondary School was estimated at \$500,000 after wind ripped off most of the roof of three of the school’s four wings. After rain and wind wrecked 47 of the 50 classrooms, the school was closed indefinitely forcing 1,200 (1,500?) students to be placed elsewhere. On January 15, all schools in Port Alberni were closed because of the danger of falling trees and downed powerlines. The high winds reported at 80 mph (128.7 km/h) caused a partially constructed home in the 300 block 6th Avenue South in Port Alberni to collapse. The high winds broke hundreds of logs loose from their booms, congesting Alberni Inlet. The wind-driven wood was pushed up into the Somass Division sawmill area, forcing MacBlo officials to call off the afternoon crew at the plant. A barometer reading at the weather station of 29.88 in. was the lowest in the three-year recorded history at the station. Around Sproat Lake, hydro service would be out for most of January 15. The Somass River and water levels in Alberni Inlet were rising, flooding low-lying areas in northern Port Alberni. The inlet was also congested with logs broken loose from their boom on the west side. At Tofino, winds were reported gusting up to 80 mph (128.7 km/h).

The storm was described as the “worst storm of the winter” with trees falling “like tenpins” (*Nanaimo Daily Free Press*, January 15, 1974). At Ivy Green just north of Ladysmith, a propane truck drove into a falling 200 ft. (60 m) tall fir tree that came down onto the Trans-Canada Highway. The tree also knocked down the telephone lines.

The storm also broke up logjams in Alberni Inlet and damaged roofs of homes. Early on January 15, the Alberni to Parksville highway was closed. By 9:30 a.m., it was reopened to one-lane traffic only. The second lane remained closed due to a highways truck being pinned down by a fallen tree. A falling tree hit at least one other car. The highway was later closed again. The entire highway from Nanaimo to Cathedral Grove was affected by the rainfall and high winds. It was littered with trees and debris while Cameron Lake threatened to flood the highway. BC Hydro reported an unprecedented number of outages from gale-force winds inflicting considerable damage, especially south of Nanaimo.

In the Coombs-Errington district, small farmyards were flooded. In Parksville, the banks near the Englishman River eroded. Both Nanoose and Morello creeks burst their banks. Near the highway, floodwaters of Nanoose Creek lapped at the front door of a mobile home.

Though several levels of the provincial government investigated the flood conditions throughout Vancouver Island to determine if the sustained damage warranted the “disaster” label, those who suffered damage and losses held little hope of reimbursement.

*1) North Cowichan Mayor Gerry Smith pressured the government into participating in a \$3 million dredging and dyking program to control the Cowichan River from overflowing its banks in winter, flooding nearby streets and homes. The provincial government already intended to meet on September 15 to discuss a plan to protect low-lying areas of Duncan and North Cowichan. In July 1983, a \$500,000 flood control program for the Cowichan River started. The dyking work to protect the area from 200-year flood levels was expected to take 6-8 weeks to complete (*Times Colonist*, July 20, 1983).

January 28-31, 1974

Source: *The Columbian*, January 30 and 31, 1974; *The Hope Standard*, January 30, February 6, 1974; *The Daily News*, January 30, 1974.

Details: During January 28-29, heavy rains occurred in the upper Fraser Valley and Fraser Canyon. The disturbance, which developed on the front between the warm and the cold air, caused some heavy precipitation near the mountains. On January 29, following a record rainfall of 4.67 in. (118.6 mm) in 24 hours, very strong winds hit the Hope area. During the previous 19 days, Hope had recorded a total of 26.18 in. (664.97 mm) or 6.25 in. (158.75 mm) during 48 hours ending January 29 at 4 p.m.

*1) At higher elevations, the rain changed to snow in “highway-closing amounts.”

The Hope to Princeton section of the southern Trans-Canada Highway was closed due to five snow avalanches in the Allison Pass area. Slides occurred at 21 Mile and the “burn” area. About 2 ft. (60 cm) of wet snow fell in the 4,500-ft. (1,350 m) pass in a storm that saw winds gusting to more than 80 mph (128 km/h). A Department of Highway truck was damaged by a slide, but there were no injuries. On January 30, The Hope to Princeton highway reopened but the Rogers Pass section of the Trans-Canada Highway remained closed due to a series of snow slides. The Rogers Pass reopened late on January 30. On January 31 at 4:30 p.m., heavy snow, extremely slippery conditions, 2 mi. (3.2 km) west of the Sailor Bar tunnel and a number of slides between Alexandra and China Bar Tunnel closed the Canyon Highway.

On February 3, the Haig highway closed due to a rockslide about 1 mi. (1.6 km) west of the weigh station. An overhanging rock was left unsupported threatening to come down had to be blasted away. The highway was expected to re-open late on February 6 or early on February 7.

New Westminster recorded 2-6 in. (5-15 cm) of snow, which caused traffic slowdowns and several fender-benders. Tie-ups occurred in the usual spots along the Scott Hill and Peterson Hill approaches to the Patullo bridge and traffic in Newton was slowed considerably. Surrey and Delta received 2-4 in. (5-10 cm) of snow, while Langley and points east reported 6-8 in (15-20 cm).

*1) This rainfall on January 29-30 set a new 24-hour January record (*The Columbian*, January 31, 1974).

February 28-March 1, 1974

Source: *The Alberni Valley Times*, March 1, 1974; *The Daily News*, March 1, 1974.

Details: Snow slides on the Alberni to Tofino highway cut Tofino, Long Beach and Ucluelet off from the rest of Vancouver Island. On February 28 and again on March 1, three snow slides in the Sutton Pass, 27 mi. (43.2 km) west of Port Alberni, blocked the Tofino highway. About 100 people were stranded each time. Though the road was open for several hours in between slides, it was closed for a total of 17 hours. The first one was actually two slides close together that covered a 90 ft. (27

m) wide stretch of the road with snow up to 15 ft. (4.5 m) deep. The slide on March 1 was 100 ft. (30 m) but only 4 ft. (1.2 m) deep. There were no injuries reported. Heavy rain-soaked snow initiated the slides, which are a rather rare as some years no slides occur here at all.

March 10-17, 1974

Source: *The Hope Standard*, March 13, 1974; *The Columbian*, March 18, 1974; *The Ashcroft-Cache Creek Journal*, March 21, 1974; *The Vancouver Sun*, July 22, 1974.

Details: On March 10 between 2-3 p.m. , a snowslide occurred at 20-Mile on the Hope to Princeton highway. The slide, 8-10 ft. (2.4-3 m) deep, came down from 500-600 ft. (150-180 m) and covered both lanes for a distance of about 200 ft. (60 m). At 7:45 p.m., the highway reopened to one-lane traffic.

On March 17 at 4:30 a.m., a rockfall at Mile 74.9 about 1 mi. (1.6 km) west of Spences Bridge derailed an empty eastbound 87-car CPR coal train killing two members of the train crew. After hitting the rockslide, the train plunged 200 ft. (60 m) down a cliff blocking the Trans-Canada Highway. Upon impact, the train slid about 60 ft. (18 m) before careening over the bank. One diesel engine ended up on top of the other, which was accorded to about half its original size. Two empty coal cars landed perpendicularly up the bank to the bank above. It took about two hours to free the two men trapped in the engine. About 24 hours after the accident, early on March 18 the highway reopened to one-lane traffic. Section foreman Ljubo Bukvic, who went by the area where the slide occurred twice the previous day, saw nothing unusual. "I have never seen one rock fall in that area in 21 years." *1)

According to MP Mark Rose, slide fences (slide sensors, electronic monitors that in event of a slide automatically trigger train signals) might have given warning had they been working.

*1) A government commission probing the fatal CP Rail derailment learned that a similar slide to the one that occurred on March 17 was possible. Roadmaster James Tarasoff agreed that at Mile 74.9 there was a "significant section of more rock to descend on the tracks." (*The Vancouver Sun*, July 22, 1974).

April 16-18, 1974

Source: *The Province*, April 16, 1974; *Oliver Chronicle*, April 18, 1974.

Details: During the middle of April, a combination of unusually high runoff from the Park Rill area north of Oliver, recent rainfall and high water levels in the Okanagan River caused flooding at the south end of Island Road. This area normally drains into the Okanagan River. Fifteen properties were flooded with up to 3 ft. (90 cm) of water.

In anticipation of heavy high level snowmelts later in the season, the Water Resources Branch had kept the river at a high level in previous weeks in order to draw down Okanagan and Skaha lakes. After residents complained, the flow in the river was reduced from 1,850 cfs (52.4 m³/s) to 400 cfs (11.3 m³/s). Subsequently, the water level in the Island Road area dropped about 4 ft. (1.2 m) overnight April 17-18. This cutback in flow was scheduled to continue for 72 hours. Since April 16, when the gates had been closed, water levels in Skaha Lake had risen 6 ft. (1.8 m).

April 20, 1974

Source: *The Vancouver Sun*, April 20 and 22, 1974.

Details: On April 20 at 8:30 a.m., a rockslide blocked the BC Rail line 2 mi. (3.2 km) south of Porteau Station, between Britannia and Horseshoe Bay. After a 10-hour delay, traffic on the line resumed. The slide did not affect highway traffic.

May 22-25, 1974

(Spring runoff).

Source: *The Vancouver Sun*, May 27, 1974.

Details: Four days of rain caused some local flooding in the Lower Mainland and the Fraser River runoff took a sharp climb. In the four-day period ending late on May 25, the Vancouver International Airport recorded 2 in. (50 mm) of rain. Almost double that amount fell on the North Shore. This brought the total rainfall up to May 26 to 4.62 in. (117.3 mm), just short of the May record of 4.76 in. (120.9 mm) set in 1948.

On May 27 at 8 a.m., the Fraser River stood at 14.17 ft. (4.25 m) at the Mission gauge, a climb of 2.4 ft. (72 cm) since May 25. This rise was attributable to province-wide rain on May 24-25 and warmer temperatures.

June 14-28, 1974

(Spring runoff/flooding).

Source: *The Chilliwack Progress*, June 19 and 26, 1974; *The Kelowna Daily Courier*, June 22, 1974; *The Province*, May 17; June 24, 1974; *The Vancouver Sun*, June 15, 18, 19, 20 and 21; August 10, 1974; *Victoria Times*, June 19, 1974; *The Quarterly*, Fall 2002.

Details: In the spring of 1974, British Columbia was facing the most critical spring runoff flood threat since 1948. Mid-May snow readings showed record snowpacks throughout the mid and higher elevations in the southern half of the province. The unseasonably cold first two weeks of May reversed higher than normal April temperatures, which had increased the runoff at lower and mid elevations. Cold weather during the second week of May produced an increase in at least six snowpack areas, instead of a gradual decrease.

While no complete snowpack levels were available for 1948, it was believed in 1974 the snowpack was higher than in 1948. Also, the water equivalents in the 1974 were extremely high. Consequently, it was generally felt that the same potential flood conditions existed in 1974. In the first two weeks of May, for example, the Okanagan watershed runoff was equal to the total of the four months from April-July 1973. At Penticton, the flood gate controlling Okanagan Lake had been wide open for weeks and would remain so for as long as possible. (*The Province*, May 17, 1974).

On June 14 with temperatures in the southern Interior well above 90° F (32.3° C), Keremeos Creek flooded its banks along a 6-mi. (9.6 km) stretch south of Keremeos. Orchards were inundated and it triggered flood control measures along Similkameen River. Water coming down from Apex Mountain was expected to crest before at least 24 hours. Some low bridges, which had backed up water in 1972, had been removed. *1)

After the Fraser River reached the 20-ft. (6 m) level at Mission on June 18, local manpower centres were placed on the alert with four manpower marshalling centres between New Westminster and Chilliwack. With the Fraser River continuing to rise, Chilliwack was officially put on flood alert on June 19 at 9:40 a.m. Though the Fraser, Columbia and Kootenay rivers had not peaked yet, the Kettle, Similkameen and Okanagan rivers had all reached their crests.

On June 19 when the Fraser River passed the 21-ft. (6.3 m) mark, the first flooding occurred. In the Nicomen Island and Dewdney areas, the first seepage was reported. On June 19 at noon, the Fraser River at Mission reached 21.23 ft. (6.37 m) up more than 1 ft. (30 cm) from 19.89 ft. (5.97 m) the previous day and recorded a rise of 2.5 in. (6.25 cm) from the 8 a.m. reading. It was expected to reach 22 ft. (6.6 m) at Mission some time on June 20. At Langley, the northern end of 280th Street was inundated to a depth of up to 4 ft. (1.2 m) in places. In Mission, homes on Louie Crescent outside the West Langley dike were surrounded with up to 4 ft. (1.2 m) of water and had their basements flooded. The Sorensen residence at 20883 Louie Crescent was surrounded by water. Part of the Oscar Nordman farm on nearby Allard Crescent flooded after a culvert blew. At Port Hammond, the river flooded a residential area outside the dike. Lesser problems were reported from Seabird Island near Agassiz and in the Kanaka Creek area between Haney and Mission. Seepage at Seabird Island threatened about 200 ac. (80 ha) of farmland belonging to the local Indian reservation. Some flooding continued in the Derby area of Langley. The Vedder River flooded one home in the Keith-Wilson and Hopedale Road area and threatened others in the Greendale area of Chilliwack.

On June 20, the melting of record snow packs in the Galton Range caused hundreds of acres

in Grasmere Valley 45 mi. (72 km) south of Fernie to flood with up to 6 ft. (1.8 m) of water. The creeks in the area had been running rampant for several days and jumped their banks. The flooding peaked late on June 19, causing “thousands and thousands of dollars damage from one end of the valley to the other.” Crops, mostly hay, were destroyed. A large section of the Slee farm’s alfalfa fields near Grasmere were under 6 ft. (1.8 m) of water. According to J. Douglas McDonald, the flooding conditions were the “worst in 51 years.” His sawmill was closed for several days after Rainbow Creek knocked out the mill’s power generator. On the U.S. side of the border, some livestock was reported lost. The Columbia River was expected to cause some flooding at Golden.

Highway 93 was flooded at several points. On the night of June 20, a plugged culvert at Gold Creek flooded and cut Highway 6, 3 mi. (4.8 km) south of Nelson. The floodwaters washed the road out to a depth of 8 ft. (2.4 m) in places and covered it with debris. It closed for several hours and later reopened to one-lane traffic. According to the Highway Department, it would be several months before the road could be fully repaired. The Fraser River at the Mission gauge was expected to crest at the 23.23-ft. mark. On the afternoon of June 21, it registered 22.42 ft. Between June 21-23, the Fraser River dropped 0.26 ft. to 22.12 at Mission. On the evening of June 23 with the highest tides of 15.6 ft. (4.7 m) at the mouth of the Fraser, the river was expected to reach 23 ft. The river finally crested on June 28.

On June 17, flood conditions started to develop on Shuswap Lakes with water levels 8 in. (20 cm) below flood level at Sicamous. A serious flood situation could still develop along the Shuswap, where 65-70% of the snowpack still remained. The rising water levels in Shuswap Lake caused some flooding in Sicamous. About two dozen homes and five businesses were affected in Sicamous. On June 23, Shuswap Lake reached 15.78 ft., still 2 ft. (60 cm) below flood level. It was expected to continue rising at a rate of 4-5 in. (10-12.5 cm)/day and crest about 1 ft. (30 cm) below flood level.

On June 17, rising temperatures pushed creeks over their banks in several areas of the Kootenays. On June 16 and 17, temperatures in the Kootenay areas hovering between 85-90° F (29.4-32.2° C) melted high level snow bringing water levels up in creeks. Rampaging creeks in the Harrop-Procter area, about 30 mi. (48 km) west of Nelson, washed out two small bridges on a side road. In the Harrop, Procter and Crawford Bay areas, washed out gardens and other property damage was reported. Other Kootenay creeks reported causing problems included Goat Creek near Creston, and Salmo River and Wild Horse Creek near Ymir. In Elkford, 20 mi. (32 km) up the Elk Valley from Sparwood, crews ripped up a 100-ft. (30 m) section of the main street about 2 mi. (3.2 km) above the coal mining town of 2,200 to allow Bolvin Creek through. Though the Elk River backed up over the road between Elkford-Sparwood, it remained open to traffic. As a precaution, some 125 students from Elkford were bussed home early from the Sparwood highschool. Around June 18, the Elk River flooded low rural areas in the Fernie area with water continuing to seep through the dikes. Later, a debris jam in the Elk River, about 20 mi. (32 km) north of Elkford, threatened the town and other sections of the Elk Valley. Minor breaks, 4 mi. (6.4 km) west of Fernie were eroding Highway 3. In Elkford, some people were evacuated from a trailer court in a low-lying area. On June 17, a bulldozer trying to clear Bolvin Creek ruptured a natural gas line, leaving Elkford without a gas supply. Bolvin Creek also washed out the village’s domestic water line but enough water was left in the line to supply the town for some time after the break.

At Wasa, 20 mi. (32 km) north of Cranbrook, the Kootenay River covered Highway 95 in spots up to 21 in. (52.5 cm), closing the road. Traffic between the Cranbrook and Fort Steel area was diverted into the Windermere Valley along Highway 95A. High water on St. Mary’s Creek damaged a bridge on the road between Cranbrook and the airport. Debris in the creek caused the bridge to be knocked out of alignment. Around June 18, the Kootenay River overflowed its banks a few miles east of Cranbrook, flooding fields for 0.5 mi. (800 m) on either side.

Floodwaters in the Little Slokan River swept away a logger. The victim’s body was never located. *2)

On June 17, the Similkameen River runoff was leveling off. On that night, water levels in Osoyoos Lake were rising at a rate of 0.5 in. (1.25 cm) an hour. According to provincial water branch engineer Earle Anthony, the lake was above the flood level of 914 ft. (274.2 m) and a rise of another 2 ft. (60 cm) would affect about 70 lakeside properties, including 50 homes. On June 19, the water level in Osoyoos Lake was not expected to rise further and the level on Similkameen River was down from June 17. On June 17, the Similkameen River at Hedley was running at 24,000 cfs (679.6 m³/s) down slightly from the day before. *3) Sandbagging crews managed to stabilise Keremeos Creek, which joins the Similkameen at Cawston. On June 17, streamflow on the Tulameen dropped to 9,000 cfs (254.9 m³/s) from 10,000 cfs (283.2 m³/s) the previous day.

In the Kamloops area, the Thompson River was rising steadily north of the city. On June 17, its level at 25.7 ft. (7.71 m) was still below the danger mark or the 1972 crest mark at 32.5 ft. (9.75 m). On the afternoon of June 18, the North Thompson River at Kamloops rose to 26.8 ft. (8.0 m). On June 19, the Thompson River continued to rise, up more than a foot at Spences Bridge. With colder temperatures in the northern part of the province, the Fraser River started to level off. On June 23, the North and South Thompson River system was only rising slightly.

*1) On August 9, Resources Minister Bob Williams announced the government would provide financial aid to individuals and small businessmen who suffered from flooding earlier in 1974.

*2) In 2002 nearly 30 years later, a fisherman discovered a half-buried skull on Koch Creek in the Slocan Valley. Having recently done a review of all outstanding missing person files combined with specific forensic evidence, allowed the RCMP to make a positive identification (*The Quarterly*, Fall 2002).

*3) The Similkameen River runs into Osoyoos Lake just below the U.S. border at Night Hawk. Its backed up waters cause the lake to rise.

June 21, 1974

Source: *The Province*, June 22, 1974; *The Vancouver Sun*, June 2, 1974; *The Daily Colonist*, June 22, 1974; *The Kelowna Daily Courier*, June 22, 1974.

Details: Early on June 21, an irrigation-induced slump in glaciolacustrine silt occurred in Kelowna. A house off Swamp Road sustained about \$10,000 damage. The mudslide from a hill 100 yd. (90 m) from the house broke through the bedroom wall and filled the entire room to the roofline. It also knocked over a cabin and a garage and damaged a boat and farm tools. A man and his wife escaped the mudslide just by seconds. The slide was probably caused by water from irrigating the property owner's 17-ac. (6.8 ha.) fruit orchard. According to *The Province*, the slide came down from a 75-ft. (22.5 m) hill about 100 ft. (30 m) behind the home.

September 14, 1974

Source: *The Province*, September 16, 1974.

Details: On September 14, a rockslide on Cypress Bowl crushed to death a 48-year old Vancouver man. Two companions who were about 30 ft. (9 m) from the victim were not hurt. The men triggered the rockslide while gathering rocks for a home construction project.

November 13, 1974

Source: *The Province*, November 16, 1974.

Details: Late on November 13, a mudslide on the Upper Levels Highway near Rogers Creek trapped two cars. Waterlogged gravel and earth was blamed for the slide, which blocked the highway until early on November 14. Following a heavy rain, more material could come down from the area. As a precaution, traffic was rerouted to the future eastbound lane of the divided highway.

November 20 and 24, 1974

Source: *Victoria Times*, November 20, 1974; *The Province*, November 25, 1974.

Details: On November 20 at 5:30 a.m., a slide near the Rock Cut on the Malahat caused \$400 damage to a southbound panel truck. Traffic on the highway was reduced to one lane for more than four hours. This was the third slide in the area in one-and-a-half months. No damage was reported in the earlier two slides. The Highway Department had been widening the road north of the slides but not done any work where the slides took place.

On November 24, a small rockslide came down onto the Trans-Canada Highway about 20 mi. (32 km) west of Revelstoke. It knocked down number of telephone poles cutting telephone and telegraph communications to Revelstoke for several hours.

Ca. 1974-1975

Source: Ministry of Transport File 32350-40750.54 May 23, 1995. Hardy Bartle.

Details: Small rockfall debris came down near west portal of Elke Tunnel, segment 1395, km 12. 1-ft. dia. Rock went through windshield of west-bound car. The driver struck in the head with debris and was killed when the vehicle left the road. Injuries due to rockfall were minor compared to injuries from vehicle crash.

February 9-25, 1975

Source: *The Hope Standard*, February 12 and 19, 1975; *The Vancouver Sun*, February 13, 1975; *Revelstoke Review*, February 20, 1975. *The Province*, February 15 and 25, 1975.

Details: Between February 9-11, the Hope airport recorded 21 in. (52.5 cm) of snow in three days. Overnight February 11-12, snowfall amounts ranged from about 8 in. (20 cm) at Hope to over 1 ft. (30 cm) at Boston Bar. Between the afternoon of February 11 and February 13, the Hope airport recorded a total snowfall of 2.5 ft. (75 cm) while just over 40 in. (100 cm) fell at Boston Bar. In Chilliwack, freezing rain was falling. On February 12, some Fraser Valley schools did not open. A warm west wind averaged 35 mph (56.3 km/h) with gusts up to 44 mph (70.8 km/h).

Early on February 10, a small slide came down at Sailor Bar blocking one lane of the highway for a couple of hours. Early on February 12, six slides occurred between Yale and Boston Bar blocking the Fraser Canyon Highway, which was not expected to be cleared for three days. Seven front-end loaders were working round the clock to clear a 27-mi. (43.2 km) stretch hoping to reopen the highway to convoy traffic on February 15.

Highways crews were unable to get past the Ferrabee tunnel. A slide estimated at 30 ft. (9 m) wide and 20 ft. (6 m) deep blocked a detour around an earlier rockslide. A slide at Hell's gate was reported 30 ft. (9 m) wide and 20 ft. (6 m) deep. Three more slides came down 1 mi. (1.6 km) further east on Hoodoo Hill between the Airtram and the China Bar tunnel. The largest of these was about 15 ft. (4.5 m) deep covering 150 ft. (45 m) of the Trans-Canada Highway. Other slides came down at Sailor Bar and at Bell's Crossing, about 3 mi. (4.8 km) east of Yale. CPR reported several small slides.

Snow totaling 4 ft. (1.2 m) closed the Fraser Canyon on February 12 at 3 a.m. More than 22 slides came down between Yale and Sailor Bar; 18 more south of Boston Bar and another eight just north of Boston Bar. A Highway's foreman rated the snowfall "almost comparable to the one in 1972 but definitely not as bad." As it was light snow, it caused no problems for the railroad plows. During the night of February 11, the Trans-Canada highway between Abbotsford and Chilliwack was closed. Between 1:30-4 p.m. on February 12, the Hope to Princeton Highway closed at the Allison Pass. On February 15 at 4 p.m., the Fraser Canyon section of the Trans-Canada Highway was reopened to traffic.

Early on February 12, three slides in the Cheakamus Canyon closed Highway 99 between Squamish-Whistler. At about 8 p.m., the highway opened to single-lane alternating traffic.

On February 19, the Rogers Pass in Glacier National Park was closed all day. Up until February 18, Revelstoke had received 200.8 in. (5.1 m) of snow. Around February 20, the Rogers

Pass was closed several days. Designated workers of the striking employees of the Public Service Alliance of Canada cleared the snow and opened the pass around February 25.

Early March 1975

Source: *Revelstoke Review*, March 15 (16?) and 23, 1975; *The Vancouver Sun*, March 19, 1975.

Details: Up until March 14, Revelstoke had received 306.7 in. (7.79 m) of snow. The winter's heavy snow caused the roof of the Golden Curling Rink to collapse early March, shortly after a women's evening curling draw was completed. A few days later, a further portion of the roof gave way while the remaining center section was expected to also fall.

During the middle of March, snow slides caused traffic interruptions on the Trans-Canada Highway through the Rogers Pass and the CPR *Canadian*. Train and highway traffic was halted for a few days. The trouble spots were around the Laurie Tunnel and the highway sheds across the Illecillewaet.

The northern 80-unit campground of Okanagan Lake Provincial Park closed after an earthslide destroyed part of the access road.

April 8, 1975

Source: *The Province*, April 9, 1975.

Details: On April 8, a mudslide 25 mi. (40 km) east of Revelstoke closed the Trans-Canada Highway for two hours. The slide measured a length of 100 ft. (30 m) and was between 8-10 ft. (2.4-3 m) deep. Initially, the highway only opened to one-lane traffic.

April 28, 1975

Source: *The Vancouver Sun*, April 29 and 30, 1975; *The Daily Colonist*, April 29, 1975.

Details: On April 28, a 200-ft. (60 m) section of the Trans-Canada Highway collapsed and slid into Little Shuswap Lake 3.5 mi. (5.6 km) east of Chase. It left a 220-ft. (66m) wide and approximately 100-ft. (30 m) deep hole in the two-lane road at a point where the highway runs about 100 ft. (30 m) above the lake. The section that collapsed had been built up by fill that was brought into the area when this section of highway was built. The highway was closed indefinitely. An unused stretch of road near Chase was temporarily reopened as a 1-mi. (1.6 km) detour. Gerry Millar, Regional geophysical and materials engineer, suspected that the earth and rockslide was caused by spring overflow which seeped through an abutment and loosened the fill. The CPR mainline, which follows the highway at the point of the slide, was not affected.

July 22, 1975

Source: *The Province*, July 25 and 26, 1975; *The Vancouver Sun*, July 24 and 25; October 7 and 29, 1975; Mokievsky-Zubok 1977; Smith and Patton 1984 (p. 96); Clague and Evans 1994; Clague and Souther 1982 (p. 525); Patton 1976 (p. 26); Evans and Gardner 1989 (p. 710); Brooks and Hickin 1991; Evans and Brooks 1991; Evans 1992; B.C. Ministry of Energy, Mines and Petroleum Resources 1993; Evans, unpublished data.

Details: On July 22, a complex series of landslide events took place at Devastation Glacier (Evans 1992). A large landslide came down the Devastation Glacier near Meager Mountain, 35 mi. (56 km) north of Pemberton (Patton 1976; Clague and Souther 1982). *1) An estimated 12 million m³ of ice and hydrothermally altered volcanic rock broke away from the flank of Pylon Peak. Evans (1992) and the B.C. Ministry of Energy, Mines and Petroleum Resources (1993) estimated the amount of material displaced by the Devastation Glacier rock avalanche at approximately 13 million m³.

The debris slid across the stagnant toe of Devastation Glacier, and flowed at high velocity down Devastator Creek to its mouth (Mokievsky-Zubok 1977; Smith and Patton 1984). Peak velocity estimates are 36 m/s. At the base of the run-up in Pandemonium Creek, the velocity of the rock avalanche reached 100 m/s (360 km/h) (Evans, unpublished data). The overall length of the slide path was 7 km and the vertical path was 1,220 m. The debris avalanche was followed by major

debris flow formed from the talus deposits of ice and soft rock which had collected in a portion of the debris avalanche scar. Both slides traveled roughly the same distance. The debris avalanche also triggered a major secondary slide on the western flank of the Devastator (Evans 1992).

Heavy rain and hot weather had sped up the melting rate of a glacier in a high valley at the 5,500-ft. (1,650 m) level, causing a huge block of ice to break loose and start the massive slide. It traveled at least 3 mi. (4.8 km) before reaching Meager Creek. The slide blocked Meager Creek to form a small lake. This lake later drained slowly by overtopping and incision of the dam (Evans and Gardner 1989; Clague and Evans 1994 p. 9-10).

The quaternary volcanic rocks buried and killed four members of a survey crew hired by BC Hydro to prepare a survey grid for geothermal studies. The men had been waiting on a creek sandbar to be picked up by a helicopter. The pick-up spot was covered with 50 ft. (15 m) of "porridge-like mud, trees and debris." The deep covering of mud was too soft to walk on for searchers. On July 25, RCMP called off the two-day search by 20 police and mountain rescue volunteers, three helicopters and tracking dogs. They were expected to return in two months in order to be able to walk on top of the debris and continue the search for the missing men.

A helicopter search for the bodies of the four missing men scheduled for October 29 was cancelled because it was snowing heavily in the area. The search was not to be resumed till the next spring.

*1) Other large landslides of a similar nature occurred in the same valley in 1931 and 1947 (Mokievsky-Zubok 1977). There also is geological evidence for much larger, prehistoric landslide dams in the Mount Meager and Mount Cayley areas (Brooks and Hickin 1991; Evans and Brooks 1991; Evans 1992).

October 16-23, 1975

Source: *The Hope Standard*, October 22, 1975; *The Vancouver Sun*, October 24; November 18, 1975; December 17, 1988; *The Province*, October 21 and 22, 1975.

Details: Between October 16-20, Hope recorded 5.84 in. (148.3 mm) of rain. On October 17 at 7 p.m., a rock and mudslide occurred when material loosened by the heavy rainfall came down in the highway construction zone near Hunter Creek, 7 mi. (11.2 km) west of Hope. A rock falling on the roof of a car caused \$250 damage. The section of highway was closed all day October 20 and reopened at noon on October 21.

On October 17, a slide occurred on a steep slope in the Capilano watershed (*The Vancouver Sun*, December 17, 1988). *1)

On October 23, rain-swollen Stoney Creek washed out a section of the Squamish highway and a 30 ft. (9 m) of track on the PGE rail line 2 mi. (3.2 km) south of Squamish. The highway was closed at 5:30 p.m. At 5:45, the rail line closed but was back in service by noon the next day. Freight movement slowed down but passengers were transferred around the damaged area.

In West Vancouver, heavy October rains caused flash flooding on McDonald Creek. The rains that caused the flooding were reported of a "50-year cycle" variety (return period). Mayor Peter Jones discussed flood control measures affecting McDonald Creek with engineers of the Department of Highways. Jones wanted to press the highways department to alter their trash racks because they had become plugged easily in the October rains (*The Vancouver Sun*, November 18, 1975).

*1) In December 1988, this slide was getting larger. According to forester Mark Wareing of the Western Canada Wilderness Committee, allegedly this was due to clear-cut logging in the area that commenced in October 1983 (*The Vancouver Sun*, December 17, 1988).

October 29-November 6, 1975

(Rain-on-snow and storm surge/tidal flooding).

Discharge (m³/s): Max. daily: November 3: Sall.: 46.2; November 4: L. Qual.: 128; November 5: Squam.: 1,800E; Stamp A.: 731; Stamp G.: 382E (extreme record); max. instant.: November 3: Sall.: 65.1; November 5: Squam.: 1,950E; Stamp G.: 408 (extreme record).

Source: *The Vancouver Sun*, October 30, 1975; *The Columbian*, October 30, 1975; *The Province*, October 30, November 5 and 6, 1975; *Victoria Times*, November 5, 1975; *The Daily Colonist*, November 6 and 7, 1975; *The Campbell River Courier*, November 7, 1975; *Nanaimo Daily Free Press*, November 10, 1975; *The Daily News*, November 12, 1975; Environment Canada 1991.

Details: During the first week of November, steady to intermittent rain caused flooding in a number of areas. During the first six days of November, the PWA rain gauge (at Campbell River?) recorded 113.8 mm of rain. A surge of warm Pacific air caused the snow to melt. During the earlier part of November, the melting level was around 8,000 ft. (2,400 m). Early on November 6, the Pacific coast was hit by a cold front moving rapidly from off shore. Winds gusting to 70 mph (112.7 km/h) were accompanied by rain, hail, and thunder and lightning.

On October 29, 60 Surrey families were evacuated after torrential rains flooded part of the 127-unit Greenbrook Townhouse Complex on 135th Street and 70B Ave. The damage could run as high as \$100,000. Some of the basements were under 8 ft. (2.4 m) of water. The flooding was blamed an inadequate culvert, which carries the water under 135th Street. The 3-ft. (90 cm) culvert was not large enough to handle the water flow of the creek, which normally only carries a couple of inches. On the evening of October 29, 11 ft. (3.3 m) of water backed up at the culvert and water was running across the road. At 6 p.m., 8 p.m. and at midnight, a diver checked the culvert grating for blockage. By 3 p.m., water started seeping through the basement drains. Within 20 minutes some basements were flooded to a depth of 8 ft. and water started to spill to the ground floor area. BC Housing Management Commission (BCHMC) promised the residents compensation for any losses. *1)

Areas worst hit with flooding were 168th Street north of 64th Avenue, portions of 88th Avenue east of 168th and the Bridgeview area along Scott Road and Old Yale Road. At 4 p.m., Old Yale Road east of Scott Road was closed to traffic. The flooding in that area coincided with high tides of the Fraser River. The Nicomekl and Serpentine rivers also flooded. High tides backed up drain culverts. In Coquitlam, a creek near Schoolhouse Street below Brunette Avenue flooded a number of basements in the district. In New Westminster, some overtopping of ditches in the Queensborough area occurred and a “rash of blocked catch basins.”

Tides driven by strong southeast winds added to the problem. High tides contributed to flooding along parts of the Alouette River near Haney. On November 4, the Alouette River caused localised flooding north of Haney. The river levels subsided by November 5.

On the night of November 3, Coquitlam Lake overflowed its dam. On November 4, heavy rain and warm temperatures caused the Coquitlam River to flood its banks. The rain-swollen river topped the Red Bridge, which was closed to traffic on November 4 but reopened the next day. On November 4, the flooding river also cut off the approaches to the span that serves the Mary Hill district.

During the first week of November, due to heavy rains frequent flooding occurred in the lower-lying areas of Departure Bay.

Floodwaters caused by high tides and heavy rain combined blocked the approaches to the Island Highway Salmon River bridge. On October 29, floodwaters from the Salmon River cut the Island Highway for most of the day. In the Sayward Valley, stretches of the Island Highway were under 3-4 ft. (0.9-1.2 m) of water. Most motorists for the ferry at Kelsey Bay turned back at Campbell River. The ferry *Queen of Prince Rupert* was forced to sail empty. The highway reopened late on October 30 but the RCMP warned that motorists travel at their own risk. On November 5 at noon, the highway between Campbell River and Kelsey Bay reopened.

Near Campbell River, streams feeding Buttle and Campbell lakes, which provide Campbell River with its domestic water supply and source of hydroelectric power, were swollen. *2) The Upper Campbell Lake reached a point 4 ft. (1.2 m) above the recommended winter storage level. The

Campbell River flooded its banks in at least one section along the road to Gold River and also flooded part of the Campbell River Lodge at 1760 Island Highway. Homes along the river's banks were threatened especially when the incoming tides backed up the flow. Although the Oyster River did not flood, some bank erosion occurred.

Slides hampered logging operations in the Gold River area and washed out logging roads. Floodwaters tore free the airplane float at Gold River. At the mouth of the Campbell River, several floatplanes were stranded on a log boom. After BC Hydro opened floodgates on storage lakes upriver, a sudden surge of water tore a log boom loose and surged under five moored aircraft. Logging tugs pulled the stranded aircraft free. Two of them were damaged with punctured floats.

During the first three days in November, 138 mm of rain fell in the Port Alberni area. Early on November 4, with heavy rain, high winds and a 12.5-ft. (3.75 m) tide flooding peaked in Port Alberni. High tides caused the Somass River to flood yards, basements and houses. Some localised flooding occurred along the riverside of River Road, which was built as a dyke. Several Native Indian people were evacuated from a motel unit. On November 4, flooding problems caused the evacuation of 12 homes along the banks of Somass River on River Road and some property damage. A creek in the Beaver Creek district north of Port Alberni filled its storage areas. A 24-hour rainfall of more than 3 in. (75 mm) caused the high level of Cameron Lake, adjacent to Highway 4, the main link between Port Alberni-Parksville. One lane of the highway was covered with 8 in. (20 cm) of water for a distance of 15-20 ft. (4.5-6 m). Sections of the highway to Tofino were also flooded. McCully Aviation of Port Alberni lost a \$19,000 floatplane when it broke loose from its moorings, hit a log boom and sank in the inlet.

On November 4, continuous rain combined with a sudden rise in the freezing level to 7,000 ft. (2,100 m) caused the Cheakamus, Squamish and Upper Squamish rivers to flood. *3) Due to high water in the Cheakamus River in the upper Squamish area dozens of residents were evacuated or commuted by rowboat. Many backroads were impassable and homes were surrounded by 3 ft. of water. On November 5, 14 people were evacuated about 18 mi. (28.8 km) north of Squamish. Most of them were in trailers, some of which flooded with water up to 20 in. (50 cm).

The Daisy Lake reservoir on the Cheakamus River quickly threatened to overflow its dam. BC Hydro was forced to open the dam's gates to regulate the flow, thus increasing the river levels above its banks at some points. About 25-30 people were believed to have left the Cheakamus area north of Cheekye when minor flooding hit their homes. Worst hit were about 12 families at Tantalus Acres, a development about 11 mi. (17.6 km) north of Squamish on the Upper Squamish River, with water reported lapping at trailer windows and car roofs.

The Mamquam River caused bank erosion. The Squamish District carried out emergency bank stabilisation. Because due to the lack of funds the dyke on the Mamquam River had not been extended, floodwaters went around the lower end. Fields and a few basements were lightly flooded.

In Squamish, areas where the Squamish River follows the highway were flooded with 3 ft. (90 cm) of water. Residents of Harris Road, Eagle Run Village and Brackendale used rowboats to get to their homes. About 20 mi. (32 km) north of Pemberton, a flooding Birkenhead River washed out about 2 mi. (3.2 km) of track. A second washout occurred 8 mi. (12.8 km) south of Pemberton at Green River. A washout 7 mi. (11.2 km) south of Pemberton forced a closure of Highway 99. Repairs were expected to be completed on October 31. The Squamish highway also closed after heavy rain washed out a temporary bridge at Stoney Creek, 3 mi. (4.8 km) south of Squamish.

On November 5, the Lillooet River recorded the second highest measured flow for the 65-year period prior to October 10, 1984 with a discharge of 705 m³/s at a gauge height of 5.15 m. The next highest was on June 10, 1969 with a discharge of 637 m³/s at gauge height 3.26 m (gauge heights not related). The maximum instantaneous gauge heights were 5.535 and 3.417 m, respectively. (Smith and Vallieres 1986) *4)

*1) In July 1974, the provincial government had purchased the complex, which the residents now called "Mudbrook," from Nu-West Development Corp. for \$4.72 million. BCHMC rented out the units (*The Columbian*, October 30, 1975).

*2) Spill gates at the John Hart Dam on Lower Campbell Lake are used to control the outflow of water into the Campbell River. Before the dam was constructed, at one point in 1939 the river recorded a flow of 39,000 cfs (1104 m³/s). At present an unusual high flow will run 16,000 cfs (453.1 m³/s), while the average summer rate will be around 4,300 cfs (121.8 m³/s) (*The Campbell River Courier*, November 7, 1975).

*3) The northern end of the Squamish River bank was dyked during the previous winter at a cost of \$550,000. Previously, Squamish requested the provincial government to finance the construction of a dike to bolster the central areas along the Squamish and Mamquam rivers, estimated to cost about \$1.5 million (*The Province*, November 6, 1975).

*4) The average runoff from the Lillooet River near Pemberton for the 65-year period up to 1984 was 126 m³/s. The maximum daily runoff of record was 1,110 m³/s, which occurred on October 8, 1984 (Smith and Vallieres 1986).

November 9-16, 1975

(Rain-on-snow).

Discharge (m³/s): Max. daily: November 13: Zeb.: 728 (extreme record); November 14: Nan. C.: 402; November 15: Cowich.: 236; Sproat: 292; max. instant.: November 13: Nan. C.: 510; Zeb.: 1,180 (extreme record); November 15: Cowich.: 240.

Source: *Nanaimo Daily Free Press*, November 12 and 13, 1975; *The Columbian*, November 13, 14 and 15, 1975; *The Daily News*, November 17, 1975; November 30, 1972; *The Vancouver Sun*, November 30, 1972; *The Province*, November 17, 1975; *North Island Gazette*, November 18, 1987; *The Campbell River Upper Islander*, December 10, 1975; *The Campbell River Courier*, November 14 and 21, 1975; November 26, 1976; *Victoria Times*, November 15 and 17, 1975; February 18, 1976; Nasmith and Mercer 1979; Scanlon et al. 1976; Lewis and Moran 1985 (p. 5.180); Environment Canada 1991.

Details: During the second week of November, Vancouver Island was hit by a week of heavy rain and flooding. Strong winds and heavy seas hampered regular ferry runs between Campbell River-Quadra Island. Sayward was surrounded by water and Courtenay experienced widespread flooding. Around Courtenay, the freezing levels rose from 3,000-7,000 ft. (900-2,100 m). *2) At Comox, in a three-day storm ending in the afternoon of November 14, 4 in. (100 mm) of rain fell and winds gusted up to 50 mph (80 km/h). The Comox Valley, with 9.5 in. (241.3 mm) of rain, was on its way to surpass the old monthly record of 13.5 in. (342.9 mm).

On November 11, the White and Salmon rivers started overflowing their banks, but danger situation did not develop until November 13. On that day one of the most devastating floods hit the Sayward Valley. In Sayward, hundreds of homes were flooded. Some logging equipment was left stranded in rising waters since Remembrance Day. All low lands in the valley about 1 mi. (1.6 km) south of the Salmon River bridge north to the river estuary at Kelsey Bay were flooded with water up to 8 ft. (2.4 m) deep. Also flooded were Sayward Elementary-Junior Secondary School, the White River Court, the Cable Cafe and Link and Pin Museum and Hetty Fredickson's Valley of Thousand Faces. Since November 11, some 12 in. (304.8 mm) of rain fell in the Salmon River watershed in 48 hours. Deep muddy waters covered hundreds of acres in the lower valley and damage was considerable. The sea was a chocolate brown from the floodwaters for at least 0.5 mi. (800 m) into the ocean.

On November 13, in Sayward a Canadian Armed Forces Rescue helicopter dispatched from CFB Comox airlifted 95 stranded people, eight dogs and three cats. At least six people were taken off from the roofs of their flooded homes. Air rescue resumed on November 14 at dawn. All people displaced by the flood were put up at MacMillan-Bloedel, Kelsey Bay Division facilities. The Sayward water supply was knocked out by a mudslide into its domestic water supply. The ambulance was caught outside the village by flood, but medical emergencies were flown to Campbell River.

All roads linking Sayward with the rest of Vancouver Island were cut. On November 15, a mother and her daughter were killed near Port McNeill after passing two barricades, their car fell into a creekbed at a washed out section of Highway 19. The highway and all logging roads were flooded. On November 12, floods beginning south of the Salmon River bridge cut off the highway from Campbell River to Kelsey Bay. Vancouver Island Coach Lines buses to Port Hardy and Port McNeill were cancelled. The Gold River to Port Hardy road was also impassable because of general flooding and slide situations. Other roads on the northern part of the island, including Port Alice road and Port McNeill to Beaver Cove road, were also out. The Island Highway in the Mission Hill area of Courtenay was closed due to flooding of the Courtenay River. Traffic there was diverted over the Dike Road.

In Campbell River, the PWA weather bureau recorded 2.5 in, (63.5 mm) of rain in 24 hours ending noon on November 13. Between Shelter Point-Stories Beach, a creek flooded the Island Highway. On the afternoon of November 13, some homes in the area were reported flooded. The Quinsam River flooded residences in some low-lying areas. River seepage and unseasonable high run off caused the flooding.

On November 13, the Oyster River went on a rampage for the second time in a week. Property owners along the river lost hundreds of feet of land to winter floodwaters. The next day, the RCMP dispatched six men to help residents sandbagging the banks. The Department of Highways dumped "shot rock" in the most affected areas in an effort to contain the water before a 2 p.m. high tide. In nine days, residents along the Oyster River sustained thousands of dollars worth of property loss from two floods in November. They lobbied for temporary protective measures to be taken and for future permanent measures and maintenance to contain the river. *1)

During the storm on November 14-15, which had a duration of 33 hours, two ships reported the maximum wind of 70 knots (112.7 km/h). The storm developed from a frontal wave in mid-ocean on November 13. Swells of 10 m and 6.5 m waves were reported. Shortly after deepening to a minimum of 96.0 kPa, it struck the coast north of Vancouver Island and then deteriorated as it crossed the Coast Mountains (Lewis and Moran 1985).

Around November 12, farmland along the east side of the Trans-Canada Highway on the north part of Duncan was again under several feet of water. The "annual flooding problem" occurred as nearby Somenos Lake "once again flooded onto surrounding land."

On November 13, a mudslide, 2 mi. (3.2 km) long and 0.25 mi. (400 m) wide, wiped out the Tofino water supply. A fire truck pumped emergency water supplies into the distribution system from the swamp that was the municipal supply 25 years earlier. The village water supply was restored on November 16.

Following heavy rain, on November 12 at 11 a.m., another debris avalanche came down on Port Alice. *3) It hit Rupert Avenue, the highest level street in Port Alice. The slide, one of several in the area that day, took place in three stages. The first stage began at the foot of a bluff below a waterfall. It pushed to its right and then stopped as it ran into heavy vegetation. The second stage veered left, running along a rock face and again piled up in heavy vegetation. The third stage, the one that actually reached the town, turned right and cut a curving swath down the mountain to Rupert Avenue. The mud and water then poured through the town (Scanlon et al. 1976). The deluge of mud, trees and debris during the previous two days reportedly wiped out two drainage channels the provincial government built after the 1973 slide at a cost of about \$100,000.

The debris came down the southern gully of the two that come down towards the townsite. *4) The event was generally similar to the one in December 1973. A substantial amount of debris was deposited before the flow reached the first houses. The volume deposited in the town was estimated at 4,500 m³. The debris was flowing by a process of true flow. At a bend in the gully the material had been thrown up about 15 m higher outside of the bend than on the inside. The velocity of the debris at this point was estimated at 20-30 km/h. As soon as the debris spread out on the fan, it slowed down. When it reached the first houses, it flowed around them without moving them off their foundations. When the debris came to a rest, it blocked the creek channel and diverted creeks through the town. The flows from the heavy rain overturned cars and washed debris into basements and carports and deposited it on roads and lawns. *5) When the slide hit, it separated in about six rivers of water and mud, each about 20 ft. (6 m) wide and 3 ft. (90 cm) deep. It was feared that the massive gravel hill behind the town might come down (*Nanaimo Daily Free Press*).

Much of the damage in the town was the result of flooding. Though substantial damage occurred exceeding \$500,000, there was no loss of life. Soon after the slide came down, a mass evacuation started. On November 12, 1,100 of 1,800 residents of Port Alice were evacuated. The bulk of the population that was evacuated, about 1,000 people, went to the two main evacuation centres, the neighbouring towns of Port McNeill and Port Hardy. Some residents went to the neighbouring trailer camp, to the logging camp at Jeune Landing 1 mi. (1.6 km) away, or to the construction camp by the mill 4 mi. (6.4 km) away (Nasmith and Mercer 1979). Most of them returned to their homes on November 16. Due to the forced evacuation, many Port Alice residents were unable to register for the December 11 provincial elections. Resources Minister Robert Williams declared flood-struck Sayward Valley and the Alert Bay district disaster areas.

The road leading out of Port Alice deteriorated as sections were flooded and substantial washouts occurred. The road link between Port Hardy-Port Alice was cut 14 km east of Port Alice when the 80-ft. (24 m) bridge over the Marble River where 5 ft. (1.5 m) of water crested over the bridge deck, washed out. After a Bailey bridge was put in the road re-opened on November 17. According to the *Victoria Times*, the main road access to Port Alice was not expected to be restored till about November 22. On November 14, a Canadian Armed Forces Buffalo aircraft flew in a ton of foodstuffs, including 800 lbs. (363 kg) of fresh powdered milk and 1,500 loaves of bread, from Victoria. Food was also brought in by barge from Coal Harbour. Rayonier Canada Ltd., which operated a pulp mill 4 mi. (6.4 km) outside the town and at which most of the local residents were employed, shut down its operations until after the emergency. On November 16, work started to get the pulp mill back into operation.

The rain gauge at the mill, 4 mi. (6.4 km) from the townsite, showed total rainfall for the first 11 days of November at 21.63 in. (550 mm). This was well above the 18.52 in. (470 mm) mean rainfall for the entire month. The records that are available show that during the 24-hour period around the slide there was 250 mm (9.20 in.) of rain. Official weather records at Port Hardy, the nearest Environment Canada weather office, show this would be not only above the highest 24-hour rainfall for November, 130 mm (5.21 in.), but above the all-time high for any day, any month, 190 mm (7.75 in.) (Scanlon et al. 1976). During the previous 24 hours more than 228 mm of rain fell. During the night November 12-13, rain was falling at a rate up to 20 mm/hr. (*Nanaimo Daily Free Press*, November 13, 1975). Prior to the onset of the storm a substantial amount of snow (1-2 m) had accumulated at the upper logging road above the townsite. About 170 mm of precipitation occurred during the 24 hours preceding the slide. The precipitation at the upper logging road occurred initially as rain. As temperatures rose dramatically, this soon turned into snow. The storms continued after the debris flows occurred. A total of 230 mm of rain fell during the 24 hours after the slide.

During a windstorm that struck Vancouver around midnight November 14, gusts up to 60 mph (96 km/h) were reported. Damage included the awning over the Seymour entrance to the Orpheum Theatre after the ornamental facing and brick fell during the storm.

By November 21, water levels on the Quinsam River had dropped, but many of the low-lying residences were still troubled by river seepage and unseasonably high runoff (*Campbell River Courier*, November 31, 1975).

On November 13, residents of a trailer park near Squamish were evacuated.

*1) Crown Zellerbach (CZ) denied a Comox-Strathcona Regional Board claim that runoff from CZ lands contributed the flooding of the Oyster River. CZ's Courtenay logging operations about 8 mi. (12.8 km) west of the Oyster River would have accelerated the highland runoff (*The Campbell River Courier*, November 27, 1976). According to Ed Mankelow, a director of the B.C. Wildlife Federation, post-logging practices contributed to the heavy flooding and damage to rivers and fisheries in northern Vancouver Island. Clear-cutting of trees in entire valleys plus poorly constructed logging roads, and logging at high altitudes where the soil is fragile, increases the runoff in many areas.

*2) Rainfall will cause snow to ripen (i.e. reaching the point where it will be greater than 46% water) and melt. Upper and Lower Campbell lakes are adequate containers to hold the tremendous runoff from Campbell River's 723 mi.² (1,872.6 km²) watershed. In Courtenay, the storage facilities are about equivalent to those of Lower Campbell Lake, while in Sayward the Salmon River does not have a lake to absorb increased runoff (*Campbell River Courier*, November 14, 1975).

*3) Local legend has it that the original name, Rumble Beach, dates back to Indian times and that the rumble refers to the way most people describe (in English) the noise of a slide (Scanlon et al. 1976).

*4) The new townsite of Port Alice was established in the 1960s without an impact study being conducted (*Victoria Times*, November 15, 1975). Mankelow noted that the mudslide at Port Alice was an example of what happens when governments ignore sound planning principles. Bristol Foster, director of ecological reserves, agreed. "Development should never have been allowed on the Port Alice townsite." Dr. Bert Brink, a leading soil and plant expert at the University of British Columbia, said the development of a site like Port Alice would not be allowed today (1975) (*Victoria Times*, November 15, 1975).

*5) During the fall of 1976, dikes were built of coarse gravel from the fan, using bulldozers to push the material into place. The total cost of the protective works was about \$250,000 compared with about \$700,000 in claims for damage caused by the two debris flows (Nasmith and Mercer 1979). The provincial government paid nearly \$300,000 out from their provincial major disaster fund set up in 1969 in claims for flood damage and mudslides on Vancouver Island during the fall of 1975. About \$100,000 was paid to residents of Port Alice and an additional \$188,000 to residents of Sayward, Port Alberni, Alert Bay and Port McNeill. More individual claims were expected and not included were the compensation municipalities and companies were expected to seek for repairs to roads and other facilities. It would several months before the full extent of the claim would be known (*Victoria Times*, February 18, 1976).

November 29, 1975

(Tsunami).

Source: *Alberni Valley Times*, December 12, 1975.

Details: On November 29, a 7.2 Richter earthquake in mid-Pacific produced a 12-cm tsunami at Port Alberni. Combined with a high tide and run-off, the water came within a "hair's breath" of overtopping the dykes. It was later characterised as having been a "35-year flood." (*Alberni Valley Times*, December 12, 1975).

November 29-December 8, 1975

(Rain-on-snow and earthquake).

Source: *Victoria Times*, December 1, 3 and 12, 1975; May 14, 1976; *The Daily News*, December 1, 1975; *Alberni Valley Times*, December 1, 1975; *The Campbell River Upper Islander*, December 3 and 10, 1975; *The Daily Colonist*, December 3, 4 and 5, 1975; *The Province*, December 4, 8 and 13, 1975; *The Chilliwack Progress*, December 3 and 10, 1975; *The Gazette* (Maple Ride-Pitt Meadows), December 10, 1975; *The Hope Standard*, December 3, 1975; *The Vancouver Sun*, January 21, 1976; *Nanaimo Daily Free Press*, December 4, 1975; *The Globe and Mail*, December 6, 1990; Environment Canada 1988. Environment Canada 1991; Church 1988 (p. 226); Fraser Basin Management Board 1994 (p. 34).

Details: Overnight November 29-30, Port Alberni recorded 16.5 cm of snow. Not only caused the snow havoc on roads, combined with the heavy rains earlier in the month, it set a new November precipitation record for the Port Alberni area.

On November 30, Victoria recorded 4.8 in. (12 cm) of snow with unofficial reports of deeper snow from Langford and points north. The Pat Bay airport set a new 24-hour record for November with 16 cm (6.4 in.). On December 2, a rainstorm left a finished basement of a bungalow at 4137 Tuxedo in Saanich flooded with 5 in. (12.5 cm) of water. The heavy precipitation was caused by land-based cold air trapped beneath incoming warm Pacific flows. Between November 30-December 3, Chilliwack recorded 232.9 mm of a combination of snow and rain. On November 30, Chilliwack reported a record 24-hour snowfall of 31.8 cm. An additional 101.6 mm of rain fell on December 7-8. In the 24-hour period to 10 p.m. on December 2, Victoria recorded 1.77 in. (45.0 mm) of rain. *1) In the 24 hours to 4 a.m. on December 3 at Gonzales weather station, 52.3 mm (2.09 in.) of rain was measured added to 72.2 mm (2.8 in.) in the previous 24 hours. About half that amount was measured at the airport, which had 51.1 mm (1.96 in.) in the two days.

A slide west of Victoria near Thetis Lake, which covered part of one lane on the Trans-Canada Highway interrupted highway traffic. Part of a cut collapsed, sending 350-400 yd.³ (267.6-305.8 m³) of rock and earth onto the highway near Thetis overpass. Minor washouts occurred on a number of roads, including part of a shoulder on Patricia Bay Highway near Haliburton and on William Head Road and Sooke Road. Sooke Road was flooded with about 1 ft. (30 cm) of water. A washout occurred at the Kirby Creek bridge on the West Coast Road. As the Greater Victoria Water District released water from the Humpback reservoir, water pressure was down in some districts. Low-lying basements in Victoria, Saanich and other municipalities and suburban areas as far as Duncan flooded.

Flooded roads and basements were reported from the coast through the Saanich Peninsula and west to Sooke and Port Renfrew. Some of the trouble spots in Greater Victoria included Blanshard at Finlayson, Beach Drive at Cattle Point, Weir's Beach, View at Vancouver, Tillicum at Burnside, Braefoot and Cedar Cross Hill Road, Whittier, Vanalman, Orillia, Ten Mile Point, Colville and Blenkinsop. Flooding, plugged drains, culverts and ditches hit both rural and urban parts of Saanich. *2) Many roads were flooded and Dewdney Flats between Glen Lake and Sooke and the 3000 block Whittier closed to traffic. Other trouble spots were on Colville Road in Esquimalt, Blenkinsop Road, the Gorge and Ten-Mile Point in Saanich.

Bowker Creek flooded its banks below Cadboro Bay Road and flooded the nearly \$4-million Oak Bay recreation complex, which opened only 38 days earlier. Old-timers noted that they "had never seen Bowker Creek so high near the Oak Bay border." It spilled over below the recreation centre parking lot, flooded the lot and entered the building to a depth of 16 in. (40 cm) in the hockey arena, dressing rooms, storage area, lower lounge and concession area, curling rink and mechanical rooms. Catch basins and creeks in Oak Bay flooded. Sandbagging of Bowker Creek prevented more water from getting into the new recreation centre.

On December 3, a rainstorm melted a record 17-in. (42.5 cm) snowfall that had fallen in Campbell River on the morning of November 30. Between November 29-30, Campbell River

recorded 45 in. (114.3 cm) of snow before it turned into rain on November 30. Vancouver set two new records. It recorded the greatest snowfall in 24 hours with 22 cm (8.7 in.) breaking the old one of 4.4 in. (11.2 cm). With a total November snowfall of 8.7 in. (22 cm), it also broke the old 1955 record of 6 in. (15.2 cm). A major flood hit the Sayward area.

Overnight December 1-2, flooding occurred at Texas Creek, blocking traffic on the Trans-Canada Highway near Camper's Roost. A logjam forced the water south of its original course. Floodwaters cut a wide channel through the highway to a maximum depth of 6 ft. (1.8 m). Exceptionally heavy rain on December 2 caused damage to all highways around Hope.

Hunter Creek flooded the Trans-Canada Highway west of Hope in the Hunter Creek construction area. Flooding also occurred at Floods. Traffic on the Hope to Princeton highway was reduced to single-lane between 3-6 mi. (4.8-9.6 km) east of Hope. At 40 Mile, there was also water running along the highway undercutting the shoulders. Dikes had to be built along the edge of the blacktop. Small creeks flooded parts of Kawkawa Lake Road, which was covered with a fair amount of debris. Although the Coquihalla River was running high, it did not flood the golf course.

At Seabird Bluff, a stream was blocked and diverted across the highway. The inner shoulder was undermined for a short distance. At the lowest point, the entire eastbound lane collapsed into a hole. Just west of Haig, a slide came down. The Lougheed Highway between Haig-Agassiz was blocked for brief periods during the evening of December 2. The next day, traffic was still reduced to one-lane. Just east of the Agassiz overpass and at the east end of Seabird Bluff, slides came down. At 5 p.m. on December 2, an eastbound car hit a rock and mudslide at the Agassiz overpass. Its front end was smashed and two people had to be taken to Chilliwack Hospital. A truck was caught by the slide at the same point.

On December 3, after four days of torrential rain and a heavy snowfall, near Chilliwack flooding occurred. The heavy flooding was described as "one of the worst in memory" in Yarrow and Chilliwack. Shortly after midnight December 3, Yarrow and the east end of Abbotsford municipality became a 4,000-ac. (1,600 ha) lake when water backed up behind the BC Hydro railway track. The Vedder River, which suddenly rose on December 2, flooded the unprotected land east of the tracks. Early that morning, about a dozen houses was surrounded by water. As the water kept rising, it backed into culverts that drain streams from Vedder Mountain. Property damage was estimated to run "in the millions." Some chickens drowned and other livestock was thought to have been lost. Radio station CHWK broadcast an urgent appeal for cattle trucks to evacuate 500 head.

Most of the limited protection in the area comes from "training" dikes which "guide" the course of the river. In Yarrow, postmaster John Kehler said it was "the worst flooding he had ever seen in 45 years." He noted that floods about 12 years earlier had demonstrated the need for improved dyking. According to Mayor W.G.R. Simpson, previous municipal attempts to get proper dyking on the south side of the river east of the tracks had been blocked by fisheries officials wanting to protect the salmon run.

By late afternoon, there was concern that the rail line, which functioned as a dike protecting the main part of Yarrow from the east, would wash out. Simpson stated, "There would be 15 feet (4.5 m) of head behind there if it ever breaks." BC Hydro did not allow him to blast the track bed open outside the municipal dike. By 7:30 p.m., water rose to the top of the track bed. The tracks failed to hold the floodwaters and about 120 ft. (36 m) of railbed washed out. Twelve RCMP officers worked through the night to help flooded-out residents. The actual damage at Yarrow was less than had been anticipated because the track bed gave way more gradually than had been expected.

Inside Yarrow, one culvert was taking water from the flood side into a Yarrow Central Road ditch. The ditch backed up and flooded homes in the immediate vicinity. Around 8 p.m. the evacuation of residents began. About 75 Yarrow families were evacuated. The Evergreen Hall served as marshalling point for close to 100 evacuees. Numerous homes were under 2 ft. (60 cm) of water. In the Yarrow area, all that could be seen of one house was about 6 in. (15 cm) of the top of the chimney.

Across the river at the south foot of Hopedale Road, municipal crews were reinforcing the dike protecting the north bank of the Vedder River. Early on December 3, the Greendale area was threatened when water topped that dike. On December 2, some 80 residents of 50 homes in the south Greendale area were evacuated. On December 4, when about 200 ac. (80 ha.) were flooded up to 8 ft. (2.4 m) an additional 80 residents were evacuated for a total of 160. The Yarrow break took the pressure off the Greendale dike. Residents of Yarrow and Greendale, who had been evacuated returned on December 6-7 after the breaks in the dikes were plugged and all the surf water pumped back into Vedder Canal.

The floodwater that moved through Yarrow crossed into Abbotsford early December 3. Despite fears that the water would follow its natural course to the old Sumas Lake bed, it appeared that the ditches diverted most of the flow back into the Sumas Drainage Canal system. Some 100 men from No. 3 Field Squadron at Canadian Forces Base Chilliwack were working three trouble spots with heavy equipment. The base's wet-bridging area at the south foot of Sumas Prairie Road was under 4 ft. (1.2 m) of water. The caretaker's home and much of the equipment stored at the facility were evacuated. On Chilliwack Lake Road just east of Slesse Park, a 600-800-ft. (180-240 m) mudslide took a car with it. Several homes in the vicinity of First Avenue and Williams Street were isolated from the street from water between 1-2 ft. (30-60 cm) deep. Lickman Road North was flooded, cutting off Chilliwack access through Wolfe Road to the Lickman freeway interchange. At 9 a.m., though the water levels in Yarrow were static, the RCMP recommended evacuated residents not to return as yet. The high water forced closure of four elementary schools.

On December 3, logs complicated the situation. Jammed in at least two sections of the Vedder River, they caused more water to divert across more farmland at the south foot of Lickman Road. The flooding also affected the Sumas Prairie area, which used to be the bottom of Sumas Lake until the Vedder River was diverted by canals and drainage ditches many years ago. A lake up to 16 ft. (4.8 m) deep and about 8 mi. (12.8 km) long and 2 mi. (3.2 km) wide extended from Yarrow. More than 75 houses were flooded above the main floor level and another 150 were endangered. *3) Further upstream, near the south foot of Peach Road, a 200-ft. (60 m) break occurred in the dike. Harvey Schroeder, Social Credit MLA for Chilliwack in the previous legislature, said he saw floodwater coming out of the eaves of one house near Yarrow. He said he would appeal to Victoria for compensation after damages had been assessed.

On December 3, the Chilliwack River at Vedder Crossing recorded maximum daily and maximum instantaneous discharges of 530 and 787 m³, respectively (Environment Canada 1991). That same day, the Vedder River near Yarrow recorded a maximum daily water level of 4.801 m, the second highest record for the period 1952-87 (Environment Canada 1988). On December 4, the floodwaters started to recede.

The flood on the Chilliwack River, with a return period of about 20 years, deposited some 200,000 m³ of bed material calibre sediment on the alluvial fan where the river enters Fraser lowland. This is about four times the estimated average annual bed material charge. In the 7-km reach downstream from Vedder Crossing, bed elevation increased by up to 0.6 m., averaging 0.3 m. Substantial widening of the channel occurred in the main depositional reach (unpublished data of D.G. McLean In: Church 1988). *4) On December 6-7, a large section of the Sumas Prairie flooded when the Nooksack River south of the U.S. border flooded its banks.

The Department of Highways estimated the damage in the Columbia Valley and Chilliwack Lake Road areas at \$150,000. The BC Hydro transportation division estimated the cost of repairs made to the flooded railway line around \$100,000. At Cultus Lake, there was close to \$300,000 damage due to the combination of heavy rains, strong winds and rising lake levels. It was expected to cost up to \$250,000 to replace the washed-out campsite and other facilities, and to install safeguards against future similar damage at Cultus Lake Provincial Park. The Park Board's frontage at Sunnyside and Main Beach wharves were destroyed or damaged to the extent of \$50,000. The overall flood damage would not reach the \$ 2.3 million mark needed before the province could ask for federal disaster funds.

The heavy rain and flooding in the Chilliwack area caused serious problems for Elk Creek Water Works Co. Ltd. Around December 1, the streams began to turn black. The company reduced its water pressure to cut off the streams and for a while was depending on its new Sardis well and the Little Mountain reservoir. When the reservoir flattened out, the water system was opened at minimum pressure. Subsequently, the water was a little muddy for a few days.

On December 2, flooding at Scott Road in Surrey backed up rush-hour traffic over the Patullo Bridge causing a two-hour traffic delay. Around December 3 in Surrey, 3 mi.² (7.5 km²) of farmland were flooded when the Nicomekl River burst through a dike near the 4600 block of 184 Street.

On December 3, a 20-ft. (6 m) wide slide at the foot of Penzance Drive, Burnaby, dumped earth 400 ft. (120 m) into the harbour. As it occurred mainly under water, it caused little damage but reduced support at the base of the slope. The slide was caused by the continual movement of soil on the property above the shoreline owned by Goodwin-Johnson Ltd. and CPR. The latter had its main track running along the base of the hill. It was partly caused by the 4.5 Richter earthquake, which had occurred four days prior. *5)

On December 3 at 8:30 p.m., a mudslide about 1 mi. (1.6 km) north of Goldstream blocked part of the Trans-Canada Highway on the Malahat. Floodwaters of Goldstream cut through a treed section of the park. Gouging out a new channel, a section of the original channel was left high and dry. Large maple trees were uprooted, leaving gaping holes in the ground. Just below the picnic site, silt piled up as high as 5 ft. (1.5 m) in the original channel. Further flooding in the next few years might result in the erosion and destruction of about 2 ac. (0.8 ha.) of forest below the picnic site and thus turning Goldstream flats into a gravelly rock-strewn bed. The problem is compounded by Niagara Creek, a tributary of Goldstream. *6)

In Greater Victoria, several hundred basements were flooded and traffic conditions were hazardous. Saanich was hardest hit with about 200 flooded basements. Floodwaters blocked about nine roads in the municipality. The worst flooding occurred in the 4700 block of Interurban, which was almost completely under water. In Oak Bay, floodwaters hit a community centre.

On December 3 at 3 a.m., a large mudslide from a 40-ft. (12 m) bank above Allenby Road in Duncan crushed a two-year old \$250,000 two-storey building. The 14,000-ft.² (1,288 m²) concrete block housed the offices of four businesses. The building was in an unorganised area on the western outskirts of Duncan, about 1 mi. (1.6 km) from the city centre. A combination of factors caused the slide: an earthquake on November 30 along with frost and heavy rains causing runoff from Indian Road above. *7) The earth bank behind the building was unstable and the structure was not designed with this in mind. The Cowichan Valley Regional Board had not been

able to take any prior action as it was built before building regulations were introduced to the area. Four cars parked in front were also destroyed. Tzouhalem Road and other low-lying streets in Duncan were flooded. Around December 8 (?), tons of earth slipped from the banks of Beacon Hill Park into Horseshoe Bay taking with it a section of the pathway to the beach.

Near Cowichan, a culvert on the E&N Railway washed out, interrupting freight and Dayliner service to and from Victoria on December 3.

On December 3, two slides in the Fraser Canyon, at Sailor Bar and Jackass Mountain trapped "scores" of travelers overnight. The rockslide north of Sailor Bar Tunnel about 6 mi. (9.6 km) south of Boston Bar closed the Trans-Canada Highway indefinitely. According to the RCMP, the slide at Sailor Bar consisted of one huge rock, which would have to be blasted off the road. The canyon had been closed earlier but had reopened briefly to one-way traffic before the new slides hit. Because of slide danger, traffic was rerouted on the Hope to Princeton highway. On December 3, the Fraser Canyon section of the Trans-Canada Highway was still closed due to a washout at Texas Creek, between Hope-Yale. Snowslides closed down the Salmo-Creston section of Highway 3.

Floodwaters washed out culverts and small bridges in Cultus Lake. Slides caused by the heavy rain closed a number of highways. Three slides closed the Chilliwack Lake Road, while three others closed Highway 7 between Agassiz and Hope. The mudslides that blocked the highway at the Sailor Bar tunnel were partly cleared on December 4. A 50-ft. (15 m) deep mudslide near Yale blocked the CNR tracks. Until the track would be cleared by December 6, train passengers to and from Vancouver were airlifted

At Saddle Rock, 7 mi. (11.2 km) north of Yale, a rockslide covered the CN tracks for eight days. Loosened by a record 14-in. (350 mm) of rain in the first four days in December, mud, rocks and debris covered 400 ft. (120 m) of Fraser Canyon mainline. The earth tremor on November 30 may also have had some effect. A howitzer gun detachment from the 1st Airborne Battery/Canadian Airborne regiment shelled the massive overhang endangering workmen trying to clear the tracks.

On December 9 at 3:10 a.m., a small mudslide came down at Mi. 99.7 on the CP Rail line just east of the Albion Crossing. Twenty rail cars of a 33-car eastbound freight train derailed on the undermined part of track. Twelve cars slid towards the river and seven blocked the westbound track. More than 100 ft. (30 m) of westbound and 300 ft. (90 m) of track were damaged. Traffic was interrupted for about a day.

*1) The 45 mm were less than a quarter of the record 114.0 mm (4.49 in.) of rain that fell in Victoria in a 24-hour period on December 8, 1956.

*2) Much of the flooding was caused by an overcharged drainage system designed when much of Saanich was rural. More development and more asphalt results in a greater concentration of runoff water.

*3) Harry Schroeder, Socred MLA for the area, pressed for a dredging and dyking program for 4.5 mi. (7.2 km) of river between Vedder Crossing and the start of the canal at Yarrow. The section had not been dredged for eight years and was the cause of the flooding (*The Province*, December 4, 1975).

*4) High bedload deposition in the Vedder/Chilliwack Rivers had raised the riverbed causing the severe flooding in 1975 and was posing a threat of the river changing its course. To avoid conflicts between water management, fisheries, agricultural, and recreational interests, a program was adopted to construct dikes, set well back from the edge of the river, and to purchase the land between the dikes and the river to eliminate land ownership issues (Fraser Basin Management Board 1994).

*5) A report prepared by Dames and Moore Consulting Engineers concluded the slide did not endanger the houses located near the top of Capitol Hill and Highfield Drive, which are on or near

solid rock (*The Vancouver Sun*, January 21, 1976).

*6) According to Don Curruthers, Malahat district park superintendent, the problem of erosion and silting had started in 1972. An engineering study following the December flooding of Goldstream warned about further winter flood damage to the attractive lower section of the provincial park if nothing is done to contain the river (*Victoria Times*, May 14, 1976).

*7) A structural engineering firm, which had done a study on the building, recommended in October 1975 that the building be vacated (Pat Clements, Cowichan Valley Region Board, In: *The Daily Colonist*, December 4, 1975).

December 26, 1975

(Storm surge and tidal flooding).

Discharge (m³/s): Max. daily: December 26: Kok.: 124; December 27: Chem.: 306; max. instant.: N/A.

Source: *The Columbian*, December 27, 1975; Hay and Oke 1976 (p. 39); Environment Canada 1991.

Details: On December 26, heavy precipitation on Vancouver's North Shore mountains resulted in local flooding. Cypress Creek burst its banks (Hay and Oke 1976). On December 26 in New Westminster, a record high temperature of 13° C was recorded. *1) The unusual spring-like weather combined with heavy rain caused Cypress Creek to flood basements and homes bordering the creek after it overflowed soon after 5 a.m. on December 26. The western portion of Stanley Drive also flooded on December 26 due to a combination of high tides and gusting winds forcing water onto the road. Winds lashed the west side of Stanley Park uprooting trees and knocking several tree trunks across the drive. Gale-force winds of 35 mph (56.3 km/h) gusting to 65 mph (104.6 km/h) knocked out power in several Fraser Valley locations. The winds downed lines and power poles on the north side of the Fraser River between Mission and Harrison. Power interruptions were also reported at Hope.

On December 26, Still Creek at Burnaby recorded a max. instantaneous discharge of 12.5 m³/s (Environment Canada 1991).

*1) The new record high temperature was two degrees above the previous record set in 1947. (*The Columbian*).

January 14-16, 1976

(Fatal avalanche).

Source: *The Hope Standard*, January 14, 1976; *The Province*, January 16 and 30; February 13, 1976; *The Vancouver Sun*, January 19, 1976; *The Creston Valley Advance*, January 19, 1976 Bowers 1994 (pp. 25-27).

Details: On January 14 at 6:45 a.m., a slide just north of Hell's Gate Airtram blocked the Fraser Canyon section of the Trans-Canada Highway for five hours. The slide with snow up to 15 ft. (4.5 m) deep was cleared by 12:30 p.m. Overnight January 13-14, more than 1 ft. (30 cm) of snow fell throughout the region. By 9:00 a.m., the highway was cleared sufficiently for traffic to pass. The Highway later closed again as a precaution for more slides.

Around noon on January 16, a classic slab avalanche came down onto the Salmo to Creston summit section of Highway 3 at the 1,774-m Kootenay Pass, 20 mi. (32 km) east of Salmo. The huge slab suddenly gave way about 200 m above the highway and began to slide on the smooth crust. It picked up so much speed that it thundered over a shelf cut into the slope to stop small slides from reaching the highway. The avalanche set loose a torrent of 28,000 m³ of snow that buried about 300 m of highway to a depth of 3.5 m.

A car with four women and a child driving through the pass was swept off the road and down a long, steep embankment. The convertible was tossed 600 ft. (180 m) into the valley, throwing the victims out of the car. Rescuers were able to save one woman and, after more than two hours of resuscitation, the child. The three other women were killed. The bodies were all located within 25 ft. (7.5 m) from the car. *1) A second slide trapped a police car.

Five days prior to the accident, artillery had failed to dislodge the snow in the area of the avalanche. The pass was already snow-covered in early 1975. Fluctuating temperatures formed a smooth frozen surface for the avalanche to slide on. A hoarfrost layer formed on top, which was crushed by subsequent snowfalls, forming weak layers in the snow pack. A storm on January 14-15 deposited a further 38 cm of new snow, burying the surface hoar layer about 80 cm deep. On January 16, the snow turned to rain again (Bowers 1994). Snow and temperature conditions had already caused several slides in the previous days on the opposite side of the summit. A temperature inversion combined with an overnight thaw had caused two large slides to come down during the previous night.

*1) During an inquest into the accident, held at Salmo on February 11, recommendations were made to improve the safety factors on this section known as the Skyway. The event spurred the highways ministry to strengthen its avalanche control program at Kootenay Pass.

January 27, 1976

Source: *Cowichan Leader*, January 28, 1976; *Victoria Times*, January 28, 1976.

Details: Early on January 27, tons of loose mud came down from a hill in Duncan and smashed through a chain-link fence ending up in the parking lot of the BC Tel service building. The slide came down from the same cliff as the one on December 3, 1975. About 60 yd.³ (45.9 m³) of dirt cascaded down the Allenby Road embankment at the BC Tel building next to the site of the disastrous slide that had wiped out the large business building in December. Later on January 27, mud was still rolling off the bank. It was the third and worst cave-in since December.

Art Harrison, owner of the demolished building and the BC Tel warehouse, blamed the problems on the water drainage from Eagle Heights subdivision. According to the department of highways spokesman, the area has had a history of slides since it was the Trans-Canada Highway years earlier and that the Regional Board should not have issued a building permit. Harrison noted that parts of the bank were considered to be a natural watercourse when he originally looked at the property about three years earlier. But since then several more drainage furrows had developed. A combination of high winds and rain seem to trigger the slides.

February 16, 1976

(Tidal flooding).

Source: *The Vancouver Sun*, February 16, 1976; *The Province*, February 17, 1976.

Details: Early on February 16, a high 15.7-ft. (4.7 m) tide at Point Atkinson caused an exceptional high water along Richmond dikes. The high tide broke a 20-ft. (6 m) wide hole in the temporary rock dam in the Richmond dike causing to flood basements of as many as 50 homes up to 1 ft. (30 cm) in a large area around Cambie and River roads. The flooding occurred on the east bank of the Fraser River's middle arm where a new pumping station was being installed. According to a long-time resident, the land had not even been flooded during the 1948 flood.

April 7-9, 1976

Source: *The Vancouver Sun*, April 8, 1976; *Victoria Times*, April 8 and 9, 1976; *The Province*, April 10, 1976.

Details: On April 7 at 2 p.m., a mudslide came down near Brilliant about 22 mi. (35.2 km) southwest of Nelson. It covered an area 1,000 ft. (300 m) long with debris 10 ft. (3 m) high blocking CPR's southern rail line. The slide separated the underground BC Tel cable, cutting long-

distance service to Castlegar and neighbouring villages. It also closed Highway 3 and disrupted natural gas service to Nelson. According to *The Vancouver Sun*, the slide covered 450 ft. (135 m) of highway and 135 ft. (40.5 m) of railway. Early on April 8, the highway reopened after the slide was cleared by 4:30 a.m. on April 8.

Around April 9 (?), a second slide occurred near Brilliant. It was about 30 ft. (9 m) long and 3-4 ft. (90-120 cm) deep. The power and BC Tel long distance lines were cut. Power was out for about one hour in the new slide area.

On April 9 at 3 a.m., a third slide in three days, 200 ft. (60 m) long and about 12 ft. (3.6 m) deep, closed another portion of Highway 3 between Castlegar-Nelson. It occurred about 0.5 mi. (800 m) west of the two other slides 8 mi. (12.8 km) east of Castlegar. Telephone service was still out and not expected to be restored till later on April 9.

July 28-August 4, 1976

(Burst water line/flooding).

Source: *The Vancouver Sun*, July 29, 1976; *The Province*, July 29 and August 5, 1976; *Vernon Daily News*, July 29, 1976; *Vernon This Week*, August 4, 1976; Evans, unpublished data.

Details: On July 28 at 1 p.m., a burst 2-in. (5 cm) water main on top of a hill 1 mi. (1.6 km) north of Vernon caused a 60-ft. embankment to collapse. The mud and debris slide in glaciolacustrine silt destroyed a mobile home and garage on Pleasant Valley Road, opposite the Swan Lake fruit stand. A nearby home was heavily damaged. After having been trapped for 90 minutes in the buried ruins of the mobile home, an injured woman was rescued. The woman had been trapped against the side of the house by a tractor that was also caught up in the slide. Twenty sheets of plywood carried down saved a woman's life.

At least three other people narrowly escaped the slide. "Tons of water-laden earth" damaged a neighbouring home and knocked another one off its foundations. A witness described it as, "It sounded like an explosion, a half second explosion, like dynamite." The slide moved the garage before it hit the trailer. "The car popped out of the garage, and then the garage folded like an accordion. It took less than a half a second for everything to happen." According to Walter Nahachewski, who was only 10 ft. (3 m) from the path of the slide, its possible cause was orchard sprinkler irrigation on top of the hill. "There'd been water trickling down for the past while but I didn't think much about it." The water pipe was broken with a deep-water gouge in the ground leading to the slide site.

On August 3, a slide came down at the mouth of the Fraser Canyon about 80 mi. (128 km) west of Kamloops. It cut the CPR mainline and delayed eastbound passenger service for about five hours. The slide was cleared early on August 4. On that day, crews also cleared mudslides on the stretch between Penticton-Spences Bridge where slides and washouts halted freight traffic.

August 25-September 5, 1976

Discharge (m³/s): Max. daily: September 5: Squam.: 932; max. instant.: September 5: Squam.: 1,010.

Source: *The Vancouver Sun*, August 25 and 30, 1976; *Nanaimo Daily Free Press*, August 26, 1976; *The Province*, August 26, 1976; *The Daily Colonist*, August 26, 1976; *Comox District Free Press*, August 27, 1976; *Squamish Citizen*, September 6, 1976; *Cowichan Leader*, September 1, 1976; Watt et al. 1989; Eisbacher 1983 (p. 22). Environment Canada 1991.

Details: Shortly before noon on August 25, a freak tornado-like windstorm hit the east area of Vancouver. The storm, which lasted only 3-4 minutes, shattered windows, knocked down trees, damaged roofs and parked vehicles. According to the weather office, the general weather conditions would be conducive to whirlwinds. An eyewitness said the wind came up "all of a sudden. It was like a tornado."

A 15-minute downpour on August 25 caused flash floods on at least two downtown streets in Courtenay. CFB Comox recorded 0.28 in. (6.4 mm) of rain during the short deluge, accompanied

by brief flashes of lightning and thunder. Despite efforts to clear a storm drain, Fourth Street flooded “ankle-deep.” The runoff backed up to the door of Goodwill Enterprise’s retail outlet in less than 10 minutes. On Fifth Street, the city storm sewer backed up, causing the basement of Searle’s Shoes Ltd. to flood with 5 in. (12.5 cm) of water. None of the considerable damage caused by the floodwaters was covered by insurance, as it would be classified as “an Act of God.” City works superintendent Robert Waugh said the storm drains were big enough. Being a flash flood, to happen once in 25-50 years, the water could just not get away fast enough. During the localised rainfall, Cumberland measured only 0.01 in. (0.25 mm) and Royston no rainfall at all.

On August 25 at 1 a.m., the collapse of a small cliff a rock fall near Brunswick Point, 5 km north of Lions Bay, closed Highway 99. The fall, which consisted of some 1,500 m³ of rock, also blocked the rail line for 300 ft. (90 m) below and caused the derailment of a train (Eisbacher 1983). The section of cliff collapsed and came down near Windy Point, about 4 mi. (6.4 km) north of Lions Bay. The rock, mud and debris slide, blamed on recent rain and wet conditions, knocked an engine of a four-unit BC Rail freight train off its tracks. The four-man train crew escaped injury but the line would not be cleared until later that day.

The slide, which was reported about 2 a.m., covered about 100 ft. (30 m) of the highway with rocks and debris 20 ft. (6 m) deep and stretched about 300 ft. (90 m) from the cliff to the rail line below. Though the highway could be open to single-lane traffic late afternoon on August 25, the highways department expected to have the slide cleared late on August 25 or early next day.

The slide left a number of motorists stranded in Squamish. BC Rail passengers were bussed and the railway’s Royal Hudson steam train trip from North Vancouver to Squamish was cancelled. Rayonier Canada Ltd., operating a pulpmill at Woodfibre, chartered a boat to pick up its employees stuck at the south side of the slide at Horseshoe Bay. (*The Vancouver Sun*, August 25, 1976).

On August 30, a derailment about 13 mi. (20.8 km) north of Squamish closed the BC Rail line. There were no injuries when 11 of the 58 boxcars pulled by three engines jumped the track early on August 29. The derailment ripped up about 400 ft. (120 m) of track.

On September 1 and part of September 2, a rockslide north of Lions Bay closed down Highway 99. A slight earthquake or the vibration of a passing train below may have set off the slide. According to B. Vetch of the Highway Department, it was caused by weather eroding away at a U-shaped fault in the rock bluff above the road. The rocks, including one several tons in weight, broke out of the bluff and knocked out a section of reinforced concrete. They then plummeted down onto the BC Rail line causing a passing train to partially derail. The engine of a four-unit train derailed after it smashed into the slide shortly after 2 a.m. The railway tracks were cleared late on September 1. By 11 p.m. on September 1, Highway 99 re-opened to one lane traffic.

According to Watt et al. (1989), a flood occurred on the Duncan River. On August 26, the Duncan River below Duncan Dam recorded a maximum daily discharge of 459 m³/s, setting an all-time high for the period of record. On September 5, the Duncan River below B.B. Creek recorded a maximum instantaneous discharge of 518 m³/s and a maximum daily discharge of 351 m³/s (Environment Canada 1991).

On August 27, 25 cars of a 71-unit CNR freight train derailed, blocking the rail line near Rosedale. The line reopened on August 29.

October 29-30 and November 1976

Source: *The Campbell River Courier*, November 5, 1976; *The Province*, November 13, 1990.

Details: Following heavy rain overnight October 29-30, a plugged roof drain caused water to seep into the Maple Elementary School in Sayward. On the afternoon of October 30, four classrooms were flooded.

In November, floodwaters from the Salmon River ran through the yard and buildings of the Sayward elementary and junior secondary school. It took a week to repair the damage. (exact date unknown).

1977-1980

Source: Moore and Imrie 1982; Evans, unpublished data.

Details: Between 1977-1980, during excavations for the dam and powerhouse at the site of the Revelstoke Dam on the Columbia River several complex rock slope movements were detected in both the east and west walls of the excavation (Moore and Imrie 1982; Evans, unpublished data). The dam site straddles the Columbia River Fault zone. Excavations took place entirely in foliated metamorphic rock consisting of micaceous gneisses interlayered with marbles and quartzites. Intense fracturing of the rock, the presence of gouge and breccia-filled shear zones as well as foliation shears are associated with the Columbia River Fault zone and substantially reduce the rock mass shear strength at the site. At the Diversion Tunnel Inlet, a catastrophic failure with an estimated volume of 12,000 m³ occurred in which sliding took place along an undulating foliation shear containing breccia and graphitic gouge. The foliation shear was daylighted in the slope during excavation.

October 23-29, 1977

Source: *The Daily Colonist*,

Details: On October 29 at 8:45 p.m., a rockslide came down at the rock cut at the Malahat Summit lookout. Large rock chunks covered two-thirds of the road. As it came down, a northbound car ran into the slide. The southbound lane remained open. *1)

*1) In 1974, a similar incident occurred at the same location, blocking part of the highway for 12 hours (*The Daily Colonist*, October 30, 1977).

November 1, 1977

Source: *The Daily News*, November 3, 1977; *The Province*, November 4, 1977.

Details: On November 1, a storm peaking at 110 km/h toppled trees, flooded creeks and blocked highways. At Yale, a mudslide covered the CP Rail tracks and Trans-Canada Highway. In the Rogers Pass section, snow halted traffic. By November 2, except the Trans-Canada Highway near Yale, all highways were clear.

On November 1, a storm caused Sakwi Creek to go on the rampage. The creek brought down a torrent of rocks, logs and mud, knocking out Morris Valley Road bridge. The Weaver Creek spawning beds near Agassiz were damaged after being covered with silt. The gravel beds below Sakwi Creek turned into a silt-bottomed lake about 0.5 m deep and 3 km long. L.S. Freeman of the federal fisheries department noted, "We were concerned what might happen to the creek because bulldozers have been stripping the hills free of trees to make ski runs up Hemlock Valley. We... warned the developers that this could cause serious damage to the creek and (sockeye and chum salmon) spawning channels."

Late November-December 7, 1977

(Rain-on-snow and flash flood).

Source: *The Columbian*, December 1, 1977; *The Chilliwack Progress*, December 7, 1977.

Details: On November 30 and December 1, Chilliwack recorded 15.6 and 55.6 mm of rain, respectively. On December 2, strong gusts of wind caused the new Lonestoga Auto sales showroom under construction to collapse.

At the end of November near Coquitlam, a flash flood prompted by heavy rains went through a gravel pit on Pipeline Road. It covered two properties with "a sea of mud and gravel." A too small-sized culvert on the Kask Bros. Ltd. gravel pit property had been blocked up and diverted the stream. The floodwaters brought debris into the yards of 1392 and 1402 Pipeline Road. Ian Armstrong, resident of 1392 Pipeline Road, managed to save his home from major damage by

diverting the creek created by the deluge. Using a front-end loader, the debris was cleared off the roadway.

December 11-15, 1977

(Tidal flooding).

Source: *The Columbian*, December 12, 1977; *The Vancouver Sun*, December 15 and 16, 1977.

Details: Starting December 11, Point Atkinson recorded high tides above 16 ft. (4.8 m). Around December 17, they were expected to drop. The high water also swept a large amount of debris into the Fraser River and the Vancouver harbour. On December 15, high water in English Bay submerged the wall around the Kitsilano pool and came close to swamping the Kitsilano Show Boat before subsiding.

Snow and rain on December 10-11 caused Hume Park in New Westminster to flood.

On December 15 at 10 a.m. during the annual peak, a combination of southwesterly wind and the highest tide of the year caused the Fraser River to top its dikes and Richmond's Mitchell Island to flood. *1) Floodwaters over the north side of Mitchell Island inundated streets and parking lots with water reportedly up to 2 ft. (60 cm) deep. Several businesses on Mitchell Island, including Hankin Furniture Industries Ltd. and Hemfir Lumber Ltd. were affected by the flooding. The flood also brought 8 in. (20 cm) of water into a machine shop. By late afternoon, the excess water had been pumped off the island. Higher dikes on Lulu Island were keeping the water back.

*1) To prevent a recurrence of this flooding, the dike on the north side was built up with 1-3 ft. (30-90 cm) of clay (*The Vancouver Sun*, December 16, 1977).

December 19-24, 1977

Source: *The Vancouver Sun*, May 30, 1980; Moore and Mathews 1978; Eisbacher 1983 (p. 35).

Details: On December 24, approximately 300,000 m³ of rock fell from the near-vertical upper cliff face below Barrier Lake, near Garibaldi Lake. The debris covered most of the springs at the foot of the Talus (Moore and Mathews 1978; Eisbacher 1983). It involved a segment of the precipice some 200 m long, 200 m high and metres to perhaps tens of metres thick. The debris consisted of rock fragments to about 4 m in diameter. The rockfall post-dated a snowfall of December 19. Residents 3 km to the west reported hearing about midnight December 24 the noise caused by the rockfall. The week previous to December 24 had been cool and partly cloudy. When the rockfall was visited on December 28, marks of a second and much smaller slide were seen near the northern end of the Barrier. No local earthquake had been recorded at the time nor unusual weather conditions were identified. Perhaps disturbance caused by one rockfall triggered the second one (Moore and Mathews 1978). *1)

*1) On May 29, 1980, because of the threat of a devastating landslide off Barrier, 6 km up Rubble Creek, or flooding by a slide-caused wave in the Daisy Lake, the provincial government offered to buy all of Garibaldi's 80 homes at a cost of \$7 million. Daisy Lake is a reservoir created by BC Hydro along Cheakamus River just below the Daisy Lake dam. A three-year study conducted by a panel of geotechnical experts concluded that the catastrophic 1855 rockflow from Barrier could reoccur. It recommended that the endangered area should not be further developed but did not recommend that the existing development should be abandoned. In 1978, the government commissioned a series of wave studies on Daisy Lake and the combination of the two studies convinced the government to buy out the homes (*The Vancouver Sun*, May 30, 1980).

Early January 1978

Source: *The Daily Colonist*, January 31, 1978.

Details: During the first week of January, a massive cave-in occurred near the Westport Marina in the Tsehum Harbour, North Saanich. It took place just east of the Pat Bay Highway at the excavation to make room for about 100 more berths. It was filled in with blasted rock and clay.

March 8, 1978

(Non-fatal avalanche).

Source: Stethem and Schaerer 1980 (pp. 71-75).

Details: On March 7, small to medium sized avalanches were initiated with explosives on the northern and northeastern slopes of Whistler Mountain. Also a small natural one occurred on a northeastern exposure. On March 8, medium to large sized avalanches were again released with explosives on the northwestern, northern and northeastern slopes of Whistler Mountain. During the stabilisation operation of the Surprise Shale area two ski patrollers were buried by an avalanche from the North Face. The victims were found quickly visually and with transceivers and ski probing and could be dug out fast enough by hand. They were dispatched by helicopter to the alpine Office where they recovered completely within a few hours (Stethem and Schaerer 1980).

March 10, 1978

Source: *The Vancouver Sun*, March 10, 1978; *The Province*, March 11, 1978.

Details: Early on March 10, a 12,000-ton earth and rockslide occurred at BC Hydro's Revelstoke Dam project. Melting snow and recent rain caused the slide to come down into the Columbia River, about 30 m. from the intake structure of the dam project. Twenty 4-in. (10 cm) rock bolts gave way, leading to the slide. As no equipment was damaged by the slide, no delay in the construction occurred.

July 4-6, 1978

Source: *The Vancouver Sun*, July 7, 1978; *The Province*, July 8, 1978.

Details: On July 6, a mudslide came down during land clearing for a housing development at the foot of Mount Seymour along the 1100 block Riverside Drive, North Vancouver District. Tearing out trees and brush on the hillside flanking the roadway, it covered 30 ft. (9 m) across the road. The mud then oozed over the embankment to the Seymour River before it stopped. To clear the road, 100 loads of mud were trucked away. *1) The slide actually started on July 4 while crews were bulldozing brush and trees on the development site.

*1) Neighbours demanded the project stopped, claiming it should never have been allowed to start. A soil test many years prior showed that the water table in the area posed a slide threat (*The Vancouver Sun*).

August 3, 1978

Source: *The Province*, August 1 and 3, 1978; *Victoria Times*, August 2, 1978; *The Princeton Herald*, August 4, 1978.

Details: At the beginning of August, a massive landslides occurred near Kamloops in the geologically unstable terrain in the Barnhartvale area. A house at 5435 Morris Place in the heavily gullied subdivision was left hanging precariously over a 30-ft. (9 m) cliff along the valley overlooking the South Thompson River. The family evacuated their \$60,000 home while another 20 homes were in immediate danger. *1)

Cracks were noticed two months prior quite a way from the house. These started getting bigger and closer to the house. The foundation sunk 5 in. (12.5 cm), the floors twisted and cracks appeared in the walls.

On August 3, two slides came down on the CPR line holding up traffic. The first one, about 10 mi. (16 km) east of Princeton knocked the front engine of a freight train off the tracks. The other

occurred on the mainline about 80 mi. (128 km) west of Kamloops at the mouth of the Fraser canyon. It caused eastbound trains to run about six hours late.

*1) Having approved the subdivision, the city acknowledged it being responsible and offered to move the house to a safer location. The Highways Department had denied approval for the subdivision.

August 22, 1978

Source: *The Vancouver Sun*, August 22, 1978; *The Ashcroft-Cache Creek Journal*, August 23, 1978.

Details: On August 22 at 1:05 a.m., a westbound CNR coal train hit a mud and rockslide 1.5 mi. (2.4 km) south of Ashcroft. The slide derailed a locomotive, which plunged into the Thompson River. Another locomotive and eight cars also left the tracks. Two crewmembers in the cab had to break a window to escape and swim to shore. One of the two men riding in the caboose suffered injuries. The CN mainline was expected to reopen on August 23.

September 5-6, 1978

Source: *The Daily Colonist*, September 7, 8 and 9, 1978; *The Province*, September 9, 1978; *The Vancouver Sun*, September 21, 1978; Garden 1991 (pp. 196-197); Evans, unpublished data.

Details: Overnight September 5-6, a debris flow came down at the spiral tunnel in Cathedral Mountain, Kicking Horse Pass. *1) It cut an 80-ft. (24 m) wide hole in the CP Rail mainline at Partridge. The Yoho siding disappeared under 20 ft. (6 m) of debris over a distance of 0.5 mi. (800 m). About 6 ft. (1.8 m) of material covered the Cathedral siding and 8 ft. (2.4 m) of rubble covered the Trans-Canada Highway (Garden 1991).

Following three weeks of rain, the narrow column of mud came down from a glacier on Cathedral Mountain. The 20-m wide flow meandered down the mountain from a point below the glacier. It spread out more than 300 m wide above the highway. From there it veered over a steep downhill section of the highway. It finally covered about 2 km of the highway.

The debris flow blocked the Trans-Canada Highway and the CPR line 8 km east of Field in Yoho National Park. The slide covered an estimated 1 km. It came down behind the two locomotives pulling the westbound CPR freight train. Though skewed off the track, the diesel units remained upright (Garden 1991). One car was hit by the initial slide but no injuries were reported. The landslide trapped at least one car. The mud and rock reached up to the windows. A second slide reached the door handles and lifted the car 1.5 m off the highway. Ten CPR employees (one from the caboose of the freight train and nine of a track repair crew) spent the night inside the Cathedral Mountain railroad tunnel after the second slide partially buried the empty freight train.

Highway traffic resumed on September 9 (?) with the slide area still being unstable. CPR expected to reopen their line later on September 8. Some 40,000 tons of debris was removed from the highway. The north side of the highway washed away and about 400 ft. (120 m) of guardrail had to be replaced. It would take a month to put the roadway back into shape. The worst of the debris was cleared away after two days but the cleanup continued till around September 21. By that date, traffic flow was near normal but repairs would take another week to complete.

*1) On August 29, 1984 another debris flow occurred at this location (Evans, unpublished data).

September 9-10, 1978

Discharge (m³/s): Max. Daily: September 10: Squam.: 728.

Source: *The Squamish Times*, September 13 and 20, 1978; Thurber Consultants 1983 (Appendix B); Environment Canada 1991.

Details: On September 9, a rainfall of 14.3 mm caused more than 90 ft. (27 m) of boulders and concrete riprap to be swept away from the bed of Harvey Creek. An estimated 5 ft. (1.5 m) of erosion took place over a 50 ft. (15 m) length of the creek (Letter E. and A. Anderson In; Thurber

Consultants 1983). The heavy rain on September 9-10 caused a number of traffic accidents around Squamish.

Early January 1979

(Icejam/flooding).

Source: *Revelstoke Review*, January 10, 1979.

Details: Early January, ice flow blockages in the Illecillewaet River from the bridge to the river's mouth caused flooding and septic tank inundation in some properties on Fourth Street, Revelstoke. Some manholes next to the city's trailer park filled up rapidly. According to Geoff Battersby, Regional District Director, BC Hydro should be dropping the Arrow Lakes Reservoir level this week.

February 10-14, 1979

(Fatal avalanche).

Source: *Victoria Times*, February 12, 1979; *The Vancouver Express*, February 14, 1979; *Golden Gazette*, February 21, 1979; *The Citizen*, February 13, 1979; Schaerer 1983 (p. 23).

Details: On February 10, heavy snow, recent warm temperatures and rain caused many avalanches. On February 11, the summit section of the Salmo-Creston portion of Highway 3 was still closed indefinitely.

Early on February 13, winds gusting up to hurricane strength hit the British Columbia coast and then funneled through to the Fraser Valley. At Cape Beale and Pachena Point, winds of 145 km/h were recorded, reaching the hurricane level. On southern Saturna Island, winds reached 123 km/h. Buildings were toppled, trees uprooted and widespread power outages occurred. About 25 circuits were affected by the storm, all together, 90% of them in the Fraser Valley and a few in Burnaby and Richmond. Langley, Whalley and Surrey also suffered outages. The Sumas and Mission substations were also affected by the storm. Between Abbotsford-Chilliwack, a number of power poles were down along the Trans-Canada Highway. Winds up to 90 km/h at Abbotsford resulted in power outages overnight of at least 12 hours for many residents. As of 8 a.m. on February 13, three-quarters of Abbotsford was without power. In Abbotsford, a newly built motel unit containing about six rooms collapsed in the storm. Several barns were also reported being blown down. At the Abbotsford airport, at least five parked light aircraft sustained extensive damage when the winds flipped them over on their backs. At the Chilliwack airstrip, two small aircraft were damaged.

Heavy snowfalls and major avalanches caused closures of highway routes in the Rogers Pass and several sections of the main CP Rail line for various periods. The heavy snowfall in the Revelstoke area caused snowslides and several highways being closed indefinitely.

On February 13, within two hours, both high voltage transmission lines from the Mica Dam went down. Snow avalanches heavily damaged a railway bridge at Rogers Pass and a ski lift at Fernie. The slides did also minor damage to telephone lines, small structures and forests, and closed major highways for two days. *1) The highway through the Rogers Pass was closed for about three days. One snowslide in the Rogers Pass was 200 m long with a depth of at least 3 m. Traffic on the Hope-Princeton highway was reduced to single-lane at many points.

Rail service through the Mountain and Revelstoke divisions of the Rock Mountains were halted for almost four days. Hardest hit was a bridge west of the 8-km long Connaught tunnel between Revelstoke and Golden. The avalanche, which covered about 450 m of track and crossed the Trans-Canada highway shifted the 32-m bridge off its abutments. The 6-m deep avalanche, which came down on the afternoon of February 13, kept work crews busy till the morning of February 17 when VIA Rail passenger service resumed.

On February 14 at 4 p.m., an avalanche 23 km southwest of Golden in the Purcell mountain range killed seven heli-skiers. *2) The slide coming down from the top of the northwest face of Spillamacheen Mountain released a 0.5-mi. (800 m) wide swath of snow. The group of 10

skiers had tried to out-ski the avalanche. The victims, buried under a depth of 3-20 ft. (0.9-6 m) of snow were all located within one hour. According to rescuer Ken Piggot, because of wind crust conditions the snow during the search were “like blocks of igloo ice.” He said the bodies of the skiers were like “encased in cement.”

*1) Ski specialists noticed a general trend this winter of snow sliding in many places where in the past years no problems were encountered (*Golden Gazette*, February 21, 1979).

*2) In four years of helicopter-skiing in the Rocky Mountains, 11 skiers had been killed. This was the first fatal accident during the five years of operation by Mountain Canada Helicopter Skiing (*Golden Gazette*, February 21, 1979; Schaerer 1983).

March 5, 1979

Source: *The Squamish Times*, March 7, 1979; *The Vancouver Express*, March 7, 1979.

Details: On the morning of March 5, two avalanches on Whistler Mountain buried the World Cup Downhill course to a depth of 2 ft. (60 cm). Unseasonably warm weather of recent days caused the slide to run down “Goat Gully” under the orange chair and all the way to the red chair loading ramp. Further down the mountain, “Insanity” avalanched down to the rocks.

The avalanche closed the resort slopes to public skiing three days before the scheduled opening of the World Cup downhill competition. On March 6, race organisers were desperate to get crew up to the mountain in an attempt to remove the avalanche material and rebuild the course.

A weak snow layer near the ground and two days of warm rain were the major causes of the slides, some of which occurred naturally while others were set off by the Ski Patrol when the mountain was closed.

December 4, 1979

Source: *The Vancouver Sun*, December 4 and 5, 1979.

Details: On December 4 at 3:30 a.m., some 200 tons of loose rock and soggy earth came down near the north portal of the Yale Tunnel 16 km north of Hope. The rockslide was triggered by rain. It spilled onto the CP Rail line directly below the highway. It was the first slide of the season to block traffic on Interior highways. Crews cleared one lane three hours later but halted further clearing till later that day. Another mass of rock estimated at about 100 tons poised to slide over the same cliff 20 m above the road. Traffic was allowed past the site on alternating basis. Later that night, both lanes of the highway were reopened.

December 9, 1979

Source: *The Vancouver Sun*, December 10 and 15, 1979; *The Hope Standard*, December 12, 1979.

Details: On December 9, two separate mudslides near Hope killed one man, injured three others and narrowly missed taking the life of another. Around 2:30 p.m., heavy rain caused a debris flow at the Carolin Mines camp on Ladner Creek in the Coquihalla Valley. An 80-ft. (24 m) mud bank gave way and swept a 10 x 20-metre mechanic’s shed off its foundations and demolished it. The torrential rain loosened the mud bank down onto the shed 10 ft. (3 m) from the bank. One man was crushed to death and three others were injured. The slide swept the building with the truck still inside. The three employees of White Mine Developments Ltd. on contract for Carolin Mines Ltd. were sitting in a truck parked in the shed when the slide occurred. They rode down the slide inside the vehicle. The mining camp that was partially destroyed sustained damage estimated between \$50,000-100,000. Slides and flooded roadways hampered rescuers from reaching the mine site.

The second slide occurred on the Hope to Princeton highway just east of Manning Park. Highway worker Ernie Fitzpatrick was trying to push a boulder off the highway when the slide hit his truck and sent it to the edge of a 20-metre drop to the frozen river below. He compared the

feeling at the moment of impact to “being hit with a sledgehammer.” The right side of the truck was demolished and a number of large rocks came down directly on the sandbox behind the cab. The slide was the second one onto the highway in less than 24 hours blocking the highway route to Princeton. On December 15, traffic through the Circle K slide area east of Manning was still one-lane.

December 12-18, 1979

Discharge (m³/s): Max. daily: December 14: Chem.: 452; Kok.: 212 (extreme record); December 17: Capil.: 247; Shawn.: 28.3 (extreme record); Zeb.: 340; December 18: L. Qual.: 104; Nan. C.: 507; December 19: Cowich.: 222; Stamp G.: 252; max. instant.: December 17: Capil.: 343; Zeb.: 542; December 18: Nan. C.: 765; December 19: Cowich.: 223; Stamp G.: 257.

Source: *The Daily Colonist*, December 14, 18, 19 and 20, 1979; *The Columbian*, December 15, 1979; *The Vancouver Sun*, December 15, 17, 18, 22 and 27, 1979; April 7, 1983; *Victoria Times*, December 13, 14, 17, 18 and 19, 1979; January 5 and 29, 1980; *The Province*, December 19, 1979; VanDine 1985 (p. 65); Environment Canada 1991; Lewis and Moran 1985 (p. A.22); Thurber Consultants 1983 (Appendix B); Church and Miles 1987 (p. 73).

Details: Between December 12-18, two periods of intense rainfall triggered widespread flooding and slope failure throughout coastal southwestern British Columbia. From the evening of December 12 to the evening of December 14, a southwesterly flow of mild, moist Pacific air brought heavy rain to the Vancouver area. Following a dry fall, Victoria received about one third of the monthly average in a single day. Between 4-10 a.m. on December 13, about 22.6 mm of rain fell on southern Vancouver Island. During the same period, the Gonzales Heights weather station recorded 20.6 mm, which exceeded the November total of 15.2 mm. Victoria recorded some 172 mm of rain in an 8-day period. In the 24-hour period ending 10 p.m. on December 12, Pat Bay Airport recorded 46.6 mm of rain. Tofino reported 96 mm of rain by 4 p.m.

Early on December 14, about 80 people living on two Indian Reserves near Mission had to be evacuated after Sisan Creek flooded the neighbouring Scowlitz and Skwakam reserves. The evacuation started at 2:30 a.m. after a logjam blocked the creek, forcing the water over the banks. RCMP members helping in the evacuation said the water was up to their waists in some cases. The flooding also forced closure of the Lougheed Highway, about 25 km east of Mission.

Hardest hit was Port Moody, which had its downtown area virtually cut off. On December 14, following heavy rains a mudslide caused the access to downtown to be closed off, leaving access via Barnett Highway only. Water and mud made St. John's and Clarke virtually impassable. Along the slopes above Port Moody, other small failures occurred, causing temporary evacuations of some homes (Eisbacher and Clague 1981). Evans and Clague (1999) put the damage at ca. \$500,000. The two most destructive landslides occurred in the Seymour-Riverside and Coquitlam-Port Moody areas. *1) The two mass movements took place towards the end of the two storm phases. Though the damage was substantial, there was no loss of life. The damage to houses and storm sewers in Port Moody was considerable. The flood bill for the municipality of Langley was put at \$500,000. To replace the washed out culvert at 56th Ave. alone, some \$250,000 would be needed.

In the Seymour-Riverside area, a slide cut a swath through a thick stand of tall conifers and avalanched onto the terrace below. Two houses located on the lower terrace were demolished and one house at the top of the escarpment was left partially unsupported. Two other slope failures occurred in the same area, causing only minor damage. At the edge of the Coquitlam upland, a slab of sediment about 5,000 m³ collapsed. It continued down a ravine for more than 500 m, irrupting over a densely urbanised section of Port Moody. Runoff water flooded through Port Moody and reworked the debris flow deposits, causing additional damage.

On December 14 at 5 p.m., a massive mudslide occurred at Port Moody, demolishing one house and damaging several others as well as numerous cars. It started on Porter Street when a rain-swollen creek overran its bank and loosened the soggy dirt surrounding it. Hope Street was most severely affected with mud more than 2 ft. (60 cm) for about two blocks. One home on St. George

Street caught fire after being shifted off its foundations. As a precautionary measure residents of about 30 homes were ordered out for about an hour while a natural gas leak was being repaired. A camper truck was pushed against the side of the house. Roads in the area were temporarily blocked, causing massive traffic jams until the mud, more than a metre deep in some places, was cleared. Fearing more slides, crews tried to divert water from a creek, which was eroding the hillside. Following a small stream beside the demolished house belonging to the Jim Roland family, the slide had flowed northward cutting an 80-ft. (24 m) swath through Hope Street, St. George Street, and finally coming to rest against a small frame house on St. Andrews Street. Later that night, the Port Moody engineering department had constructed a small canal of sandbags and earth to channel water runoff into a large sewer.

Near Water Street, the normally passive Noons Creek rose and flooded Ioco Road and ran down nearby Elm Street. The creek washed “thousands of tons” of mud and debris into residential sections of Port Moody. Fearing mudslides from Noons Creek early afternoon on December 17, police ordered residents of an apartment block at 3408 Henry Street to evacuate. This brought the total evacuated families to 70. On December 17, a Bailey bridge was suspended over Ioco Road, which was opened to one lane traffic later that day. Early on December 17, water again streamed down the Hope Street ravine to St. John’s. Houses in the Hope-St. Georges-Elgin streets were in danger of being washed away. Water and BC Hydro gas mains to nearby residences on the north shore of Burrard Inlet were in danger of being swept downstream. Another area of concern was along Gatensbury Road, where a slow moving mudslide was headed towards a creek that empties a major Greater Vancouver drainage system sewer.

Port Moody Mayor Ian Young and Coquitlam Mayor Jim Tonn asked the government to proclaim the area affected by the slide disaster areas. They requested immediate aid in clearing the debris and “full compensation” to be given to people who suffered losses. Property damage was apparently not covered by insurance because the disaster might be classified as an “Act of God” after two days and nights of heavy rain (*The Vancouver Sun*, December 17, 1979). *2)

More slides occurred in the southwestern mainland area, including another mudslide early on December 15 on the Hope to Princeton stretch of the Southern Trans-Provincial Highway. The slide, about 5 km east of Hope, reduced traffic to one lane. As equipment was working to clear it, more mud continued to move. At Vedder Crossing near Chilliwack, one man was slightly injured when a small landslide carried mud and a tree over a road.

On December 16, a renewed flow of moist air from the southwest caused heavy rains for the next two days. Between the morning of December 15 and December 17 at 4:15 p.m. Vancouver reported 110 mm of rain. During the two phases of the storm, Burnaby Mountain recorded 124 mm of rain and 148 mm of rain, respectively. Corresponding values at Pitt Polder were 144 mm and 169 mm. In the Lower Mainland, 40.8 mm of rain fell in 30 hours between 10 p.m. on December 15-4 a.m. on December 17.

In Vancouver, Fourth Avenue west of Alma was closed. Residents of the low-lying apartment buildings were forced to leave their homes. The Landmark Apartments had its entire ground floor of the 63-unit building covered with water. Fourth Avenue traffic was diverted through Canadian Armed Forces property on the higher level and through the Justice College property at Jericho. Flooding also forced the closure of Yukon at Commercial and Marine Drive at Knight Road. Low-lying areas near First Avenue at the Canada Highway exchange were flooded. Early on December 17, Lougheed Highway was closed due to flooding. On December 16 in Richmond, the London junior secondary school was forced to close. A sanitary sewer backed up flooding much of the gym. Storm sewers were also backing up in some residential areas. In Richmond, worst flooding occurred at Leonard Road, Milner Road and Mitchell Island.

Elsewhere in Burnaby, Byrne Road, off Marine Drive, Royal Oak at Gilpin and Gilmour between Dawson and Still Creek were closed due to flooding. Many minor washouts were reported. One lane of the bridge over Mosquito Creek, after floodwaters and debris forced its closure on December 16, reopened on December 17. The other lane was not expected to be reopen for several

days. Early on December 17 in North Vancouver, the Low Level Road was closed opposite the waterfront grain terminal for an hour-and-a-half due to a dirt slide from the adjacent bank. The King George Highway west of 128th Street was reduced to one-lane traffic during rush hour traffic because of flooding. In Coquitlam, Schoolhouse Road and the Cape Horne Interchange were closed.

Late on December 17, BC Tel reported 1,000 telephones out of order in Richmond due to wet cables. At that time, a section of Marine Drive in Burnaby's Big Bend area was still closed due to a blocked culvert. "Hundreds of tons of mud, debris and wood waste" washed down ravines and onto Marine Drive. Market gardens in the Big Bend area were reportedly "reduced to sea of mud." Sections of Marine Drive from the 5600 block to Byrne Road were closed on December 18. BC Hydro crews reported leaking gas lines in the Byrne Road area. In South Burnaby, sections of Willar Avenue and Trapp Avenue were under water. The heaviest flooding of the day was reported at South Burnaby where sections of two roads were under more than a metre of water at one time. Basements sustained extensive damage and several ground floor apartments were flooded. In Langley, the 56th Avenue bridge went out and the Trinity bridge was threatened. The Fraser Highway, the Old Yale Road and 208th Street were flooded. The 208th Street bridge in Langley remained closed until the water receded enough to allow engineers to examine its pilings. In New Westminster, Brunette Creek overflowed on December 16, flooding Brunette and Braid streets and endangering nearby industries such as Canfor. The next day, the area was still under water. It was still unknown when the streets in New Westminster's largely industrial east side would reopen. On December 16, about 30 North Vancouver residents were forced to leave their homes when a mudslide slammed in at least two homes at Riverside Drive. In Coquitlam, a home on Harbour Drive was threatened to slide off its foundations. On December 18, four pumps were working non-stop to keep out floodwaters threatening several homes in the Pembina Street on Lulu Island. Several residents reported flooded basements and damage to carports. In Surrey, sandbags were used in the northern Bridgeview-Whalley lowlands, the Bear Creek park area and around the Surrey municipal golf course. South of Highway 10, heavy flooding occurred along 168th Street, 176th Street, 184th Street and 192nd Street. On December 18, the municipal hall received between 850-900 flood-related distress calls.

On December 19, Kingsway at the CPR underpass in Port Coquitlam remained closed and the farm area was still partially flooded. The Queensborough district of New Westminster was still flooded up to 7 ft. (2.1 m) in places. Early on December 19, 75 families were still forced to stay away from their homes in Port Moody and North Vancouver. By December 19 in North Vancouver, five families remained out of their homes. The engineering department considered the hill north of the road was still unstable. The evacuated families were advised to stay clear until the danger of more slides would pass. The main slide area on Hope Street was believed to be under control but the evacuated families were told not to return to their homes. Floodwaters washed out roads still blocked most routes into Port Moody. Water Street was the only accessible road to the Ioco area. Noons Creek had washed all but one lane. The Port Moody secondary school at the bottom of the hill in the same main slide area remained closed. South of Ioco Road, water and mud also threatened several homes.

Surrey Mayor Don Ross noted that his municipality's storm drain system was not designed to cope with the heavy rainfall that hit the Lower Mainland. He said the rainfall of December 17 was probably "the worst in 10-20 years." According to Richmond's municipal engineer Bernie Doughton, the rain of the previous days "have been the worst on record." Richmond storm sewers were designed to handle 2.5 in. (62.5 mm), while the weather office recorded 87.5 mm (about 3.5 in.) in the 24-hour period ending midnight on December 17, just below the 90.3 mm recorded December 25, 1972. Subsequently, *the Vancouver Sun* called the rains that fell overnight December 17-18 "the heaviest in seven years." After subsiding on December 16, the rains returned early on December 17, dumping 67.5 mm in the 24 hours ending 4 p.m. on December 17.

The heavy rain accompanied by a warm 25-km/h southeasterly wind gusting to 45 km/h, caused storm drain problems in Victoria and Saanich and flooding in Oak Bay. Bowker Creek neared its crest threatening to overflow. Following two days of heavy rain, Victoria experienced flooded

basements and minor flooding problems. Flooding was reported on Vanalman and Glanford, and near Interurban in Saanich, and Martindale and West Saanich roads in Central Saanich and Kangaroo and Sooke roads in Colwood. In Esquimalt, Lampson and Lyle were both closed for one block near the intersection. Some residents at Mill Bay reported flooding. In December, a slide damaged three properties in the Cordova Bay area. According to William Hartley, a former public works minister in the NDP government, it would cost about \$50,000 to rebuild of the lots. *3)

On the afternoon of December 12, a mudslide on the Malahat covered one southbound lane and part of another for about an hour. In Esquimalt, an excavation on Lyall Street was reported to have caved in. In the Langford area, roadways were flooded because of plugged culverts. On December 13, the corner of the Trans-Canada Highway and Douglas Street in Victoria was flooded.

Flooding and washouts disrupted rail service. Both the Victoria and Port Alberni lines of the E&N were shut down for at least 24 hours. Early on December 14, the E&N Dayliner was called back because of a washout on the line at Shawnigan Lake. Exceptional runoff along the right-of-way, which at the washout site runs down a grade some distance from the lake, caused the washout at the 26.5-mile point. Until repairs could be completed CPR chartered a bus for passenger service. After having been idle for three days due to the flooding near Shawnigan, the Dayliner resumed service on December 17 but was unable to make in to Courtenay or return to Victoria. A washout "of major proportions" about 24 km west of Parksville halted freight service to Port Alberni at least till December 21. Full E&N Dayliner service resumed on December 19.

By December 18, the rainfall at Victoria was getting close to the 62-year old record. The Pat Bay airport weather station recorded 232.4 mm (9.14 in.) to 4 p.m. on December 17. *4) On December 18, Victoria's low temperature of 8.8° C was the warmest December 18 ever, breaking the old record of 8.1° C set in 1966.

On the afternoon of December 17, flooding rivers in Nanaimo and Parksville forced evacuations. Along the north side of Parkville's Englishman River, about 130 people left their homes. The majority came from Parry's Park trailer court beside the river. About five other homes in the area were flooded. The flooding happened so fast, residents could not get all their belongings off the floor. Another 70 people at Plummer Road along the south bank of Englishman River were threatened. At French Creek, north of Parksville, an estimated 200 volunteers were placing sandbags. At Fulford Harbour on Saltspring Island on the afternoon of December 17, the home and lot of former deputy highways minister Tom Miard washed into the ocean. The summer home had been constructed 10 years earlier on steel posts set on concrete pads 12 ft. (3.6 m) higher than the highest ever tidemark.

At Cedar, the Nanaimo River forced about 30 people from the Riverside Auto Court. Island residents were warned to boil or chlorinate private well water if floodwaters contaminated their wells. Early on December 18, a Cedar resident became the first fatality attributed to the flood when his car skidded into a flooded ditch on Akenhead Road and overturned. In Duncan, Lakes Road was impassable for a tree- to four-block area. Cowichan Bay Road was also partially under water. Some secondary roads in the Lake Cowichan area were closed.

On December 17, a "mud and log landslide" at Qualicum Beach opposite a cliff came down hitting a northbound truck and trapping its occupant in the cab for 45 minutes. A one-metre diameter log rammed into the driver's door. By striking the vehicle's doorframe, the impact on the driver was reduced. "I heard a roar and then bang! It hit me. It knocked me off the highway," John Eaton noted.

In December, flooding occurred on Disbrow Creek in the Howe Sound area (Church and Miles 1987). The culvert under the subdivision road blocked, forcing the creek to flow over the road. Sandbagging prevented flooding the residence just north of the creek (Thurber Consultants 1983).

On December 19, a mud and rockslide hit a 60-car eastbound freight train on the CPR mainline in the Fraser Canyon, about 24 km east of Lytton. Four trainmen riding in the train's caboose were injured. The slide also buried three flatcars in front of the caboose and buried more than 150 m of track.

*1) There is reference to other debris flows in the Coquitlam-Port Moody area between 1905-1972 (VanDine 1985). As early as 1957, a study by Jack Armstrong of the Geological Survey of Canada (GSC) reported the subsurface instability and evidence of mudslides down the ravines. Acting on the Armstrong study, Port Moody and Coquitlam were reluctant to allow much development. However, they continued to do so along the top of the bluff because legally they could not stop it. Existing zoning permitted it and the land met the existing engineering standards for stability. In July 1979, Coquitlam council passed a conservation bylaw to control landfill, land removal and tree cutting in the slope area. Jim Hockey, Coquitlam deputy municipal engineer said that the existing storm sewer dumps its effluent directly into major ravines. The water pours directly over the bank from road drainage ditches and other pipes. According to Dr. W.H. Matthews, professor of geologic studies at the University of British Columbia, construction should not be allowed to disrupt the subsurface near the edge of the bluff and subsurface water should be directed down the face of the cliff quickly so it does not seep below the surface and thus cause the soil to collapse. Dr. Gerry Eisbacher, staff geologist with the GSC, noted that municipal engineers should never allow water from storm sewers or gullies or any other outfall to flow over an embankment (*Victoria Times*, January 5, 1980).

*2) Langley Mayor George Preston called for immediate assistance. The province would be entitled to aid under the federal disaster fund after Victoria had spent \$2.3 million on relief. Provincial secretary Evan Wolfe announced that the province would provide not only for those incurring personal loss, but also for “extraordinary expenses,” such as flooding in the streets and overflowing of storm sewers. The provincial government paid 100 per cent of the damage cost for victims. The loss of goods and household furnishings were compensated after the first \$500. (*The Vancouver Sun*, December 18, 1979; *Victoria Times*, December 19, 1979). The Provincial Government appointed the Canadian Independent Adjusters’ Conference to assess storm damage caused by the storm within the southwestern portion of the province (*Sun*, December 22, 1979). Premier Bill Bennett signed an order-in-council authorising \$2.5 million aid in provincial flood cleanup (*The Vancouver Sun*, December 27, 1979). For the mudslide damage caused to the more than 60 homes on December 14, a provincial compensation plan paid for the damage to the homes but did not cover damage to landscaping (*Victoria Times*, January 5, 1980).

*3) A few Cordova Bay residents, led by William Hartley, berated Saanich council for not acting on a 1975 soil stability report done by Thurber Consultants Ltd. that recommended steps be taken to prevent the eastern slopes of Cordova Bay from sliding. The groundwater levels apparently build up as surface runoff increases. As soils at the lower levels become saturated, its instability grows. Surface water increases as natural vegetation is removed. The report recommends that storm drains be installed and that lot sizes be restricted to a 5 ac. (2 ha) minimum. The Thurber report also recommends that the speed limit along Cordova Bay Road be reduced to decrease the possibility of a slide being triggered by vibration, particularly from trucks (*Victoria Times*, February 6, 1980).

*4) The record was set back in 1917 with 12.62 in. (320.6 mm).