

Some Known Dam Failures in British Columbia

This list contains the some known failures of manmade dams in British Columbia. It does not list failures of beaver dams (which can have severe consequences), or of landslide dams or glacier related dams.

Hatchery Dam, Cold Water Creek January 4-5, 1903

Heavy rain for 26 hours caused Cold Water Creek near Terrace to rise 10 ft. (3 m). The creek swept away the dam from behind which the water for the hatchery was drawn (Sword 1904). This dam was also swept away in 1902. The hatchery at Trout River (now Lakelse River) was situated on the west side of the river at the mouth of Cold Water Creek, some 2 mi. (3.2 km) down from the lake.

October 11-17, 1903

Heavy rainfall caused the hatchery dam in Cold Water Creek to give way on October 12. The early part of October had very warm weather with much rain, which "swelled the rivers and streams to a great height ... the Old Village [was] completely surrounded and some of the people who were camped there ... came down to Kitamaat." (*Na-Na-Kwa*, January 1904).

Langley Lake, Union Bay (1912) February 10, 1912

On February 10, 1912 about 5 pm, a 52 m section of the crib pivoted to open like a door. Water rushed down the narrow valley knocking down trees and a timber trestle for a logging railway. Without any warning, a 3.3 m high wall of water and debris slammed into the town of Union Bay. Scores of workers' shacks were washed out into the bay and many caught fire. Rescuers used the light from these fires to locate survivors. Several other buildings were destroyed as well. One person was drowned and an estimated \$50,000 (1912) worth of property was lost. This was the only fatality on record for Canadian dam failures. Had the dam failed at night, hundreds of lives could have been lost.

Anyox Dam November 9-13, 1933

The rainfall at Anyox on November 9, 10, and 12 was the greatest on record. On November 10 and November 12, 4 in. (100 mm) over 4 in., respectively were recorded. In the hills a heavy snowfall occurred, causing high water. The wing dam constructed the year before was left high and dry. When the river broke through at previous year's location on November 12, it took out half of the dam. Bower's Ranch at the end of the bridge was under 4 ft. (1.2 m) of water. Other small farms on the flats, including Stevens' and Calfa's, were also flooded. Some small washouts occurred between Alliance Road and Stevens Ranch. The recommendation was to

move the existing farmers out of the Kitsault Flats and to cancel the sale of more lands on the flats.

Long Lake Cofferdam

October 4-6, 1936

Near Stewart, nearly 4 in. (101.6 mm) of rain in 24 hours increased water pressure, completely demolishing the cofferdam at Long Lake. Management of the Big Missouri mine put on crews to rebuild the dam and the bridge at Silver Lake.

Beaver River Dam

October 1-4, 1961

Stewart recorded 12 in. (304.8 mm) of rain in 48 hours, Kitimat 3.5 in. (88.9 mm) in 48 hours, and the Terrace airport 2.5 in. (63.5 mm) in 24 hours. Stewart was isolated when the dam in the Bear River broke and flooded. The river broke its retaining walls and cut parts of the Stewart-Cassiar highway under construction. Stewart sustained heavy property damage and several residents had to be evacuated. Several airstrips were reported damaged. Several washouts occurred and two bridges were damaged.

Deep Creek Dam

Winter 1992

In November, December and January, Terrace had its highest recorded rainfall. During one of the winter storms, the dam in Deep Creek, one of Terrace's two principal sources of water, gave way. The small 30-year old structure washed out under the pressure of the water that had built up in a pond on the Deep Creek water system, 4 mi. (6.4 km) north of Terrace. The water this system provides is mainly from the snowpack. Following an extremely mild and extremely wet winter, the snowpack was very small. When the dam let go, even this amount of water was lost. To augment its water supply, Terrace was forced to drill a number of wells.

Mashiter Creek Dam

August 30, 1991

See video

Extremely heavy rainfall between August 27-31 resulted in flooding or near-flooding situations in the Squamish area. On August 30, Squamish recorded its greatest one-day rainfall with 103 mm. In Squamish, high flows in the Squamish, Cheakamus, Cheekye, Mamquam and Stawamus rivers and in Culliton and Mashiter creeks caused limited flooding and considerable damage to rock riprap bank protection, roads and the water intake of Mashiter Creek. The dyke and revetment on the right bank of Stawamus River in Valleycliffe suffered damage to bank protection at several locations. Damage also occurred at Mamquam River opposite

the golf course and at the Squamish River at Judd Slough, Culliton Creek, Cheakamus River, Fitzsimmons Creek, Miller Creek and Ryan River.

On August 31, the Mashiter Creek dam was taken out after a debris jam formed in the Mashiter Creek water intake. On August 30, rocks and debris had filled the dam solid and rendered it inoperable. An estimated 20,000-50,000 tons of debris clogged the Mashiter. The overall damage seemed worse than previous year's. Squamish-based engineer Frank Baumann first expressed geotechnical concerns about Mashiter Creek in a letter to the Ministry of Municipal Affairs in December 1987: "Mashiter Creek drains a basin that has been heavily logged. Its upper reaches are underlain by unstable volcanic debris from Mount Garibaldi that has produced numerous mud flows in the past and is likely to produce more slides in the future." In a submission to council just over two months before this event, Baumann stated, "The unstable soils together with the clear-cut logging and poor road building of the past, mean that the Mashiter watershed is much more susceptible to landslides than the Stawamus River basin." On the morning of August 30, the original creek bed was ripped apart but it was not until 5 p.m. that day that the creek was redirected.

Cannon Creek Dam, Quesnel May 27, 1995

See video

On May 27 at around 8 a.m., a 6-m high earth-filled irrigation dam about 45 km east of Quesnel failed. It caused approximately \$500,000 to the road system and other property damage. The sudden release of the storage killed 48 head of cattle, destroyed 1.5 km of a public road, damaged between 100-200 ac. (40-80 ha) of hayfield. According to the *Quesnel-Cariboo Observer*, the Buchanan's ranch lost 17 cows and 10 calves. Besides killing the cattle, it rendered half of the 600 ac. (240 ha.) Buchanan Ranch useless. The slide dumped thousands of tons of gravel and debris into the Quesnel River, about 300 ft. (90 m) below the ranch. Ironically, a day prior to the dam burst, a deal to sell the ranch fell through. Part of the reason for the failed real estate transaction were problems cited with the dam.

The dam was on a sloping hillside about 1,000 ft. (300 m) above the ranch, and 2 km south. It held back a 12 to 15-ac. (4.8-6 ha) body of water, 20 ft. (6 m) deep. The torrent cut a quarter-mile (400 m) swath down towards the Quesnel River. Some 700,000 m³ of material into the river, turning it dark for 45 km.

About a 40-ft. (12 m) section of Hydraulic Road disappeared into an instant 25-ft. (7.5 m) deep ravine. A 20-ft. (6 m) piece of the roadway holding the lake blew away. According to district highways manager Grant Lachmuth, it would take up to two weeks and up to \$250,000 to stabilize Hydraulic Road. Some 2 km of the road had to be reconstructed. Road damage was later estimated at less than \$200,000.

The torrent peaked at about 8:15. The roar from the mountainside was deafening, "like a squadron of jets flying in a low-altitude mission." A wall of water, trees and debris headed directly towards the ranch. Three occupants of the ranch narrowly escaped "river as wide as the Fraser." The force of the cascading river created its own wind.

Fifteen minutes later, the flow was beginning to back off and by 9 a.m. it was reduced to a trickle. Much of the ranch's northern pasture turned into a series of ravines. In some places, these gorges dropped 300 ft. (90 m) deep, measuring more than 100 ft. (30 m) across.

For a week prior to the burst, the Buchanans had experienced trouble with their irrigation dam. Just days earlier, a diver had been hired to take a look and repair a faulty gate valve at the dam. He reported that water was running under the 16-in. (40 cm) culvert. Material was deposited around the culvert and the valve was repaired. At that point, the culvert was considered working properly.

Garth Wakelam, the region's dam inspector, suspected the failure of culvert, which either became corroded or somehow separated, as the cause. Despite an extensive search of the area, including the Quesnel River, the culvert was never found. The Buchanans, who were not insured for such an occurrence, may receive some funding from the provincial emergency program.

The dam, one of the approximately 500 licenced in the Cariboo-Chilcotin-Bella Coola region, had been constructed in 1962. In 1992 when last inspected, there were several improvements recommended. But the dam itself was declared a "C" hazard, the lowest category. No follow-up inspection had taken place.

Frame Creek Dam 1996

Sometime in 1996, a dam failure occurred on Frame Creek. During the construction, earthfills were likely too great for the compaction equipment. Tracked equipment like bulldozers, though they are heavy, their weight is dispersed upon its track, resulting in less than optimum compaction. Evidence also suggested that the slopes of the dam were too great for soil conditions.

Upon reservoir filling, beaver activity plugged the inlet of the spillway raising water levels. High watermark suggests freeboard was dramatically reduced and threatened overtopping. Saturation of the downstream slope occurred and it began to slough. The 20-cm outlet sluice was opened to drain the reservoir, which took three to four weeks. The saturated upstream slope failed and sloughed into the reservoir, damaging the gates and possibly the intake.

This list is primarily excerpted from:

Flooding and Landslide Events Northern British Columbia 1820-2006
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http://www.env.gov.bc.ca/wsd/public_safety/flood/pdfs_word/floods_landslides_north.pdf