

SEA TO SKY

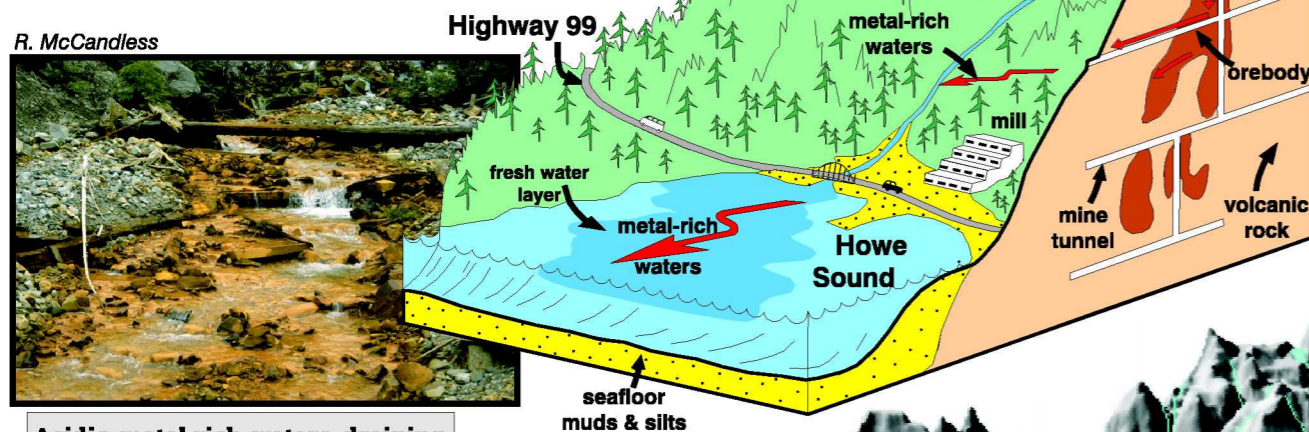
Highway 99 and the B.C. Rail line follow the east shore of Howe Sound north to Squamish, and then wind their way along mountain valleys to Pemberton and beyond. Travellers pass a mine that once was the largest copper producer in the British Commonwealth, a volcano that last erupted in the Ice Ages, unstable slopes, and hazardous debris fans.

Britannia Mine: Economic Boon, Environmental Problem

The orebody within Britannia Mountain was mined from 1905 to 1974. It was a natural concentration of over 50 million tonnes of iron sulphide-rich rock containing 1% copper, 0.6% zinc, and other metals such as silver, gold, and cadmium. At its peak, the Britannia mine employed over 2000 people and produced metal that today would be worth \$1.3 billion. The mine contributed to the growth and status of B.C. as an international centre for exploration and mining.

Metals on the Move

Metals from the old Britannia Mine contaminate nearby Britannia Creek and Howe Sound. Rainwater and snowmelt enter the mine through a pit at the top of Britannia Mountain. The waters react with sulphide minerals, leaching metals which are carried in solution from the tunnels to Britannia Creek and Howe Sound where they spread out as a sheet on denser seawater. The copper contents of these waters reach levels that are toxic to aquatic life. Controlling metal dispersion from Britannia will likely involve limiting the flow of water into the mine, and collecting and chemically treating escaping waters.



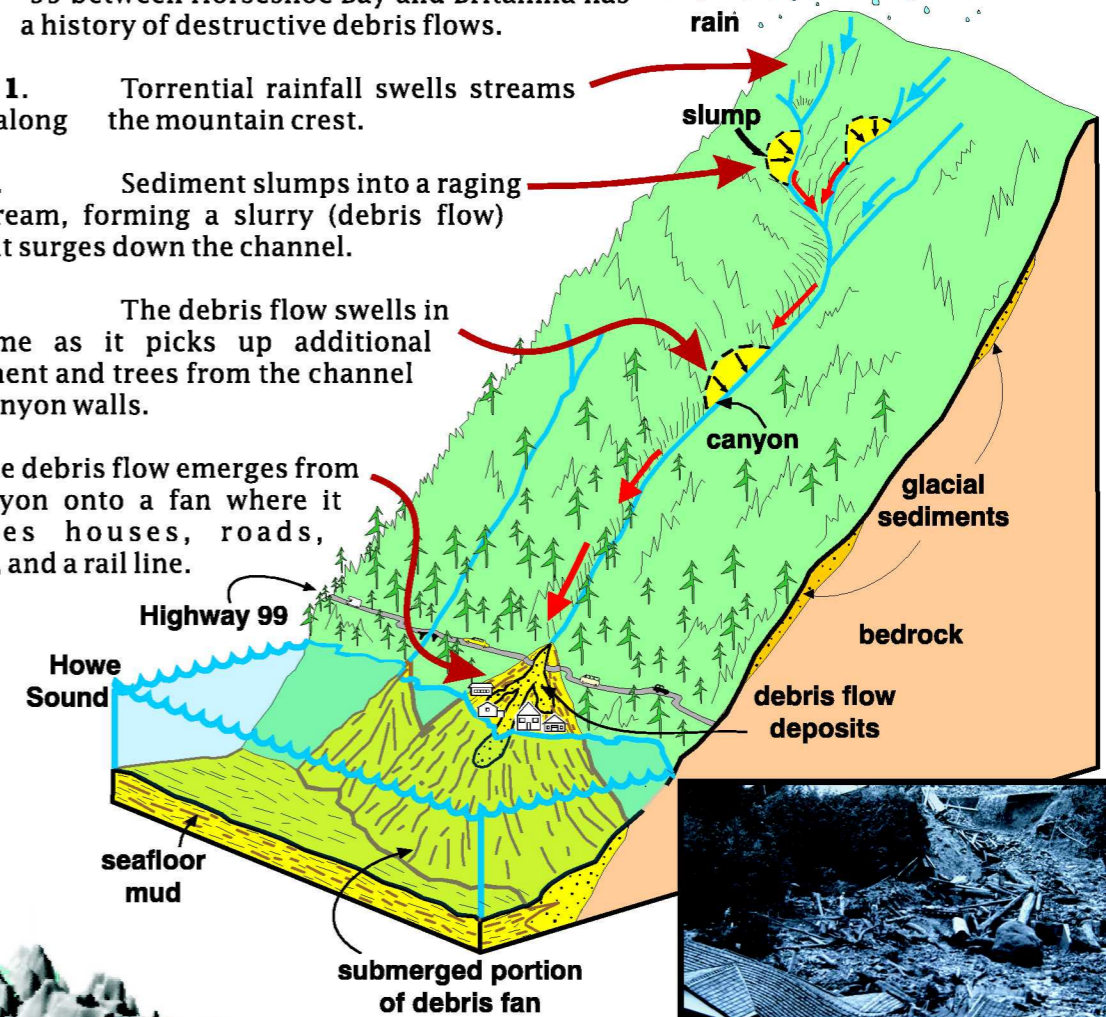
R. McCandless

Acidic metal-rich waters draining the Britannia mine precipitate iron along the stream channel.

Treacherous Slopes

Debris flows are common in our coastal mountains because heavy rains fall on steep slopes mantled by loose sediments. Highway 99 between Horseshoe Bay and Britannia has a history of destructive debris flows.

1. Torrential rainfall swells streams along the mountain crest.
2. Sediment slumps into a raging stream, forming a slurry (debris flow) that surges down the channel.
3. The debris flow swells in volume as it picks up additional sediment and trees from the channel and canyon walls.
4. The debris flow emerges from the canyon onto a fan where it damages houses, roads, bridges, and a rail line.



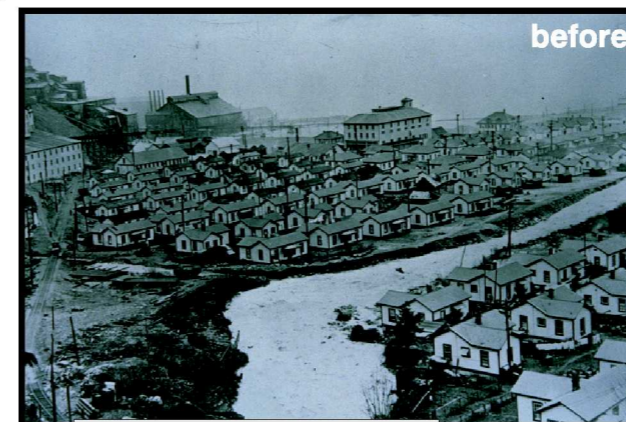
Aftermath of a debris flow that swept through Lions Bay in February 1983, killing two people.

Vancouver Sun



Protecting People and Property

Debris fans are favoured sites for development because they are less steep than adjacent mountainsides. However, the fans are prone to floods and debris flows. The mining community of Britannia, for example, was devastated by a sudden flood on October 28, 1921. This flood occurred when a blocked culvert caused a railway embankment to temporarily dam Britannia Creek and then fail, releasing a catastrophic flood. A series of debris flows in the 1980s swept across debris fans north of Horseshoe Bay, destroying bridges and homes and claiming 11 lives. Zoning regulations now restrict development on hazardous fans. Where existing development is threatened, it can be protected by dams or deflection barriers, and by deepening and lining stream channels. Over \$15 million was spent on protective works along Highway 99 following the disasters of the 1980s.

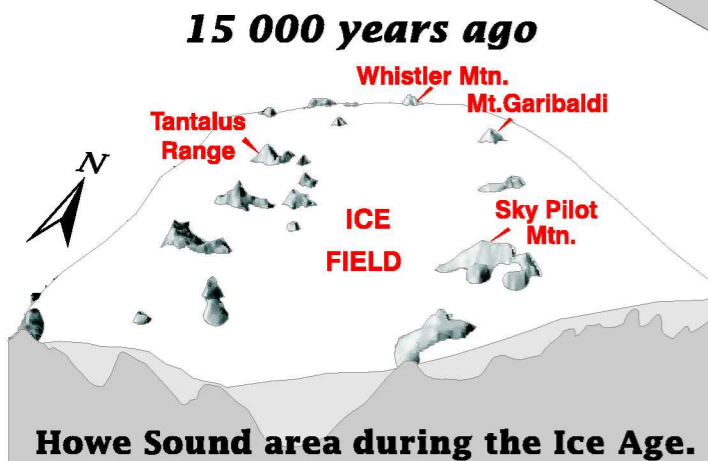


Britannia before and after catastrophic flood of 1921. Thirty-seven people were killed and about half the 170 houses in the town were destroyed.

Britannia Mining Museum



after



Howe Sound area during the Ice Age.



A tidewater glacier in Alaska - what the Squamish area looked like 13 000 years ago.

A glacier 2 km thick filled Howe Sound about 15 000 years ago and was part of an ice sheet that covered most of B.C. This was one of many glaciations that occurred during the last 2 million years ("The Ice Age"). Features eroded by glaciers include fiords such as Howe Sound, U-shaped valleys, sharp-crested mountain peaks, and grooved bedrock surfaces. Material removed by glacial erosion was deposited in valleys and lowlands as thick sequences of sediment.

13 000 years ago: glacier retreat

