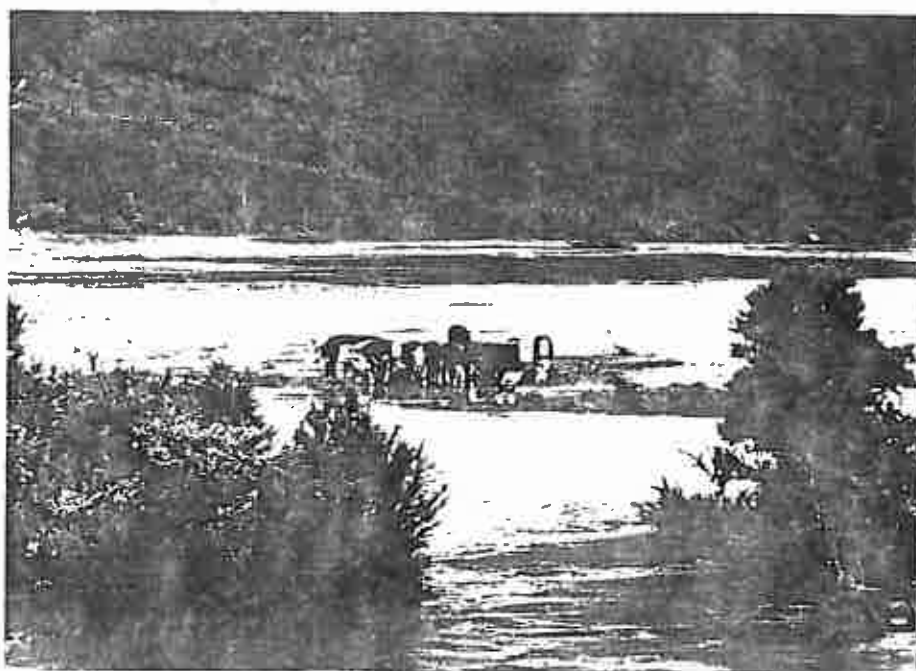




A Chronology of Flooding on the West Coast,

South Island, New Zealand.

1846 - 1990



J.L. Benn (1990)

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ISBN 0-908885-00-8

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INTRODUCTION

This report examines details of historical flooding on the West Coast (Fig. 1). For the purposes of this report the West Coast is defined as the area west of the main alpine divide between Kahurangi Point in the north to Ararua Point in the south. The investigation was conducted as part of the research programme for the Grey River flood plain management planning project. The study was extended beyond this project to avoid future duplication of effort in flood hazard assessment investigations.

BACKGROUND

A combination of high intensity rainfall (Fig. 2), high topographic relief and short steep rivers often leads to rapid flooding of low lying land on the West Coast.

This had been a problem since the earliest days of European settlement. The major urban centres of Greymouth, Westport and Hokitika, established at the mouths of the Grey, Buller and Hokitika Rivers have been subjected to frequent flooding throughout their histories and have received most public attention. Nevertheless, outlying rural areas have been equally devastated by floods. Damage has often been severe in social, economic and physical terms, and over the years flood waters have claimed a number of lives.

Records of flood events often lack detail, are very localised and are scattered throughout libraries, museums, newspapers and local body reports. At present, no single document exists recording the majority of flood events over the entire region.

AIMS AND OBJECTIVE

It extends from a consideration of the above information that this chronology aims to:

- a) produce a comprehensive record of West Coast flood events,
- b) present rainfall, river level and discharge data, and synoptic weather condition information, where possible, for major flood events,
- c) emphasise the damage and inconvenience caused by regular flooding,
- d) to identify areas most at risk from flooding,
- e) produce an historical foundation upon which subsequent flood records can be added to.

With these aims in mind, the main objective of the exercise is to produce a report based on historical information that can be of assistance in sound decision making for future flood plain management and planning needs.

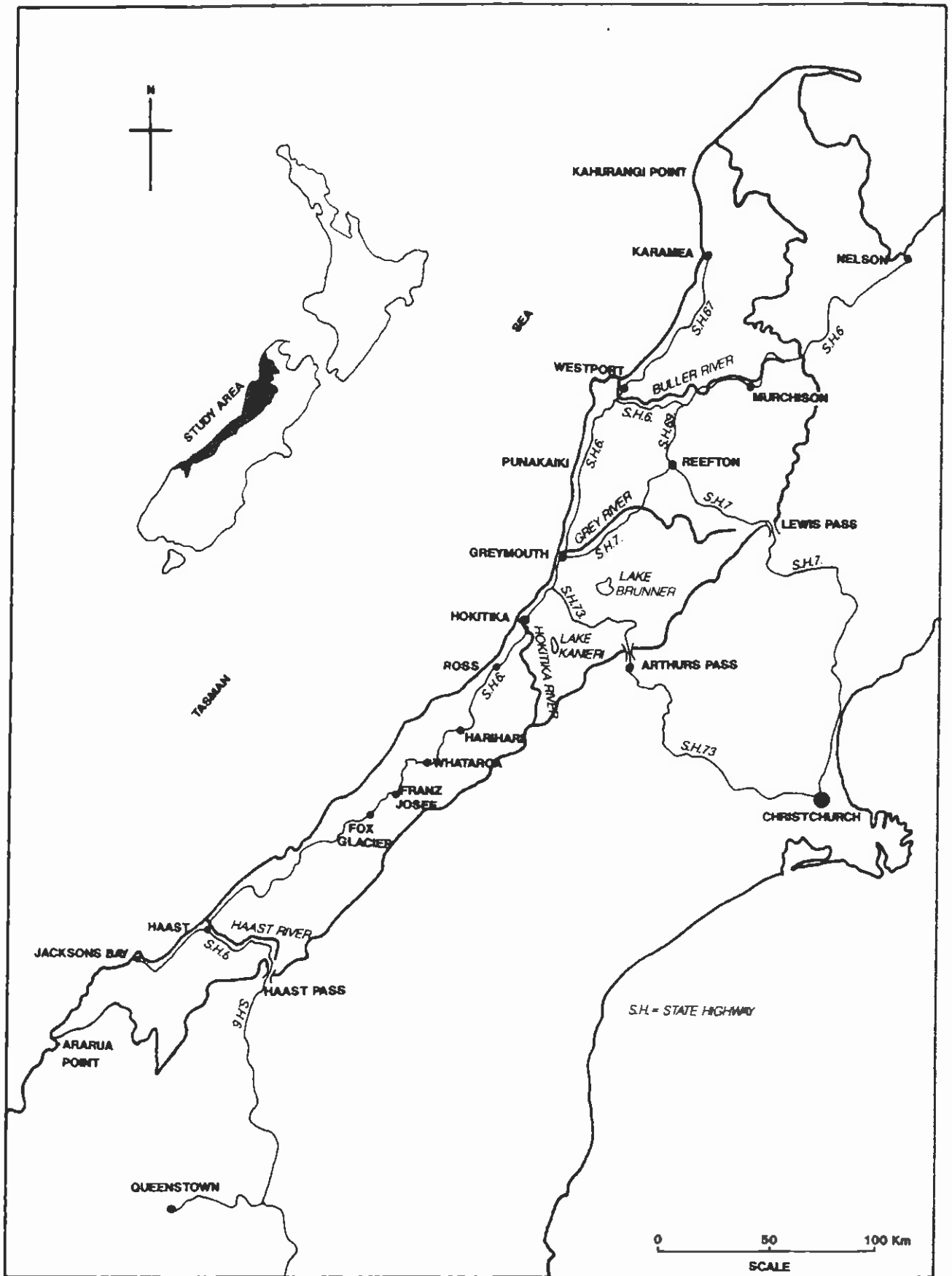


FIGURE 1. LOCATION MAP.

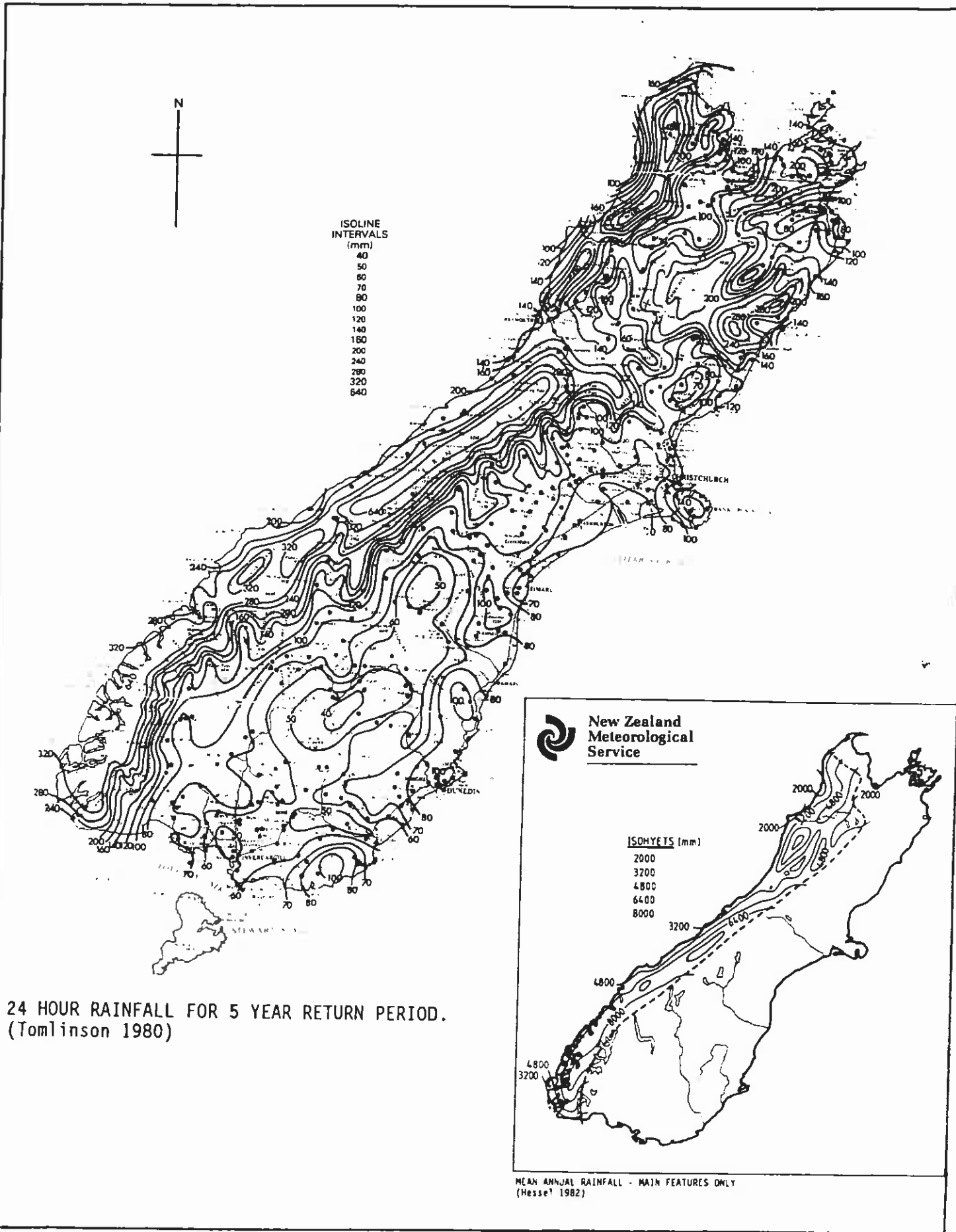


FIGURE 2. RAINFALL INTENSITIES.

Diagrams used with permission from D.S.I.R. Publishing and New Zealand Meteorological Service.

FORMAT

Details of flood events are presented first. Where possible the information outlined in (b) above will be given along with comparisons to previous floods. Throughout the text are flood photographs and diagrams illustrating the extent and damage caused by individual events.

Appendices then follow. Technical information given in the appendices includes observed and calculated flood peak discharges, return periods, flood warning levels, specific discharges, and summaries of weather conditions leading to major floods.

ACCURACY

The chronology has been compiled using the best information readily available at the time of writing. However, it is appreciated that three sources of error are possible. Foremost, it is recognised that some flood events may have been omitted from the chronology due to:

- i) some records not being readily available.
- ii) some records (e.g Greymouth Library and Greymouth Borough) have been destroyed by floods and fire.
- iii) many old Westland Catchment Board records have been discarded.
- iv) temporal and financial constraints.

Secondly, some of the older newspaper accounts and technical data are not consistent with each other. In such cases estimates have been made.

A third minor source of error may arise from all units in the text being converted to metric and rounded off.

CONCLUSION

This report has documented the causes and effects of flooding on the West Coast. By compiling information from a variety of sources the investigation has identified areas most frequently flooded and has resulted in the most complete flood record of the study area to date.

It is clearly implied from the text, that floods are the most commonly occurring natural hazard on the West Coast, highlighting the need for special attention in terms of landuse planning and management. The information in this report, in association with relevant technical data should provide a guide for sound and logical judgements regarding flood prone areas in the future.

It is envisaged the chronology will be updated as subsequent floods occur and more information becomes available on historical events.

ABBREVIATIONS USED

D.S.I.R.	Department of Scientific and Industrial Research
G.E.S.	Greymouth Evening Star
G.R.A.	Grey River Argus
H.E.S.	Hokitika Evening Star
M.W.D.	Ministry of Works and Development
N.Z.G.	New Zealand Gazette
N.Z.M.S.	New Zealand Meteorological Service
W.C.B.	Westland Catchment Board
W.C.T.	West Coast Times

c	circa
cm	centimetres
cumecs	cubic metres per second
km	kilometres
km/h	kilometres per hour
km ²	square kilometres
m	metres
mm	millimetres
m/s	metres per second

NOTES

1. Information for flood events between 11/10/1920 and 28/11/1953 is from Cowie, C.A. (1957), except in the few cases indicated differently. Besides converting units to metrics, the text of Cowie has remained unaltered. This information was used with the permission of D.S.I.R. Publishing.
2. The quality of the plates is directly controlled by the condition of the original photographs. Copies of all photos are held at the West Coast Regional Council Office, Greymouth.
3. Persons noting omissions of flood events should contact the West Coast Regional Council so as the chronology can be updated as appropriate.

ACKNOWLEDGEMENTS

This report was made possible with the assistance of the following organisations and individuals.

Funding for the project was provided by the Ministry for the Environment in association with the former Westland Catchment Board and Regional Water Board, and laterly the West Coast Regional Council.

Staff of the West Coast Historical Museum (Hokitika), the Greymouth Evening Star, Greymouth Borough Council, Greymouth Public Library and Works Consultancy allowed the writer access to valuable records upon which the report was based.

Typing was undertaken by Mrs S. Smith, Mrs L. Lysaught and Mrs A. Mahuika. Photographs were produced by Mr W. Moen and Mr M. Shearer. Mr W. Harrison oversaw the project, and Mr M. Stewart proof read the draft script and provided constructive critical comments.

Mr R. Daniel (Westland District Council) and Mrs A. Husband (Husband Construction Ltd.) provided useful information through personal communication.

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Chronology of Flooding

22 FEBRUARY 1846

Heavy rain for a week raised the Buller River and hindered Thomas Brunner's exploration of the Buller Gorge. Brunner commented "I find some parts of this at a fresh the river rises upward of 30 feet (9.1m)" (Brailsford 1984).

4 - 11 MAY 1846

Torrential, almost continuous rain fell for a week, being accompanied by a north-east gale. Rain on the night of the 4th brought flood waters down from hills above Okiri (near Nine Mile) and surface water flooded Charles Heaphy's campsite. On the 5th, Heaphy and company tried to cross the Totara River but couldn't due to it being in high flood. The Totara River remained in flood until the 11th, along with other streams and creeks in the area (Heaphy 1846).

11 - 14 JULY 1846

The Karamea River was in flood, halting Heaphy's progress northwards for three days (Heaphy 1846).

c5 JANUARY 1847

During Thomas Brunner's expedition, the Tiraumea River was recorded as being in flood. A flax raft had to be made to get supplies to the other side whilst the people swam behind the raft (Matthews 1957).

23 MARCH 1847

Torrential rain raised the Buller River hindering Brunner's progress back to Nelson (Matthews 1957).

19 SEPTEMBER 1859

A large flood in the middle reaches of the Buller Gorge was recorded by John Rochfort, a pioneer surveyor. He noted the river in most places contracted to 50 links (10m) and of great depth - the fresh rose upwards of 60 feet (18.2m) in the Gorge (Brailsford 1984).

MID JUNE 1860

The Buller was in light flood when explorer Rueben Waite arrived, but rose steadily during the day as heavy rain fell. The river overlapped its banks, stranding Waite's exploration for four days (Halket-Millar 1959).

c25 DECEMBER 1861

Previous days of rain spoiled the first Christmas party on the West Coast as creeks in the Buller region rose to even higher levels than during the winter storms (Halket-Millar 1959).

(DAY UNKNOWN) APRIL 1862

Samuel Mackley, returning to the Grey River mouth from Waipuna after setting up Westland's first farm, was hindered by a severe flood in the Grey River. All of the flat land in the middle reaches of the river was flooded, and at the mouth the land cleared by Maoris was about 2m under water (Halket-Millar 1959).

(DAY-MONTH UNKNOWN) 1863

Although the business district of Westport was flooded by the Buller River little else is known (Nolan 1976).

(DAY UNKNOWN) FEBRUARY 1863

The Buller River was in flood, being very turbulent and creating waves "several feet" high at the rapids, making transportation of goods and supplies to gold settlements upstream difficult and dangerous (Halket-Millar 1959).

6 MAY 1863

The Arahura River was in flood and the Taramakau River was in high flood. George Whitcombe and Jacob Louper, exhausted after crossing the ranges from Christchurch, managed to cross the Arahura but Whitcombe drowned whilst attempting to cross the Taramakau (Halket-Millar 1959).

AUGUST 1863

Storms swept the Buller Region throughout August and the hilltops were coated with snow for the greater part of the time, the (gold) diggers working in appalling conditions were often washed out of their primitive encampments as creeks gushed down in high flood (Halket-Millar 1959).

13 SEPTEMBER 1863

A combination of a flood in the Grey River and very heavy seas wrecked the schooner "Gipsy" which had been trying to enter the Grey Harbour for a number of days. It was on this ship that Arthur Dobson travelled to the Grey to commence his West Coast Surveys (Lord 1976).

Note: The series of storms continued from August with the same consequences for the diggers' settlements (Halket-Millar 1959).

c9 FEBRUARY 1864

On February 8th, William Revell (Canterbury Provincial Government Agent at the Grey) and two survey hands set out for Christchurch, via the Taramakau River, Hohonu Creek and Lake Brunner. The journey took 14 days, the party being detained by a very heavy flood in Lake Brunner which rose 6ft (1.8m) after two days solid rain. "This was reported by the Maoris to be the heaviest flood ever seen in the Grey, the water completely overflowing it's banks, two chains (40m) of which were washed out to sea. As a result of this the Government Depot, which has been erected three chains (60m) from the river was left in a precarious position". Another depot had to be built at the head of Revell's Lagoon (Lord 1976).

c26 OCTOBER 1864

G.O. Preshaw (Gold buyer for the Bank of New South Wales) and party were stranded on their journey to the diggings on the Greenstone River by the rapid rising of the Taramakau River. They could not cross the second ford and on their return to the first crossing place, the river had risen 30cm in half an hour. The river rose considerably after that.

Heavy rain had been falling all day and prior to setting out, the Maoris advised the party to stay put as a heavy fresh would come down the river later in the day (Lord 1976).

15 NOVEMBER 1864

Saltwater Creek at Paroa was in flood after several days of heavy rain stranded Preshaw's return to the Grey River (Lord 1976).

9 DECEMBER 1864

Preshaw was again stranded at the second ford of the Taramakau River which was too high to cross (Lord 1976).

MID DECEMBER 1864

The Hohonu River was very high halting Preshaw's return to the Greenstone River for two days (Lord 1976).

26 DECEMBER 1864

Heavy rain in the hills caused the Okatiki (Hokitika) River to rise unexpectedly. The river washed away miners shacks and supply stores on the south side of the river (Halket-Millar 1959).

(DAY UNKNOWN) JANUARY 1865

Hokitika as a town had only just opened up when a flood all but submerged the place (Halket-Millar 1959).

(DAY UNKNOWN) APRIL 1865

Three Mile Creek (near Hokitika) was in a state of fresh and one man drowned whilst trying to cross it (Halket-Millar 1959).

c23 MAY 1865

The Hokitika River was in flood and the steamer Wakool sank trying to enter the river as the current was very strong (Halket-Millar 1959).

Note: The Grey River was flooded for much of October 1865, claiming a number of victims - many being swept out to sea. Where the Arnold River joins the Grey, miners were trapped on several occasions (Halket-Millar 1959).

2 OCTOBER 1865

Very heavy rain on the night of the 1st brought the Hokitika River into flood on the morning of the 2nd. A large amount of debris was brought down the river which overflowed its banks at Hokitika township. Water reached the stores along Gibson Quay. Tancred Street looked like a canal and water ran down Weld Street, ponding up like a lake. The whole of the river beach on the south side was submerged, and the velocity of the water threatened to tear vessels from their moorings. The volume of water running through the mouth channel at the south spit was reported to have been the largest seen.

Although the rain was heavy, it was not considered intense enough in itself to raise the river so suddenly. It was therefore thought that the warm temperature (13°C) melted a lot of snow in the high country (W.C.T.03/10/1865).

The Haast River was reported to be in high flood by Vincent Pyke (Warden and Goldfields Secretary), and his survey party on their return journey to Otago (Lord 1976).

20 OCTOBER 1865

The weather had been very changeable for a week bringing rivers and creeks into flood. On the 20th, a fresh in the Grey River broke a coal boat loose from its mooring, capsized it and swept it down to the river mouth. The boat was eventually recovered (W.C.T 26/10/1865).

27 OCTOBER 1865

James Smith, a popular Cobb and Co. coach driver was drowned in Saltwater Creek near Paroa. He attempted to drive the coach across the creek in high flood and was swept away. The coach and a considerable amount of property was also lost (W.C.T. 28/10/1865).

20 - 25 DECEMBER 1865

Rain fell over the whole West Coast for a number of days, being heavier in the north. All rivers between the Grey and Hokitika were in flood; the Taramakau being so high as to be impassable. Mail deliveries to and from Hokitika were suspended for three days because of the Taramakau's level. A large amount of mail was lost in the Arahura River when the delivery person tried to cross from the Greymouth side (W.C.T. 23/12/1865).

At 9.00 p.m. on the 24th the Taramakau overflowed its banks, burst through the north tip and washed away a small village there. Except for a small amount of property, all was lost. More could have been saved but for the rapidity with which the river encroached on the bank and widened the new channel.

At Hokitika a fierce north-west gale with heavy rain commenced on the 23rd and continued unabated through to the 24th. The Hokitika River in high flood, backed up against the high tide and flooded much of the lower part of Hokitika. Boats were needed to travel around the town and the water rose so fast many people prepared themselves to be evacuated. At 8.00 p.m. on the 24th at low tide, the surface of the river was less than a metre from the highest part of the wharf. The lower end of Gibson Quay was damaged the most as the river encroached 6m into the roadway and washed away the entire wharf section of that area. On Christmas Day the flood had retreated somewhat but many buildings along Gibson Quay had to be moved or demolished and streets had to be cleaned up as much debris was strewn about (W.C.T. 28/12/1865).

23 - 25 FEBRUARY 1866

A fortnight of excellent weather was broken by thirty six-hours of almost continual rain. Much of Hokitika was flooded by surface water.

The rain commenced on the 23rd; the Hokitika River rose rapidly and was soon overflowing the sandflats on the southern side of the channel. At 8.00 p.m. the river was only 60cm lower than when it overflowed the wharf on Christmas Day 1865. The rain intensity increased throughout the 24th and eventually ceased at 6.00 a.m. on the 25th. However, the flood peak occurred some hours later in Hokitika.

It was noted that "no preceding flood had committed so much havoc in so short a time". This was accounted for by the construction of a dam on the southern channel which pushed the water over to the unprotected parts of Gibson Quay on the north bank. Along the length of the Quay, its width was reduced between 3m and 9m in places as the bank eroded away. Many buildings along the Quay were destroyed as they became undermined and the dam on the southern channel was almost totally destroyed (W.C.T. 26/02/1866).

21 - 22 JUNE 1866

A strong gale blew over the region during the day and night accompanied by incessant rain, bringing most rivers into flood. The streets of Hokitika were almost impassable as they were transformed into deep muddy bogs and unmade thoroughfares became completely swamped with water. Although a moderately heavy fresh was flowing in the Hokitika River on the 21st, no damage was caused. On the 22nd the Taramakau River was unusually high, and combined with a very heavy surf to make it completely impassable (W.C.T. 26/06/1866).

26 - 27 JUNE 1866

Three days of gale force winds and heavy rain from the north west and warm temperatures lead to snowmelt in the high country, raising the levels of most rivers. Severe flooding occurred in Hokitika and Greymouth (G.R.A. 29/06/1866).

Hokitika was completely flooded by surface water on the 26th. This flooding was attributed to poor drainage which many citizens thought could have been fixed at very little expenditure (W.C.T. 27/06/1866). On the 27th "one of the smartest showers ever witnessed on the West Coast fell for half an hour". Several streets were flooded all day and boats had to be used on several occasions to allow people access to and from their homes (W.C.T. 28/06/1866).

The Grey River rose quickly and unexpectedly, and backed up against the high tide, overflowing the Greymouth banks at about 8.00 a.m. on the 27th. Water flowed down Boundary Street and into the lagoon, flooding much of Greymouth and Blaketown. Mackay, Boundary, Arney and Gresson Streets were all under "several feet" of water and at the lower end of Richmond Quay there was about 1.5m of water in the houses, which were themselves built on 1.5m piles. Boats were needed to travel around the centre of town and at the end of Werita Street a boatman was swept away over the bar and drowned.

A great loss of property was reported from the upper Grey Valley townships, particularly at Twelve Mile. At 6.00 a.m. on the 27th, the river at the town was bank high and by forenoon the lower part of the town was flooded with 1.5m to 2m of water. Goods in stores had to be boated to higher ground, or in many cases, were destroyed by water. The Camp Reserve was reported to be completely submerged (G.R.A. 29/06/1866).

30 JULY 1867

The departure of the coach from Hokitika to Christchurch was postponed for a day on account of the rivers being high after several days of unsettled weather (W.C.T. 31/07/1867).

1 - 6 OCTOBER 1867

A week of stormy weather resulted in most rivers and creeks rising to flood levels. Showers began to fall on the morning of the 1st. By afternoon the rain had increased to a continuous downpour accompanied by a north west gale and lightning, at nightfall. The Hokitika River began to rise as snow on the ranges melted (W.C.T. 01/10/1867).

During the next day thunder and hail storms prevailed. The Hokitika River hadn't risen as much as expected but was still high enough to give the bar a good scouring. The coach driver reported the Arahura River was rising rapidly but the Taramakau was dropping (W.C.T. 03/10/1867). A man was drowned in Wainihinihi Creek, a tributary of the Taramakau River whilst trying to cross it in flood (W.C.T. 04/10/1867).

By the 4th, the Arahura River was excessively swollen, rising to within a 1m of the roadway on the bridge, and flooded the approaches so much that the Greymouth coach had to turn back to Hokitika. The Hokitika-Christchurch coach was also delayed for a day (W.C.T. 05/10/1867).

Torrential rain on the 5th caused severe surface flooding in Hokitika (W.C.T. 07/10/1867) and by the 6th the Arahura River was still running very high although other rivers had fallen (W.C.T. 06/10/1867).

25 - 26 OCTOBER 1867

Heavy rain began to fall on the night of the 24th and by midnight the rainfall had become torrential and continued in such a manner until just after 8.00 a.m. on the 25th. Showers continued throughout the day.

The Hokitika River rose rapidly and by day break it was in a state of 'tremendous fresh'. The flood peak and high tide occurred simultaneously, and the backwater from the river flooded every creek in the vicinity of the town. The creeks overflowed inundating streets and dwellings. By 7.00 a.m. water many centimetres deep laid in Hamilton, Tancred, Sewell and Weld Streets and along Gibson Quay. Some houses in north Revell Street were flooded to a depth of 60cm although no material damage was caused. By 11.00 a.m. the flood began to subside allowing people to return to their homes and by evening the river had gone down sufficiently to allow water from the streets to drain away.

All rivers inland were very high. The coach from Hokitika to Greymouth was unable to cross Saltwater Creek as the bridge was submerged and a portion of the tramway was washed away (W.C.T. 26/10/1867). Rivers were still high on the 26th but were dropping (W.C.T. 28/10/1867). The flood in Hokitika was the biggest of the year (W.C.T. 26/10/1867).

5 - 6 NOVEMBER 1867

The weather had been unsettled for a number of days (W.C.T. 06/11/1867), and on the night of the 4th heavy continuous showers commenced, lasting well into the night of the 5th (W.C.T. 07/11/1867). Although the Arahura River was high on the 5th, preventing the coach crossing for Christchurch (W.C.T. 06/11/1867), and the Taramakau was in flood on the 6th (W.C.T. 07/11/1867), it was the Grey River that was most severely affected. The Grey rose to such an extent that it was considered the highest flood in the memory of the oldest white person on the coast and many of the old established Maoris in the area.

At daybreak on the 6th the river was running bank high, and by 10.00 a.m. the water was flowing over the south bank, and flooded to a great volume along Boundary Street and to the lower portion of Greymouth. Many people had to be evacuated in boats. High tide at 5.00 p.m. increased the height of the flood (G.R.A. 07/11/1867). Nearly the whole length of the costly embankment that had only just been completed was destroyed - the lower portion of the work was first to give way at high tide. From the lower end of the Wharf about 200m of protective planks had been forced inwards towards the river, in some places lying almost horizontally. Further along another section was completely destroyed and washed away, whilst the upper section of the Wharf was greatly loosened; the current scoured a deep channel in the gravel where the piles were driven (W.C.T. 11/11/1867). By 5.30 p.m. the whole of the lower end of Greymouth and Blaketown had been flooded by mud and water (H.E.S. 07/11/1867), with many buildings being torn off their foundations and washed away (W.C.T. 07/11/1867). The bridge between Blaketown and Greymouth was swept away, isolating the two towns, and in Greymouth sandbags were used to try and stop water entering businesses (G.R.A. 07/11/1867). By 8.30 p.m. the water had fallen 15cm in Greymouth.

Up the Grey Valley damage was equally severe. At Twelve Mile township all buildings were more than half covered with water - many being destroyed along with vast quantities of goods. All horses, cattle and sheep in the area were lost. A store was swamped and a bridge washed away at Redjacks, and at Nelson Creek a store, hotel and goods were lost. A similar fate happened to Blackball. Two houses were swept away at the junction of the Arnold and Grey Rivers, as was the bridge near the Omoto racecourse. Many landslips occurred along the road between Greymouth and the Arnold River, and Coal Creek Flat was completely submerged by floodwaters. Two cases of drowning were reported; a boy at Coal Creek and a man at Nelson Creek (W.C.T. 11/11/1867).

"The most singular feature of this visitation is that it appears to have been quite local. The driver of Cobbs coach rode out in the morning and returned from the Taramakau in the afternoon with the mail, and reports that no flood had occurred at Hokitika, and that the immediate creeks and rivers were not of unusual volume...The only explanation of this...is that either the rainfall has been confined to the watershed of the Grey, or that Lake Brunner has forced some unaccustomed outlet" (G.R.A. 07/11/1867).

NOTE: From the end of December 1867 and throughout much of January 1868, most rivers and creeks were in a state of almost continual flood. The dates given below are flood peaks within that period which resulted in damage, loss of life and general inconvenience.

28 DECEMBER 1867

A man mooring a boat on the bank of Waimea Creek at 9.00 p.m., was swept away and drowned when a sudden heavy fresh came down the creek; heavy rain had been falling for most of the day (W.C.T. 30/12/1867).

30 DECEMBER 1867

The second day of the Hokitika Races was postponed as rain during the night raised the Hokitika River to the extent where horses couldn't cross it to reach the track (W.C.T. 01/01/1868).

31 DECEMBER 1867 - 14 JANUARY 1868

Greymouth, Westport and Hokitika suffered from severe flooding during this period. The four days of weather between the 30th December and the 2nd January were considered the most violent and worst in Greymouth's history. Very heavy rains, thunder and lightning prevailed.

Greymouth was flooded on three occasions when the Grey River overflowed its banks and poured down Boundary Street, inundating the lower portion of the town. In the first case on the 31st little damage occurred. Before daylight on the 2nd the river again poured down Boundary Street. Flood levels were nearly as high as in November 1867. Houses were flooded and damage occurred right down Arney and Albert Streets and the new tramway was almost completely destroyed. The river bank opposite the Maori settlement eroded so quickly it was feared the buildings would fall into the river. About 7.5m of road opposite Arney Street, and between 3m and 4m of road along Mawhera Quay was also eroded away. In some parts along the Quay, only 4.5m width remained between the river and the footpath. Saltwater Creek, in high flood washed away two thirds of the bridge crossing it; the gap directed the current towards the bank which was rapidly eroded and threatened the township (W.C.T. 06/01/1868).

On the 7th, the river flowed down the channel in Boundary Street cut by the large flood of the 2nd, making communication between Greymouth and Blaketown almost impossible. It was thought four men were drowned at Redjacks while trying to stop a waterwheel from being washed away (W.C.T. 08/01/1868); a man was also drowned at Seven Mile Creek while trying to cross it in high flood on the 1st (W.C.T. 06/01/1868).

Mining claims at Mohikinui and other places were inoperative as shafts were swamped and some completely destroyed. Communications to small settlements were suspended as the Buller and other rivers were impossible to pass. Westport suffered its worst flood to that date after a week of heavy rain. At 6.30 a.m. on the 2nd, a large tree floating down the Buller River struck the Woodpecker Wharf at Westport and carried it completely away. The mass of the structure floated downstream, hit the new Government Wharf under construction and totally destroyed it in a few minutes. The Custom House Wharf was also badly damaged. The north bank of the river, near the new sawmills and stores was washed away to a depth of about 6m; a number of huts and wharves upstream of the sawmills were also washed away. This damage was estimated at £4500. On the south side of the river a large shingle bank was "thrown up" partially filling in the channel formed by the islands. Consequently the river changed course, flowed to the north, and washed away the bank south of the bonded stores. Wharves on this side were also destroyed. The river fell during the night of the 2nd, and by the 3rd the weather had cleared. Apart from a small section of the north bank being washed away, no more damage occurred. However, steamers in the Buller Lagoon couldn't discharge goods due to the level of the river and the state of the wharves (W.C.T. 06/01/1868).

Heavy rain on the 2nd brought the Hokitika River into high fresh. Deep drains in Tancred and Weld Streets overflowed flooding the streets (W.C.T. 03/01/1868). The north river bank eroded, endangering houses at the extreme south of Beach and Revell Streets. The Wharf Hotel was washed away and the protection works at the end of Revell Street were seriously breached, placing two other hotels in danger. After a night of heavy rain, the streets of Hokitika were again flooded on the morning of the 6th. During the day however, the river dropped and the streets dried out quickly. The river remained high until the 8th as heavy rain continued.

Between the 8th and 13th the rivers were still above normal level although most had dropped considerably. Coach services between Greymouth - Hokitika and to Christchurch were delayed on several occasions as the rivers were impassable - particularly the Arahura and Taramakau (W.C.T. 08-15/01/1868).

On the 14th a fresh in the Grey River overflowed the banks, resulting in a small amount of water flowing down Boundary Street. The river bank at the lower end of the township was eroded quite badly in some places: the main body of the current, diverted down an old channel from Snag Falls, flowed close to the bank and undermined it (W.C.T. 17/01/1868).

19 - 21 JANUARY 1868

On the night of the 19th the Hokitika and Arahura Rivers were in high flood. In Hokitika bad erosion of the river bank between the spit end and Wharf Street occurred - the width of Gibson Quay was reduced 6m in places, which threatened the Kaniere Tramway. The Arahura River at the settlement was reported to be 30cm higher than previously recorded (W.C.T. 21/01/1868).

Heavy rain on the night of the 18th and most of the 19th, brought the Grey River into high flood on the 21st. A stream flowed through the gap in Boundary Street and boats were needed to transport people from one side of town to the other. Over 3m of embankment was eroded away from the lower part of the township. Coach services were again interrupted due to high river levels (W.C.T. 22/01/1868).

Note: It was after the flooding in January that "The Greymouth Borough Council first came into being as a result of the fear of the flood menace from the Grey River" (Jackson 1968).

12 - 26 MAY 1870

Most of the area around Inangahua was flooded for a fortnight before the 26th. For several days traffic was entirely stopped as the road was blocked by trees, several slips and a bridge being washed away. One man was drowned at Inangahua and two men were stranded on an island near the township for two days. Food had to be thrown to them in a boat attached to a line to stop them from perishing in the cold. Another man was trapped between Blackwater and Little Ohika for three days (W.C.T. 28/05/1870). At the Nile River, a man and his horse nearly drowned whilst trying to cross it in a state of fresh (W.C.T. 27/05/1870).

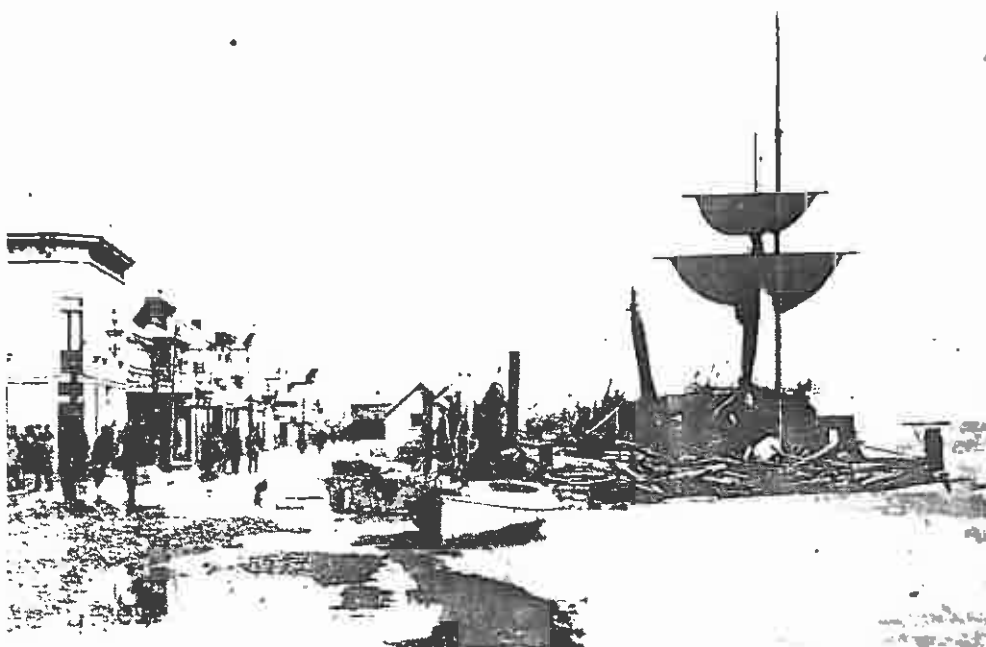
8 - 9 FEBRUARY 1872

Heavy rain had been falling for upwards of a week, and continuous rain for a period of thirty-six hours began to fall on the night of the 7th. All West Coast rivers and creeks reached major flood levels the next day (W.C.T. 09/02/1872).

By the 9th the first recorded "great flood" occurred in the Grey River, and at its peak most of Greymouth was inundated (Jackson 1968). A high sea made matters worse as the flood waters were prevented from draining away and consequently backed up; the lower end of the town soon became submerged, and with the continued rain the river rose rapidly, breaking through the primitive protection works and carrying away all before it. Richmond Quay suffered most severely as whole blocks of offices, shops and other structures were undermined and washed out to sea. From Johnston Street to Arney Street the river carried away everything before it and it was estimated that no less than seventy buildings went over the bar and were smashed by the sea. The new Borough protection works - piles, planks and fascines were completely washed away and the river flowed through where the business district of the town once stood.



a) Richmond Quay, Looking Downstream.
(W.C.B.).



b) Western Side Tainui Street-Mawhera Quay.
(W.C.B.).

At the other end of the town the protection works and wharf were severely shaken, and considerable erosion took place opposite Custom Street.

A boy was drowned in one of the houses that was washed away. News of the disaster reached the premier, Sir William Fox, who authorised immediate construction of the stone training wall between the northern end of the Cobden traffic bridge and Tainui Street, at a cost of £5000 (Lord 1928).

The brewery at Nelson Creek was surrounded by water and the brewery opposite the Ahaura was demolished. The Totara Flat tramway and stores, and a building at the Mawheraiti Junction were washed away. At Twelve Mile Creek the store, Bigswoods Hotel and others were inundated. Heavy stock losses occurred at Molloy, Bigwood and Campbell, and two houses were carried away at Camptown.

The highest flood in European times occurred in the Buller River. On the 8th the river rose rapidly during the day and by nightfall was overflowing its banks. By the next morning the force of the current was deflected by Garden Island towards Westport. Stanley Wharf, the National Hotel, a large two storey building and a store were swept away. The river commenced to scour the bank at the rear of the protective works at the foot of Gladstone Street, and with alarming velocity the narrow strip of roadway and ground that the National Hotel was on, gave way. The river changed course and cut a new channel through the north spit, thus making it an island. A slaughter house, a piggery, a skinyard and tools on the spit were completely washed away causing damage of approximately £400 (W.C.T. 10/02/1872).

The Hokitika River was in high flood on the 8th, although the level dropped considerably during the same day. However, surface water in the lower part of the town remained until late at night (W.C.T. 09/02/1872).

The whole township of Greenstone in the Taramakau Catchment was washed away and the approaches to the Greenstone River Bridge were swept away for 4m each side. The culvert at Kumara Junction was carried away as were huts at Maori Point. At Cassidy's old store, a trench over 20m wide developed and the approaches to the New River Bridge were destroyed (Hawker 1977).

Note: Estimates of levels in the Grey and Buller Rivers can be made. The original specifications for the Taylorville swingbridge across the Grey River (W.C.T. 1875 Date unknown), state that the base of the bridge was to be built 8ft (2.4m) above the 1872 flood level and about 30ft (9.4m) above normal - hence at Taylorville the river was about 22ft (6.7m) above normal.

At the peak of the flood, some water from the Buller River flowed down the Orawaiti River (W.C.T. 10/02/1872). To do this the Buller must rise at least 8.5m at Te Kuha (Stocker 1990).

31 DECEMBER 1873

A strong fresh in the Hokitika River prevented a rowing regatta being held. No damage was reported (W.C.T. 01/01/1874).

7 MARCH 1874

A heavy downpour flooded Hokitika streets with surface water. The flooding was attributed to culverts being too small (W.C.T. 09/03/1874).

Waimea Creek was reported by several people to have had its greatest ever flood, causing damage to water races and private gardens (W.C.T. 14/03/1874).

4 - 6 APRIL 1874

Continuous rain began to fall on the night of the 4th including some very heavy falls associated with strong north east gales (W.C.T. 06/04/1874). All rivers were in flood.

The Buller River at Inangahua Junction rose 9.1m in twelve hours on the 5th (W.C.T. 14/04/1874). About a metre of water flooded the streets at Reefton and many houses were inundated (W.C.T. 11/04/1874). Many mining claims in the Charleston district were damaged and the Nile River Bridge was completely washed away (W.C.T. 13/04/1874).

In the Grey River Valley soundings taken in the Brunner Gorge indicated the flood level was only 60cm lower than the 1872 flood (W.C.T. 11/04/1874). Cobden suffered considerably as much of the river bank was washed away, leaving many buildings in a dangerous position. A meeting held after the flood, proposed "that the Government be requested to appropriate the sum of £500 for the formation of the Cobden protective works". Two large reservoirs in the second right fork of Duffers Creek burst their banks, sending a wall of water down the main channel which swept away everything before it (W.C.T. 13/04/1874).

On the morning of the 5th, many low lying parts of Hokitika were flooded. Gibson Quay, Hamilton, Tancred, Sewell, Fitzherbert and Hampden Streets were flooded to a depth of up to a metre, and many outbuildings were washed away. In many places the river was as high as had been previously experienced.

Damage throughout Westland in general was light, despite the high river levels (W.C.T. 07/04/1874).

5 - 6 JULY 1874

Strong winds, rain, thunder and lightning centred on the up country districts overnight. Rivers and creeks rose rapidly and "the Ahaura was never known to increase in volume in such a short time as it did on Monday afternoon"(6th).

The weather was exceptionally warm, melting snow which had recently fallen in the ranges. The Greymouth coach was stranded at Twelve Mile township, not being able to cross the swollen No Town Creek. Traffic was able to resume on the morning of the 7th (W.C.T. 09/07/1874).

25 AUGUST 1874

Heavy rain fell for most of the day over much of the West Coast and very strong winds were recorded in the Hokitika area. "The wind commenced from the N.N.E in the morning, and as the day advanced it increased in violence, until it culminated at about two o'clock in a hurricane" (W.C.T. 26/08/1874).

The Hokitika River was in strong fresh, and at high water a strong northerly set of the sea dammed up the water greatly. This resulted in Hamilton Street and parts of Weld and Tancred Streets being flooded - Hamilton Street being the worst. Water also entered Fitzherbert Street and surrounded the Post Office. No damage was reported (W.C.T. 26/08/1874).

7 SEPTEMBER 1874

Quite a flood occurred in the Arahura township owing to the high tide backing up the fresh in the river, to such an extent that people could not travel along the road in vehicles or on horseback (W.C.T. 08/09/1874).

8 SEPTEMBER 1874

The Buller River rose 6m and the Ohika and Blackwater tributaries rose 9.1m after a prolonged period of rain. No damage was reported (W.C.T. 14/09/1874).

26 - 29 SEPTEMBER 1874

Heavy rain fell for forty-eight hours between the 26th and the 28th over much of the Coast, bringing widespread flooding. The rain was accompanied with strong winds, sleet and hail.

The major rivers were in high flood. The lower part of Westport and a section of the new railway line were flooded by the Buller River, but no serious damage was reported. The Nile and Cosmopolitan races were washed away and Thompson's Dam, in which a large quantity of water was stored in the creek below Haines Dam, broke away. At Charleston a large landslip fell on the crushing plant of the Maori Chief Company, totally destroying it.

The Grey and Hokitika Rivers were bank high on the 27th and 29th respectively. In Greymouth the recently constructed protection works functioned well, although a portion of the town was submerged. In Hokitika, only a small amount of surface flooding occurred in the lower lying streets. No significant damage was reported from either town (W.C.T. 29/09/1874).

The Arahura River was in high flood on the 28th and the 29th, making it impossible to ferry people across. The spell of bad weather in September hindered bridging and road repairs (W.C.T. 30/09/1874).

29 SEPTEMBER - 2 OCTOBER 1874

The winter was one of the mildest recorded in Westland but spring was the opposite. Wet conditions prevailed for the previous month; the last three days of continuous rain were reported to have been the heaviest for three years. However, snowmelt was the initial cause of rivers rising.

All rivers were reported to be in flood, their carrying capacities tried to the utmost limits. The Totara River was running bank high and Donnelly's Creek flooded a large area. An abutment to the suspension bridge at Donnelly's Creek was undermined and Jones' Flat storm channel was running flush with the top board. Many mining operations were at a standstill.

The level of the Hokitika River caused a three day delay in the southward mail, and flooded rivers south of Ross made many bluffs impassable (W.C.T. 02/10/1874).

2 NOVEMBER 1874

Hunter and Party on Jones' Flat had much trouble with surface water entering a shaft after a nights heavy rain. A shaft had to be driven into old ground to let the water escape (W.C.T. 02/11/1874).

20 NOVEMBER 1874

Jones' Flat storm channel overflowed its banks and water entered back premises of the Westland Hotel and a house, flooding the floors.

Up to three stays in the channel were washed away, a race was damaged and two drains were filled by a slip. A portion of the Kanieri Road was washed out at Donoghues (W.C.T. 23/11/1874).

4 - 5 NOVEMBER 1877

The Buller River was in high flood although little is known of flood damage caused (Cowie 1957).

At Lyell, the Buller rose 18.2m (60 feet) above normal. At Reefton the flood in the Inangahua River peaked between 1.00 a.m. and 5.00 a.m. on the 4th and came within 30cm of the 1872 flood level. No great damage was reported except that a large section of the road to Greymouth was washed away near the Reefton Saddle (W.C.T. 06/11/1877).

22 - 25 DECEMBER 1884

After ten days of incessant rain (W.C.T. 26/12/1884), river levels in Westland rose considerably. By the 23rd the Grey River was running bank to bank after being in a state of fresh the previous day. The river was running very swiftly and pouring out in a volume up to a metre above the adjoining sea water. The S.S. Star of the South was wrecked while trying to cross the bar on the 23rd (G.R.A. 23/12/1884). The Taramakau River was in flood on Christmas Day, stranding the coach from Christchurch to Greymouth (Jackson 1884).

27 JANUARY 1885

Construction of the Cobden Bridge (the old remaining piers) was severely set back by a large flood in the Grey River. The flood waters broke off the two cylinders of the last pier (Cobden side) about 3.6m from the pile base; they had only been in place nine days. The contractor had to replace the pier at an extra cost of £1750 - the whole bridge was supposed to have cost £14720 (G.E.S. 16/04/1983).

25 AUGUST 1885

Just after 4.00 a.m. another big flood in the Grey River struck the Cobden Bridge. Part of the temporary staging was washed away together with the derrick and donkey engine. After these two floods, the final cost of the bridge approached £18000 (G.E.S. 16/04/1983).

6 - 7 NOVEMBER 1886

Gentle rain fell on the 6th, but became very heavy during that night. Strong winds also prevailed. These conditions lasted right through until the night of the 7th.

The Hokitika River was in high flood, and combined with high tide, flooded low lying parts of Hokitika (W.C.T. 08/11/1886). During the next day the river was running bank high all day, leaving six people stranded on an island.

The Arahura and Taramakau Rivers were also in high flood. At Arahura, severe erosion of the river bank occurred which threatened the Maori Settlement. The Taramakau was so high it prevented the cage tramway from operating, thus delaying the mail from Greymouth (W.C.T. 09/11/1886).

4 OCTOBER 1886

Heavy coastal rain produced a slight fresh in the Hokitika River, and parts of Hokitika town were flooded by surface water. Complaints were made that gratings in the drainage system were not cleared to allow the water to escape (W.C.T. 06/10/1886).

13 NOVEMBER 1886

Severe damage occurred to roads and telegraph lines in the Taramakau district as a result of floods and slips. At Rocky Point a slip covered the road for 40m, carried away seven telegraph poles and pulled several others out of line. Both telegraph wires were buried in the Taramakau River bed for a distance of 60m.

Several creeks on the line of the road were scoured out to 3m deep and 6m wide. At the Taramakau Bridge new dolphin piers had to be placed and the approaches rebuilt at a cost of between £700 - £800 (W.C.T. 15/11/1886).

In the Grey River, the flood not only filled up a large dredged bay in the lagoon, but deposited sediment to raise the bed 60cm higher than before the dredging had started (W.C.T. 18/11/1886).

21 - 22 APRIL 1887

Although the weather had moderated on the coastline, continued storms occurred in the mountains bringing all creeks and rivers into flood (W.C.T. 22/04/1887).

The Greenstone area was particularly hard hit by the flood. A 300m length of road was torn up and stripped of metal and at another site, a 9m gap formed when a culvert and the ground each side of it were torn away. A large quantity of sludge destroyed another spot. Others parts of the road disappeared and water scoured under the hill side (W.C.T. 25/04/1887).

6 JULY 1887

Although strong gales decreased, heavy rain from the north-west persisted causing severe flooding in Buller, Westland and Canterbury. (W.C.T. 07/07/1887). Warm temperatures led to snowmelt, raising the rivers even higher than the rain had.

In Greymouth the flood was the worst on record to that time; the flood waters being backed up by an extremely high spring tide. Flood waters overflowed the wharf at 9.00 a.m., peaked at noon, and receded by dusk (Jackson 1968). Flood levels in the town were about 60cm higher than the 1872 flood, causing severe destruction of property. Every business and house along Mawhera Quay was flooded to a depth of at least 1m and boats were needed to rescue people between 3.00 a.m. and 10.00 a.m. Asphalt pavements were destroyed and dangerous debris was strewn about the streets. Much planking on the new wharf needed replacing. The weighbridge office on Mawhera Quay was washed about 180m downstream and the approach to the Cobden Bridge on the Greymouth side was washed away. Gas mains became water logged leaving much of Greymouth in darkness during the flood. At its peak the river nearly touched the base of the Cobden Bridge; the water level in the mid channel area was reported to be about 1m higher than at the banks. The lagoon filled up and broke through to the sea in several places alleviating some of the problem (W.C.T. 08/07/1887).

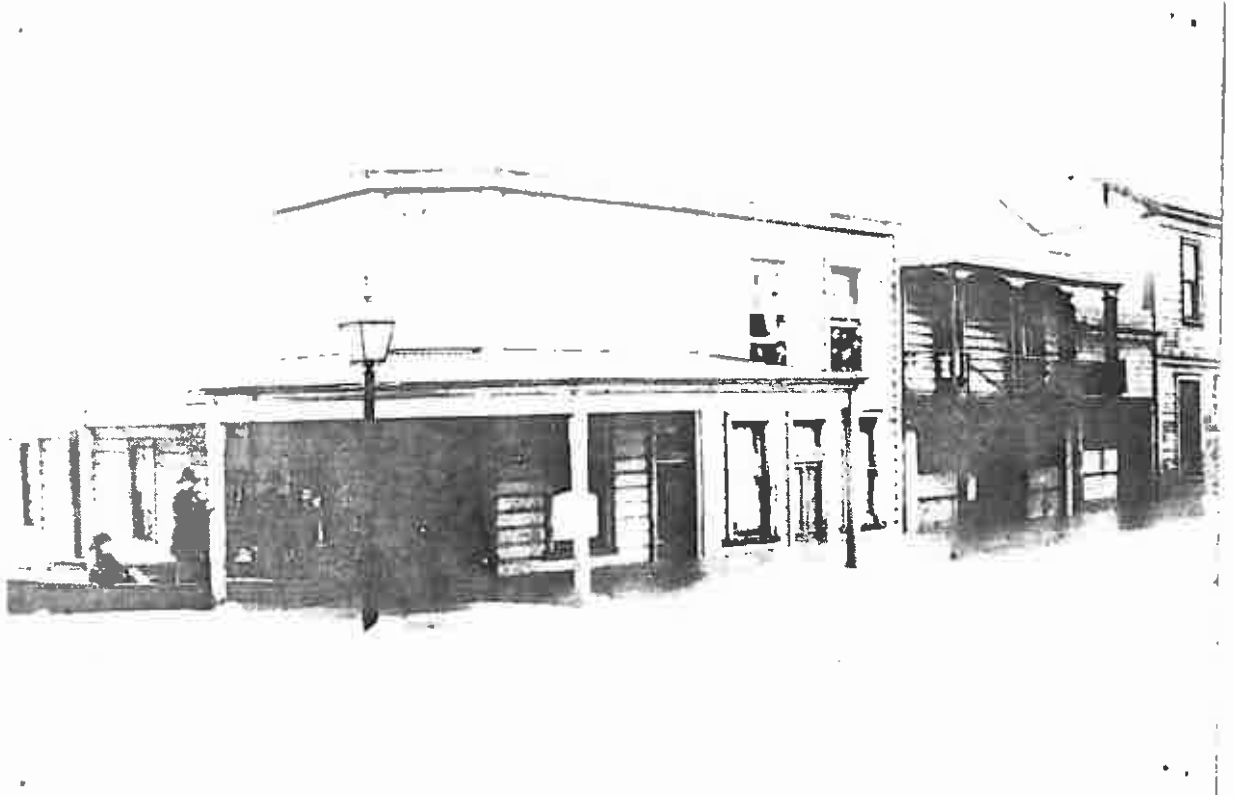


PLATE 2. GREY RIVER FLOODING AT GREYMOUTH, 06/07/1887.
Sutherland's Hotel, Guinness Street.
(W.C.B.).

All the Coal Creek Flat was submerged and it was assumed Lake Brunner had "broken out" and swelled the flood, as the river rose quite unexpectedly between 6.00 a.m. and 7.00 a.m. At Wallsend, the river came within 60cm of entering the mine shaft, washing away the carpenters shop, a number of outhouses and about 3 tonnes of powder. Several houses at Taylorville were also flooded and a large number of stock were lost between Coal Creek and Brunnerton (W.C.T. 08/07/1887). The Arnold River was in high flood, claiming the life of one man.

The Taramakau and Arahura River flood levels exceeded previous records. The Taramakau overflowed the road and entered Waimea Creek, resulting in many bridges being damaged and farm land flooded (W.C.T. 08/07/1887). The Arahura eroded into the native reserve and it was feared it would break out near the bridge and enter the lagoon.

The Hokitika River was in high flood all day, bringing down very large logs and assorted debris. The open river crossing at Quinns Hotel was very full, being backed up by tidal waters. The small footbridge was washed onto the road as well as wire, fence posts and other debris. Telegraph communications could go no further north than Kumara (W.C.T. 07/07/1887).

In Westport, the Buller River was bank high - the highest for several years, suspending all inland traffic and shipping. The Oreola Frigate, stranded on the bar for two weeks broke free, drifted seaward and disappeared (W.C.T. 08/07/1887).

Note: - Shortly after this flood the concrete nibwall along Mawhera Quay, Greymouth, was built 30cm (1ft) higher than the July 1887 flood level, (R. Daniel, pers.comm.1989).

27 MARCH 1887

A small farm on the south bank of the Taramakau River between the bridge and the cage crossing was badly damaged by the flood waters. A large percentage of the farmers stock was lost, along with 4 hectares of feed oats, 10 tonnes of hay, and over half a hectare of potatoes. Many hectares of good ground was covered with silt (W.C.T. 01/04/1887).

(DATE UNKNOWN) SEPTEMBER 1889

A flood in the Taramakau River was not quite strong enough to make an impression upon the tailings in the river bed where the Kumara sludge channel empties itself (W.C.T. 07/09/1889).

13 SEPTEMBER 1889

Warm rain melted snow in the ranges, bringing the Grey River to within about 1m of overtopping the wharf at Greymouth. No damage was reported (W.C.T. 13/09/1889).

24 MARCH 1896

A large flood occurred in the Buller River reported to be at least equal in magnitude to the 1877 flood at Westport. The flood levels were 30cm lower upstream of the Buller Bridge and half a metre lower downstream of the bridge than the 1877 flood. At Inangahua the flood was about 2m lower than in 1877 although accurate comparisons cannot be made as the 1877 tidal conditions were not recorded (Cowie 1957).

1 OCTOBER 1897

Strong northerly winds and warm rain melted snow in the ranges during the night and on the morning of the 1st the Hokitika River was in a state of considerable fresh (W.C.T. 01/11/1897).

12 OCTOBER 1897

In forty-eight hours 73mm of rain fell in the Mawheraiti area. Many crops were destroyed by the Mawheraiti River (W.C.T. 22/10/1897), which was in strong flood all day on the 12th (W.C.T. 23/10/1897).

Considerable damage was done to the road between Taipo and Arthurs Pass - two slips came down in the Otira Gorge and one on the summit at Pegleg Flat, and about 240m of road between Kellys Creek and Aickens was washed away. Many slips also occurred in the Jackson's region. At Rocky Point and Harley's Creek numerous slips covered the road - at Rocky Point, the road was also cut away. The road between Harris's and Wainihinihi was 60cm under water, whilst at Rangiriri it was flooded to a depth of 2.1m (W.C.T. 26/10/1897).

21 - 22 OCTOBER 1897

Between the morning of the 20th and 10.00pm on the 21st, 229mm of rain was recorded in the Hokitika area. The rain was accompanied by strong north-west winds (W.C.T. 23/10/1897).

The Hokitika River was in high flood all day on the 21st, and at high tide the lower streets of the town were inundated. In a couple of places water remained in the streets throughout the day. On the night of the 21st Hokitika was again flooded, but by the morning of the 22nd the river had gone down somewhat (W.C.T. 22/10/1897).

30 NOVEMBER 1897

A slip on the embankment of the Hokitika River between the main wharf and the coal wharves increased pressure on the front row of piles and the whole structure fell into the flooded river and was swept away. As the day progressed the river continued to cut into the end of the main wharf and embankment (W.C.T. 01/12/1897).

27 DECEMBER 1897

This flood was the biggest recorded in the Grey River to that date. Water came over the Wharf in Greymouth and flooded much of the town. Streets were scoured badly and many stores and houses were damaged and destroyed (G.E.S. 27/12/1957). Little else is known as newspapers of the time reported very little detail and the Greymouth Borough's records were destroyed by fire in 1947.

28-31 OCTOBER 1900

The flood peaked on the 31st with the flood level at Westport being the same as the 1896 flood and about 1m lower at the Buller Bridge. This flood caused less damage than the 1896 flood as the peak coincided with low tide (Cowie 1957).



a) Looking Up Tainui Street From The Wharf.
(W.C.B.).



b) Looking Down Mawhera Quay.
(W.C.B.).

1903 - 1904

There were several big floods in South Westland during this period. Each time a lot of water from the Wanganui River flowed down through the Harihari flat land to La Fontaine Creek. Butler's track (the bottom ford), was used quite a lot when the river was high, here the river had room to spread out and was often in these streams (Berry, 1987).

1905

"In 1905 there were some big floods in the West Coast Rivers, the Wanganui River breached Mr Purcell's breakwater protection works at the top ford near the ferry establishment (Hende's) several times. A considerable stream of water followed an old river gut down towards Bogtown before spreading out over the flat and feeding into La Fontaine Creek. This required patching up and strengthening of the breakwater from time to time. The breakwater consisted of stones closely packed together, enclosed in a wire mesh netting, often referred to as a rock groyne. Despite all efforts to stop the river breaking through, the bigger floods still surrounded the ferry buildings and the Hende's built their own stone wall on the top side of the house to turn the floodwaters down the old gut" (Berry 1987).

25 JUNE 1905

Heavy rain associated with gale force winds brought widespread flooding to Buller and Westland. The Grey River rose rapidly in two hours and lapped the Greymouth Wharf at 5.00 a.m., later rising higher than previously experienced in the town. All the main streets in Greymouth were flooded with Mawhera Quay and the major streets becoming raging torrents. In Blaketown near the old powder magazine, a channel was cut between the lagoon and the sea to relieve the pressure of backed up water in the town. By the time the river was level with the wharf, the lower end of Greymouth was completely flooded up to 1.5m deep in some places. The whole of the business district was eventually inundated. Water coming over the wharf tore away embankments and undermined and destroyed the railway track along Mawhera Quay. Every dwelling from Tainui Street back to the Tidal Creek and down to the Lagoon had flood waters in it.

At Coal Creek several settlers lost nearly all their stock and up the valley farmers also lost large stock numbers. The Ngahere and Blackball district suffered heavily. The whole approach to the Blackball road/rail bridge, from the bank to its terminus - about 200m to 240m was completely levelled. (Jackson 1968, Hawker 1977). This represented about one years construction (Cowie 1957), and delayed completion for a long period. Many washouts also occurred on the rail lines between Greymouth and Reefton, and Greymouth and Otira (Jackson 1968).

Westport was flooded although little damage occurred to the Borough. The 1877 flood was 1.2m higher at Hawkes Crag although the same level was recorded at Westport. A metre of water covered the road near Cronadun and one of the new cylinders of the road/rail bridge was shifted at Inangahua Landing (Cowie 1957).

1 JANUARY 1906

A big flood occurred in the Wanganui River. Fords across the river were very rough after this (Berry 1987).

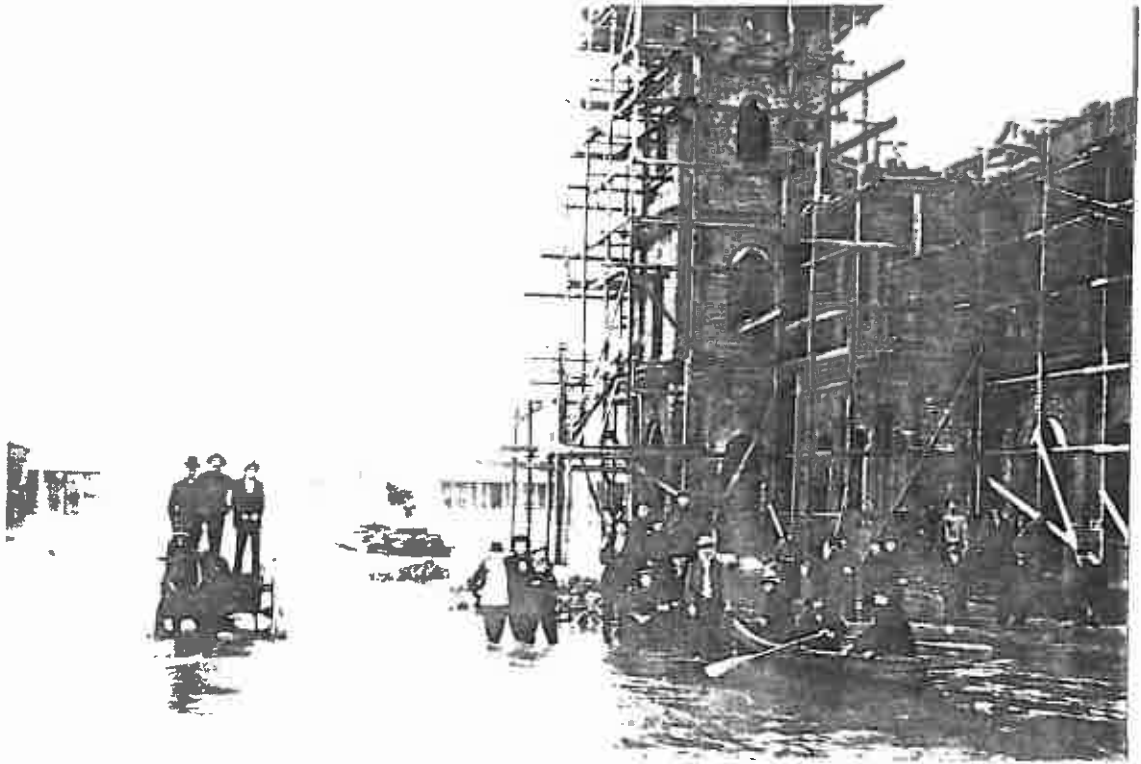


PLATE 4. GREY RIVER FLOODING AT GREYMOUTH, 25/06/1905.
Town Hall, Mackay Street, Looking East.
(W.C.B.).

5 JANUARY 1906

The Otira River was in flood, preventing the coach from Christchurch reaching Greymouth (G.R.A. 07/01/1906).

18 OCTOBER 1906

The Whataroa River was in flood, running high and fast (Otago Daily Times 19/10/1906). Little else is known.

JUNE - JULY 1910

A prolonged period of small floods had occurred in the Wanganui River before the tender for the construction of a bridge over the river was accepted (Berry 1987).

7 NOVEMBER 1910

Very stormy conditions prevailed in southern parts of the country: the storm consisted of snow, hail and a strong south west gale which swung around to the north west and was accompanied by heavy rain in the rural districts of South Westland (G.R.A. 07/11/1910).

At the Wanganui River a man was stranded on the gravel island between the two streams (near the bridge). As the rain continued, the river kept rising rapidly, and the Wanganui ferryman had to risk his own life while saving the man. Large pressure waves were noted in the river (Berry 1987).

In Greymouth the corner of Mackay and Tainui Streets was flooded, preventing traffic movements for a number of hours (G.R.A. 07/11/1910).

30 - 31 MARCH 1911

Strong north west winds changed around to the south, and heavy rain fell on the East as well as the West Coast (G.R.A. 31/03/1911). The last pile of the Wanganui River Bridge had only just been driven on the 13/03/1911 when the flood on the 30th washed away much of the hardwood for the superstructure from the island between the two streams. The flood took the span the gang was last working on, which eventually got caught up and bridged on the derrick. This probably saved the derrick and the span from being completely washed away (Berry 1987). By the morning of the 31st, most West Coast rivers were in flood (G.R.A. 31/03/1911).

DAY MONTH UNKNOWN 1911

Torrential rain and melting snow made the Whataroa River rise rapidly over night, to reach the level of the wheel pit of the newly constructed flax mill, just above the gorge. The rain continued throughout the day and next night, and by midnight flooded the mill, as the water backed up, being unable to pass through the gorge. People had to gather their belongings and flee to higher ground very quickly. Water rushed through the mill and over the drying ground, destroying a large proportion of the harvested crop (Hill-Chinn 1963).

20 - 23 JANUARY 1913

Very heavy rain for a number of days brought many rivers into flood. The Wanganui River attained a very high level, reaching the top of the piers of the new Road Bridge, overflowed its banks and damaged the protection works (Berry 1987).

On the 22nd considerable damage was inflicted on the southern approach to the Taramakau road/rail bridge. A large tree being carried down by the river crashed into the wire protection works at the approach with great force. The river then washed the protection works away. The floodwaters were striking the bluff about 400m upstream from the bridge and deflected straight towards the bridge approach and eroded it rapidly (G.R.A. 22/01/1913). One of the piers was badly damaged the next day (G.R.A. 23/01/1913).

28 MARCH - 1 APRIL 1913

On the the 28th the Grey River rose considerably. In twenty-four hours to 9.00 a.m. on the 31st, Greymouth received 44mm of rain, accompanied by strong northerly winds. Much of the lower part of Greymouth was flooded to a similar extent as the 1905 flood. However few details are given. In Kumara the storm was considered the most disastrous in the history of the district. The Taramakau River was in a "mighty flood" and washed away two 24m spans of the road bridge and over 30m of the southern approach. The flow was very swift and eroded the bank rapidly. Much river protection work on the Taramakau was completely destroyed (G.R.A. 31/03/1913).

Further afield the Wanganui River breached the protection works and nearly half of the flood flow went down the old gut and spread out over the Harihari Flat. Floodwaters covered most of the land in the centre of the district between the new Harihari School and Berry's corner, where at this point it was one white stream from the corner to Mt One One, about 1.6km wide. The Inter Wanganui Dairy Factory was right in the middle of the flow and was flooded to a depth of 1.2m (Berry 1987). However, the Grey River Argus of the 01/04/1913 states that the dairy factory was only flooded to a depth of 60cm. With the dairy factory in a mess it had to close and the dairy season in the area came to an early end. Most pastures in the area were badly silted or eroded away. The water from the Wanganui headed for La Fontaine stream, which considerably widened the stream channel. Houses in the vicinity had up to 1.3m of water through them and one cowshed was flooded to a depth of 1.8m. The breach in the protection works was repaired as soon as the flood subsided. A huge bank of rock crates protected the 382m breach in the bank (Berry 1987).

A large number of cattle and sheep were drowned in the Harihari Flat region and culverts along the main south highway were badly damaged. Severe bank erosion occurred on the Poerua River.

Floods were equally severe at Kokatahi-Kowhitirangi with the road to Hokitika from this district being covered in 1m to 1.8m of water in many places (G.R.A. 01/04/1913). The Westland railway suffered no serious damage, but one of the approaches to the Wainihinihi Bridge was washed out as were the approaches to the Kokatahi Bridge (G.R.A. 31/03/1913). The Hokitika River recorded its highest ever levels (Cowie 1957), and lower portions of the town were flooded (G.R.A. 31/03/1913). Serious damage was also reported from Okarito and Okuru (G.R.A. 01/04/1913), although no details are given and two spans of the Taramakau River Bridge were washed away (G.R.A. 01/04/1913).

13 APRIL 1913

An intensive storm covered much of the country, with barometric pressures being very low, gale force westerly winds and heavy rain (G.R.A. 15/04/1913). Another big flood occurred in the Wanganui River. Flood waters from the river covered the main highway in the region to a depth of 60cm (Berry 1987).

DAY MONTH UNKNOWN 1914

After a night of heavy rain, the Whataroa River was in high flood and changed course. Large Kahikatea and Matai trees were felled and lashed together with wire rope in a makeshift stopbank, to try and protect the best farmland in the area. However, the force of the water undermined the bank and washed the tree trunks away, as well as good farmland. About 4-5 hectares of the most productive land at Hill-Chinns fell into the river in a succession of slips over a length of 60 chains (Hill-Chinn 1963).

DAY-MONTH UNKNOWN - 1915

Both approaches to the Blackball Bridge were destroyed by a flood in the Grey River (G.E.S. 19/09/1981). No other details were given.

11 JANUARY 1920

A strong north-west wind accompanied by heavy rain brought heavy flooding to the Hokitika area. The Hokitika River rose 25cm above the 1913 record, and was 60cm from the top of the wharf. Low-lying portions of the town were submerged, and in the country considerable damage occurred to roads and bridges.

26 APRIL 1920

Extensive and heavy rain throughout the district caused heavy flooding, with a large amount of damage to back country roads and bridges. In thirty-six hours 203mm of rain fell at Hokitika, and at Greymouth 127mm fell in the same period.

27 OCTOBER 1920

A period of unsettled wet weather brought most West Coast Rivers into flood (G.R.A. 28/10/1920). A car stranded in the Poerua River was washed 180m downstream and severely damaged (Berry 1987).

12 - 14 JUNE 1921

Steady rain over three days resulted in flooded streams throughout the district. At Greymouth 140mm of rain fell in forty-eight hours, and the Grey River rose very high but did not flood the town, though local inundations did occur. The Omoto racecourse on the bank of the Grey was flooded to a depth of 1m. Slips came down on roads and the railway, but no serious damage was reported.

1 MARCH 1922

Very heavy rain, thought to be a cloud-burst, occurred in the Karamea district, washing away three bridges on the Arapito Road and some of the road formation as well as bringing down slips and causing other considerable damage.

9 JANUARY 1924

Heavy rain in south Westland caused serious flooding around Hokitika where 38mm of rain fell in twenty-four hours. The Hokitika River rose in high flood, and flood waters isolated Kokatahi. South from Ross the Kakapotahi Bridge over the Waitaha River was washed away. Other roads throughout the district were also damaged.

22 SEPTEMBER 1925

Heavy rain throughout the West Coast brought most rivers into high flood. The Grey River rose to within 1.2m of the wharf and large quantities of debris were brought down. In Greymouth many streets were under water, but no damage was reported. Over twenty-four hours 32mm of rain was registered at Greymouth. At Otira a hurricane combined with an electrical storm to give the district one of the worst nights it had experienced. In twenty-four hours 254mm of rain was registered, and all creeks were in high flood.

Two weeks of rain, hail, and snow culminated in the second biggest flood in Buller River records to that time. The Buller Gorge road at Hawkes Crag was covered by 1.2m of water, and one span of the temporary bridge at Inangahua Junction was washed away. The water level was 1.8m above the deck of the Ohikanui Bridge, 1.5m above the deck of the Chapmans Creek bridge, and 25cm from the girders of the Berlins Creek bridge. Some stock were lost and roads were blocked by slips and washouts, Westport being completely isolated for a period.

4 -5 DECEMBER 1925

Heavy rain throughout the West Coast brought rivers into high flood, the Grey River being only 30cm from the top of the wharf at the Peak. Water seeped through the banks and caused some flooding in the streets of Greymouth, but no damage resulted. Large quantities of debris were brought down by the river. Four washouts occurred on the Midland Railway between Kaiata and Rotomanu, and at Arthurs Pass some 180m of line were washed out. At Otira 305mm of rain was recorded overnight. The most serious damage to occur, however, was the washing out of two spans of the Blackball railway bridge over the Grey River. The Hokitika River was also in high flood, and the low-lying parts of the town were inundated, but no great damage resulted. Several roads in the area were blocked by flood waters. Damage to Grey County roads amounted to £2,500.

The Inangahua River was also in high flood and many washouts and slips were reported from country districts. The roads to Nelson and Westport were flooded by water, and traffic was suspended.

10 - 11 DECEMBER 1925

Heavy rain, particularly in the Alps, caused rivers to run high, and at Otira 152mm of rain was recorded in twenty-four hours. The Midland Railway suffered serious damage due to a large slip at Aickens, and transhipment of passengers on trains was necessary.

3 MAY 1926

As a result of a flood in the Grey River two spans of the combined rail and road bridge between Ngahere and Blackball were washed away, this being the second occasion that it had occurred within six months. The two spans were each of a length of 24m. This resulted in Blackball being isolated and the mine being rendered idle.

8 - 9 MAY 1926

Heavy rain in the high country caused extensive floods on the West Coast, and disorganisation to train and road services when several slips occurred on the Midland railway between Kaimata and Moana. At Greymouth 55mm of rain was recorded in 24 hours. The Grey River was in moderate flood but caused no damage, though some minor flooding occurred in cellars of premises in Greymouth. The Hokitika River was also in high flood but caused no damage. Damage to roads in the Grey county amounted to £1,530 and in the Murchison county, £700.

30 - 31 OCTOBER 1926

Following upon a week of wet weather, rivers in the district became flooded. The Grey River rose to within 30cm of the wharf at Greymouth. Considerable anxiety was felt lest the river break through into the town, but the only flooding to occur was of a minor nature and little damage was reported. Rivers in the south were also in high flood, and roads were blocked by slips and washout. £400 damage occurred on Grey county roads.

A very heavy flood occurred in Westport, and considerable damage was done in the Buller Gorge road where several landslides took place. A temporary bridge at Hawkes Crag was washed away, and two spans of the combined road and rail bridge at Rotokohu suffered a similar fate. At Reefton the Inangahua River rose to within 30cm of the bridge at the lower end of the town.

4 - 5 NOVEMBER 1926

The flood of the previous week was eclipsed by a torrential downpour experienced in Greymouth and the surrounding districts. The rain was accompanied by a north-westerly wind which rose frequently to the dimensions of a gale. The Grey River rose to the level of the planks at the Greymouth Wharf, and the low-lying parts of Greymouth were flooded, though no premises were seriously invaded.

The following rainfalls in millimetres were recorded:

Table 1. Rainfall Data 27 October 1926 - 5 November 1926.

STATION	OCTOBER					NOVEMBER					Total for 10 Days	Remarks
	27	28	29	30	31	1	2	3	4	5		
Karamea	3	21	6	17	4	..	16	25	53	8	153	Exact dates uncertain Heavy flood on 4th and 5th Much flood damage to roads, rail, bridges
Tophouse	1	1	..	3	28	2	6	35	42	6	124	
Westport	0	9	8	7	41	0	6	36	49	8	164	
Reefton	7	20	13	61	6	5	4	50	58	13	237	
Greymouth	1	10	8	32	19	9	2	34	57	12	184	
Hokitika	..	15	25	22	33	5	1	48	86	24	259	
Otira	24	6	94	110	96	17	8	140	204	34	734	
Lake Kanieri	8	12	31	30	49	6	3	65	102	17	323	
Harihari	6	14	18	25	18	112	60	24	277	
Waiho Gorge	(No Record)	3	70	52	31	19	..	Exact dates uncertain Exact dates uncertain, heavy rain inland, floods
Okuru	..	30	18	11	5	..	15	..	51	7	137	

.. = no record

Westport experienced perhaps its most disastrous flood when the Buller River broke its banks and flooded practically the whole town. Hundreds were rendered temporarily homeless, and many lost all their belongings when flood waters entered their homes. At the peak of the flood the Buller River was within a metre of the top of the combing and at Te Kuha the discharge was estimated at 7645 cumecs from 6060 square kilometres, although it is now believed that the discharge must have been much greater as the peak was some feet higher than the May 1950 flood, the peak flow of which was determined by an accurate slope-area determination.

The flood water lapped over the top of the caps of the Buller railway bridge at the height of the flood, and an enormous white pine 32m long got across piers 11 and 12, knocking pier 12 22cm downstream. Pier 13 scoured out and sank 30cm on the upstream side. The damage to public services amounted to £50,000. In the Murchison area, where 78mm of rain fell in twelve hours, serious damage occurred when the Longford Bridge over the Mangles River was washed away, and farmers suffered damage to farms through inundation and flood water. At Fern Flat the river rose 12.1m above normal, and the occupants of one home were forced to break a hole in the ceiling to escape the flood waters. At their confluence the Tutaki River peaked at 140 cumecs off 65 square kilometres, and the Tiraumea River 375 cumecs off 114 square kilometres. In the Reefton area some bridges were washed away and many roads were damaged. Buller county roads suffered damage amounting to £7,320 and the Murchison county damages totalled £11,480.

7 DECEMBER 1926

Following rain which melted snow on the Alps, the Grey River rose 2.1m in a few hours at the Brunner Gorge. No serious damage occurred apart from washouts on some roads.

23 - 24 MARCH 1927

Heavy southerly weather accompanied by rain caused flooding in many parts of the district. At Greymouth 30mm of rain was registered in twenty-four hours. The Grey River was in high flood and water flooded the Omoto racecourse, and around Coal Creek Flat farms were inundated.

8 OCTOBER 1928

After four days of wet weather the Poerua River overflowed its banks and threatened the Inter Wanganui Settlement, opposite La Fontaine Creek.

"In the river an embankment has risen higher than the north bank, and has turned the water so that the south bank has been eroded...Below the old ford road the river has now worked in considerably to the adjacent holdings, forming a half circle, before the river works out again towards midstream, with a fall towards the north bank, and floodwater has been pouring into the bay and filling up the basin, till there is very little freeboard between the river level and the top of the bank. In flood time very little rise takes the water over the top and the surrounding land is inundated. The overflow is into the settlers area into La Fontaine swamp" (G.R.A. 09/10/1928).

Beyond La Fontaine swamp the road was inundated up to a depth of 1.2m in places and the swamp itself was like a reservoir.

Slips fell on the Harihari road in a number of places. The Hokitika water supply was damaged by floodwaters (G.R.A. 09/10/1928).

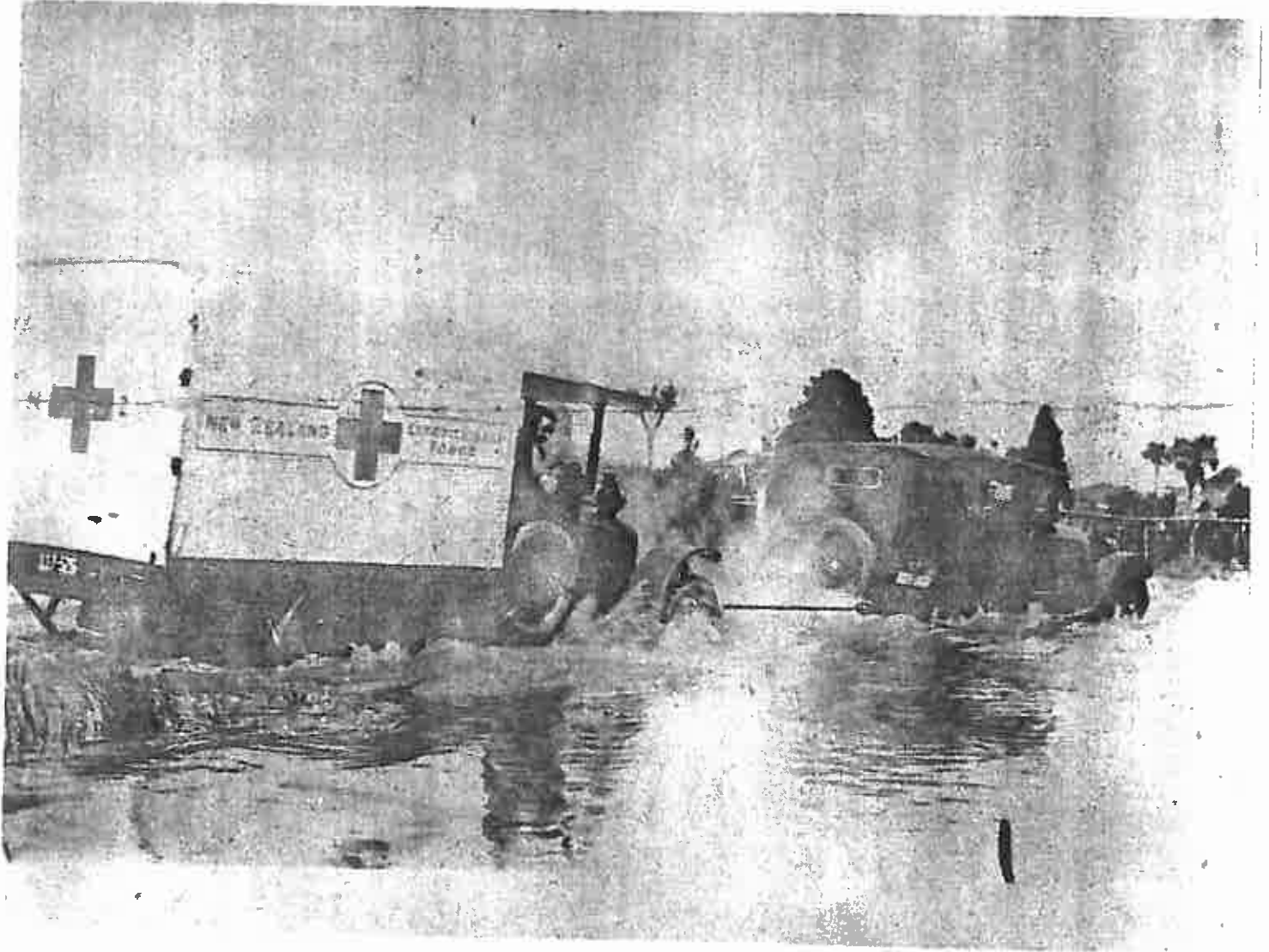


PLATE 5. BULLER RIVER FLOODING AT WESTPORT, 04-05/11/1926.
Ambulance Being Towed Down Lyndhurst Street.
(W.C.B.).

10 OCTOBER 1928

A groyne being constructed on the Waitangi-taona River in South Westland was damaged when the river got behind it and flooded the adjacent land (G.R.A. 10/10/1928).

6 JANUARY 1929

A flood in the Poerua River cut away all the piles at the protection works and the derrick and motor were left out in the river. The river again flowed over the Harihari flat (Berry 1987).

11 JANUARY 1929

The Poerua River broke through to La Fontaine Creek and flowed out to the Wanganui River (Berry 1987).

5 - 6 MARCH 1929

Heavy rain throughout the Greymouth area caused some minor flooding. In the Moonlight district 101mm of rain was recorded in twenty hours, and at Greymouth over 51mm fell in twenty-four hours. The Grey River rose to a moderate height but caused no damage. Main roads were blocked for a short time by flood waters.

5 JUNE 1929

Heavy rain brought a bank-high flood to the Hokitika River, the peak level being 28cm below the previous record flood of 1926, and parts of the town were submerged. Other rivers in the area were also at a high level, and several roads were impassable owing to flood waters.

4 JULY 1929

Following the tremendous Murchison earthquake of 17 June 1929, the Mokihiui River was dammed by a slip in the upper gorge, 26 kilometres from Seddonville. At 2 p.m. on 4 July the dam gave way and a wall of water raced down the valley, the water rising so high between Seddonville and Mokihiui that it poured through the railway tunnel. When the wave struck Seddonville disastrous damage resulted. In the church 30cm to 46cm of mud lay on the floor, and the water level reached 2.4m up the walls. Some houses were totally submerged, and a hall was floated off by the flood and deposited 80 or 100m away. This was the most serious and disastrous aftermath of the earthquake, but fortunately no lives were lost.

8 SEPTEMBER 1929

Another aftermath of the Murchison earthquake, a dam in the Little Wanganui River, broke away, and considerable damage was done in the Wangapeka Valley, where two or three houses were shifted for a distance of some metres. One bridge was destroyed and stock losses were heavy.

6 NOVEMBER 1929

A cloud-burst in the Crushington area caused much slipping and erosion, but apart from some damage to roads no serious damage was reported.

19 - 20 NOVEMBER 1929

Heavy rain over the whole of Westland caused some anxiety, but no serious damage occurred. At Greymouth 33mm of rain was recorded in twenty-four hours, and the Grey River rose at the rate of 30cm per hour to reach a peak level of one metre from the wharf. At Hokitika the rain fell steadily, but the river did not rise appreciably. At Reefton a steady downpour fell for twenty-four hours and resulted in several places being inundated. Some roads were blocked, but damage was generally very slight.

16 DECEMBER 1929

After several hours rain, a cloud-burst at Norris's mill, 10km from Westport in the Buller Gorge, caused some damage to the Waimea Creek Bridge and severed a water pipeline. A large slip also came down in the vicinity.

29 DECEMBER 1929

A dam in the Karamea River, caused by the Murchison earthquake of June 1929, gave way and caused a major flood in the Karamea Valley. Water inundated the township of Karamea, causing serious damage to property and heavy loss of stock. Water was 60cm deep in the township and some houses were invaded.

7 - 10 OCTOBER 1930

Following four days of heavy rain, flooding occurred in many places on the West Coast. At Greymouth 34mm were recorded in twenty-four hours, and a total of 125mm fell in three days. A large slip of over 2300 cubic metres caused some damage at the hydro-construction works at Kaimata. The Grey River was in moderate flood but caused no anxiety. At Harihari a flood swamped the flat between the Big and Little Wanganui Rivers, one house being flooded to a depth of 46cm.

Heavy rain also fell in the Westport area and caused many washouts and slips. The Millerton mine was idle because of six slips on the road. At Karamea the river broke its banks, flooding low-lying land and damaging the roads, but not extensively.

3 JANUARY 1931

The Otira Gorge and Arthurs Pass areas experienced a cloud-burst, which swelled all creeks and streams in the area and blocked the main road. No serious damage was reported, however, other than the severing of the Greymouth-Christchurch highway below Otira.

20 JANUARY 1931

Heavy rain throughout the province caused streams and creeks to become flooded. At Otira 167mm of rain was recorded in twenty-four hours, and the Otira Gorge was blocked through slips. Other roads were similarly affected. The Grey River rose slightly above normal but caused no damage.

2 FEBRUARY 1931

Heavy rain in south Westland caused serious damage to roads and bridges. At Waiho 317mm of rain fell in twenty-four hours and 432mm in forty-eight hours. Both the Little and Big Wanganui Rivers overflowed their banks and flooded the adjoining land. Approaches to bridges were washed out and road surfaces were damaged. An estimated £5,000 damage was done to roads and bridges in the area.

22 FEBRUARY 1931

Exceptionally heavy rain in the Greymouth area - 317mm in twenty-four hours - caused extensive flooding in the town, this being the heaviest twenty-four hour fall ever recorded in Greymouth. Sawyer Creek overflowed, and the low-lying portions of the town were inundated to depths of 46cm. Revington's Hotel was flooded to a depth of 30cm on the ground floor, and several houses had to be abandoned. The Grey River did not rise appreciably, and the flood waters soon drained away.

3 APRIL 1931

Heavy rain accompanied by high gales caused considerable damage throughout the West Coast area. In Greymouth 75mm of rain was registered in twenty-four hours. At Hokitika a spring tide backed the river up and many parts of the town were flooded, the river at its peak being 46cm from the top of the wharf. Other rivers in south Westland were also in high flood. In the Grey district most of the damage was due to the wind, the Grey River rising slightly but not dangerously.

Floods and washouts also occurred throughout the Buller district. The Buller River rose 18cm in ten minutes at Berlins at one stage, to be 60cm over the road of Hawkes Crag. Further north, the Karamea and Oparara Rivers were both in high flood, and losses of stock were reported in these areas. At Karamea some houses were invaded by water. At Tiroroa 330mm of rain was recorded in twenty-four hours, and many roads were blocked by slips and washouts. One man was killed when a slip severed his leg.

20 NOVEMBER 1931

Welcome rain after a particularly dry period throughout the West Coast caused some damage when Lawson Creek Bridge, near Barrytown, was washed away. The rainfall reached cloud-burst intensity at Barrytown.

29 JANUARY 1932

Exceptionally heavy rain caused some widespread flooding and damage. In Greymouth some parts of the town were flooded, and in the surrounding district many roads were blocked by slips and washouts. At Hokitika some flooding occurred in the town, and damage was caused to works under construction at the Seaview Hospital.

31 JANUARY 1933

As the result of abnormal nor-westerly rain high floods occurred on all rivers of the West Coast. The Grey River rose rapidly, at one stage by 2.1m in two hours, reaching a peak level of within 30cm of the wharf. Some local flooding occurred in Greymouth, but water entered no premises. At Hokitika the river overtopped the bank above the railway bridge and the lower portions of the town were submerged, but not seriously. The water subsided just in time to avert serious damage.

The Buller River also rose to a high level, parts of Westport being inundated, and at Reefton some local flooding occurred when channels could not cope with the rainwater. At Karamea the river broke its banks and flooded a large area of land, and numerous slips blocked roads.

15 - 16 JULY 1933

Torrential rain throughout the West Coast caused serious damage in some localities. At Greymouth 93mm of rain was recorded in twenty-four hours and 178mm in forty-eight hours. The Grey River caused no anxiety, but many roads in the surrounding district were damaged by slips and washouts. The Wainihinihi Bridge was seriously damaged when two piles were broken, and one end of the bridge subsided 1.2m. At Hokitika 133mm of rain was recorded in twenty-four hours and 263mm in forty-eight hours, and the Hokitika River rose 2.1m above normal. Streets and property in the lower parts of the town were inundated, and several business premises suffered severe damage and it was reported that 508mm of rain fell at Waiho in two days.

16 DECEMBER 1933

Heavy rain over two days caused numerous and severe washouts on the railways. The Midland line was blocked by an extensive washout near Stillwater, and the Reefton line was blocked by a washout near Ngahere. On the Rewanui line two washouts occurred and the line was under water for a considerable distance. In Greymouth, where 168mm of rain fell in thirty hours damage was done to streets, and Revington's Hotel was invaded by 30cm of water. Many other premises were also flooded. The Grey River was running very high with a 3.5 m/s current.

17 APRIL 1934

Heavy rain caused some serious damage on the Midland railway when a serious washout occurred at the Poerua Bridge. The creek was dammed higher up by a slip which suddenly gave way, and the sudden rush of water caused extensive damage to the approaches, cutting a breach 6m long and 3m deep within ten minutes.

27 JUNE 1934

Torrential rain caused flooding in and around Greymouth after nearly 102mm of rain was recorded in two hours. Several premises in the town were invaded and slips occurred on some roads. The bridge at Dirty Mary's Creek, near Addisons on the Westport coast road, was washed away. The Grey River rose moderately but caused no damage. At Arthurs Pass 120mm of rain was registered in twenty-four hours, and a large slip blocked the Otira Gorge road. Railway services were also interrupted by a large washout at Omoto, just outside Greymouth.

20 FEBRUARY 1935

The greatest flood that Hokitika has ever known occurred as the result of a phenomenal rainfall following a prolonged drought. In twenty-four hours 233mm of rain was registered, a fall that had never been exceeded before. The lower portions of the town were flooded up to a depth of 1.2m, and many houses and business premises were invaded, causing considerable loss to the owners. The 18.2m southern span of the Kaniere Bridge over the Hokitika River was swept away and floated out to sea, fortunately passing under the combined bridge at Hokitika but causing a menace to shipping in the vicinity. A number of other bridges were also damaged. The Arahura combined road and rail bridge was damaged and the Arahura Valley was devastated, practically every fence in the valley being down and at least half of the paddocks covered with shingle and boulders. The Arahura Valley road looked more like a stream bed after the flood. It is estimated that at Humphreys 432mm of rain fell in twenty-four hours. At Greymouth 70mm was recorded in twenty-four hours and 114mm in thirty-six hours. No serious damage was reported in Greymouth and the Grey River rose in only moderate flood. Roads throughout the West Coast suffered severe damage through slips and washouts, the damage in the Westland county totalling £3,380.

20 MARCH 1935

Torrential rain in the Millerton and Granity areas caused extensive damage to both roads and railway. A large slip beyond Ngakawau covered a road bridge to a depth of 6m, and the railway to a depth of 3.6m. Considerable inconvenience was caused during the dislocations, traffic being disorganised for several days.

10 - 12 OCTOBER 1936

A north-westerly storm, together with high winds and heavy rains brought serious floods to the West Coast. These floods were considered the biggest since 1887. In a thirty-hour period 55mm of rain fell at Greymouth, and of this 35mm was recorded in six hours. The Grey River was in very high flood and invaded the town, causing extensive damage and serious losses, particularly to business premises. In the vicinity of Revington's Hotel the water was 1.5m deep, while in the hotel itself the chairs in the dining room were afloat. Many homes had to be evacuated, some occupants being rescued by boats. When the flood waters subsided the streets were covered with a good thickness of silt. At the height of the flood the Grey River was flowing at 6.1 m/s and enveloped the wharf, to overtop its banks at the lower end. Old residents, who retained marks on the walls of their homes, indicated that this flood exceeded the 1913 flood by 23cm, and this was also confirmed with levels at the Omoto racecourse. Stock losses in the country were very severe and exceeded those of the 1913 flood, the heaviest losses occurring between Ahaura and Stillwater. Several bridges were washed away in the area, and extensive slips blocked some roads. The Hokitika and Arahura Rivers did considerable damage to protective works. At Hokitika the river was bank high but no damage was done, although the airfield on the south side of the river was inundated.



PLATE 6. HOKITIKA RIVER FLOODING AT HOKITIKA, 20/02/1935.
Hamilton-Tancred Street Intersection, Looking East.
(West Coast Historical Museum, Hokitika).

Heavy flooding also occurred in the Buller area. The rainfall at Reefton for twenty-four hours was 62mm, 25mm falling in the first six hours, the same in the next six hours, and the balance in the following twelve hours. The Buller River was in very high flood, rising 7.6m at Cascade. At the Nile Wharf in Westport the water was 1.2m from the combing. The peak discharge at the Rotoroa outfall was 110 cumecs. The rain caused many slips on the Buller Gorge road, and water covered it in places. Many slips also came down on the road between Inangahua and Lyell. At Karamea extensive flooding occurred, and much of the town was inundated. Simpson's Hotel was flooded to a depth of 30cm and many homes had to be abandoned. The Karamea River at the mouth was discharging, at its peak, 1900 cumecs off 1600 square kilometres of catchment, an intensity of 4mm per hour. The discharge in 1913 was estimated at 3140m. At lower Mokihinui all the houses were flooded, and one house in a low-lying position in Seddonville was invaded. Total damage to county roads in the Buller area was £4,970.

5 JANUARY 1937

Some surface flooding occurred in Greymouth following heavy rain in which 30mm was recorded in six hours. Creeks were in high flood and many streets were awash.

8 - 9 MAY 1937

Torrential rain over most of the West Coast, accompanied by a north-west gale, brought flooding to many areas. At Greymouth 72mm of rain fell in twenty-four hours, and the Grey River rose to within 1.5m of the wharf at high tide. Some flooding of farmlands occurred, and stock losses were reported.

4 JUNE 1937

The Grey River was in high flood following heavy rain which totalled 31mm in twenty-four hours at Greymouth. The Grey River was running high and shipping was affected, but no damage was reported.

12 JULY 1937

A deluge in Greymouth in which 51mm of rain fell in seven hours caused some minor flooding in and around the town. Stormwater backed up in some streets and several houses were invaded.

8 - 9 JANUARY 1938

Low-lying areas on the West Coast were inundated with a two-day deluge of rain. At Greymouth 52mm of rain fell in twenty-four hours and 77mm in forty-eight hours, and at Arthurs Pass 91mm fell in twenty-four hours. Slips and washouts blocked many main roads temporarily, and a train ran into a slip at Omoto near Greymouth, causing considerable damage to the rolling stock. Continuous rain caused numerous slips and washouts to roads in the Buller district, and others were impassable due to flood waters. Damage, however, was slight and of a local nature.



a) Wharf Being Overtopped, Mawhera Quay, Looking
Downstream.
(W.C.B.).



b) People Being Ferried To The Post Office, Tainui
Street.
(W.C.B.).

14 FEBRUARY 1938

A cloud-burst which struck the Otira area caused extensive damage to roads and bridges; 127mm of rain fell in two hours. At Goat Creek, about a quarter of a mile (400m) above Otira, the new traffic bridge was covered to handrail level with boulders brought down off the mountain sides, and the whole bed of the stream, whose slope is steep enough to be measured in degrees, was raised to this new level for a distance of some 180m. Large quantities of water invaded Otira township, but no serious damage was reported. Flooding also occurred in Kumara, where water 30cm deep covered the main street, and some damage was caused to streets and footpaths.

21 MARCH 1938

Heavy rain in a period of two hours, during which 44mm fell in Greymouth, caused landslides and serious erosion on hillsides. During the previous four days over 178mm of rain had fallen, thus the ground was saturated prior to the heavy fall. Roads throughout the district were blocked by slips, one at Omoto, near Greymouth, being in the vicinity of 11500 cubic metres. At Kumara a miner met his death when a fall of earth crushed him. All rivers on the coast were in high flood, and some areas were extensively damaged.

A long spell of dry weather was broken in the Buller district by the heavy rain, which caused considerable flooding in all rivers and streams, and a washout occurred on the railway near Birchfield. Heavy rain in the Lake Rotoroa area caused a peak discharge at the outfall of 90 cumecs.

7 APRIL 1938

Flooding occurred in the lower parts of Reefton following heavy rain, and several residents in the lower part of Broadway had to evacuate their homes. The Inangahua River was in very high flood, and large slips occurred on many roads in the vicinity.

13 - 14 APRIL 1938

Torrential rain and snow melted by the warm north-westerly wind brought heavy flooding to West Coast rivers. The Hokitika River overflowed its banks and invaded a third of the Borough of Hokitika to an average depth of 30cm. Considerable damage was caused by water entering many houses and shops and also by the deposition of silt and mud. At its peak the river was 60cm from the decking of the combined road and rail bridge. The Grey River was also in high flood, though little rain fell in Greymouth. Some areas of the Grey Valley were inundated, and several roads were blocked by slips and washouts.

28 - 29 MAY 1938

Heavy rain throughout the Grey Valley, particularly at Rewanui, caused some damage in the district. At Greymouth 51mm of rain fell in twenty-four hours, but no damage was reported there. Two bridges at Dunollie were swept away, several slips blocked roads, and the Liverpool mine was idle for several days. Washouts also occurred on the railway.

14 SEPTEMBER 1938

Warm inland rains caused a sharp rise in the Grey River, which at its peak was running a 5 m/s current. At one stage the river rose 1.2m in two hours. Local flooding occurred in some districts, but damage was slight. At Greymouth 31mm of rain was recorded in twenty-four hours.

2 - 3 DECEMBER 1938

Heavy rain brought creeks to a high level, and local flooding occurred in the Greymouth district. On the Midland line trains were held up by debris swept on to the track at Inchbonnie.

11 - 12 JANUARY 1939

Following a fall of 29mm in 24 hours at Greymouth, five slips came down on the Midland railway between Aratika and Kaimata. Damage generally was slight, however, and apart from a small washout, all roads were open.

29 NOVEMBER 1939

Heavy north-west rain brought a flood to the Hokitika River, and many low-lying areas of the town were submerged. The Kokatahi Valley was also flooded, and water blocked many roads. The Arahura River was in high flood, but protective works were reported to have worked satisfactorily.

30 NOVEMBER - 1 DECEMBER 1939

Heavy rain fell almost incessantly for fifty eight hours, commencing on the 29th (G.R.A. 05/12/1959). The rain intensified during the night of the 29th when the north west wind reached gale force.

At 1.00 p.m. the next day, the flood in the Hokitika River peaked with the high tide. This raised the river level nearly 36cm above the Wharf level and inundated several streets in Hokitika. By 9.00 p.m. the river was reported to have been carrying its largest volume for a long period.

The next morning all West Coast rivers were in high flood. The Hokitika, Arahura, Totara and Poerua Rivers and La Fontaine Creek reached exceptionally high levels. In the Hokitika River a large sandbank near the river mouth (near the signal station) was washed away as well as preservation works on the opposite bank (true left); this alleviated the flood pressure in the town itself. The floodwaters in Hokitika began receding at about 1.00 p.m. with the rate of fall increasing with the out-going tide. In the Kokatahi Valley, flooding occurred to the extent that the road was completely blocked to traffic. The Arahura River was reported to have reached a record height, but the recently constructed stopbanks worked very well.

Most damage occurred in South Westland. In the Harihari area the Poerua River broke through the protection works and entered La Fontaine Creek. A large area of the Poerua settlement was inundated and stock losses in the vicinity were heavy; sheep were particularly hard hit. On the road between Harihari and Poerua the water was between 1.2m and 1.5m deep, completely isolating Poerua settlement.

One family in Poerua had to be evacuated as 1.2m of water flowed through their house, and the water level reached the back of the Inter Wanganui Dairy Factory although no damage to it occurred. The whole area resembled a large lake (G.R.A. 01/12/1939). Considerable bank erosion occurred along the Waitangi-taona River. The main protective wall just below the highway bridge, that kept the river flowing through to Lake Wahapo, was badly damaged and required strengthening. Along the Lower Waitangi-taona Flat, the river bank was eroded which affected the approaches to the new county bridge giving access to Roto Road (G.R.A. 08/12/1939). A man was drowned in one of the South Westland Rivers; his body being washed up at the mouth of the Paringa River, but it may have drifted up the Coast from a river further south (G.R.A. 02/12/1939).

Heavy rain occurred in the headwaters of the Buller region. The Buller River flooded to a level where shipping movements at Westport were delayed. A washout occurred at Fourteen Mile, Waimangaroa and Birchfield and surface flooding occurred at various places without causing damage (G.R.A. 01/12/1939).

By the 2nd, the Hokitika River was still swollen but, apart from in South Westland, damage in other areas was minimal (G.R.A. 02/12/1939).

Note: Some of the highest flooding on record occurred in the Nelson district. The flooding in Nelson and on the West Coast was caused by the rainfalls associated with an extensive depression moving onto the country from the West (G.R.A. 02/12/1939).

11 - 12 DECEMBER 1939

On the 10th Reefton had one of its wettest days for a long time and by the next day the Inangahua River was in high flood. The river receded rapidly by the morning of the 12th (G.R.A. 12/12/1939).

12 - 14 JANUARY 1940

After a prolonged period of rain, the Poerua River broke its banks on the 12th; the fifth time the river had broken out since 1905. This was the worst case to that time. The continuous rain cancelled all attempts to divert the river back to its original channel. A bulldozer was used to cut a new channel which turned the river off the farmland on the 21st and then a gravel stopbank was dozed up (Berry 1987).

On the 12th heavy rain flooded the lower end of the Inter Wanganui Settlement where the Poerua River (Little Wanganui River) was flowing into La Fontaine Creek, and the southern approach to La Fontaine Creek Bridge was washed out. One house had 30cm deep of water through it and the New Zealand Railways Garage, opposite the Harihari Hall was inundated to a depth of 15cm. New tar seal in the Harihari - Inter Wanganui area was damaged.

On the 13th an intense electrical storm occurred over Hokitika and the heavy rain it produced flooded many low lying streets (G.R.A. 15/01/1940). A small washout occurred on the highway about 4km east of Jacksons. In the forty eight hours to 9.00 a.m. on the 15th, 47mm of rain was recorded in Greymouth (G.E.S. 15/01/1940).

24 JANUARY 1940

An incessant coastal downpour fully taxed the stormwater drains in Greymouth with the result that severe surface flooding occurred in many parts of the town. Almost 30cm of water covered Tainui Street in the vicinity of the Post Office, and a similar state of affairs existed in other low-lying portions of the town. During the twenty-four hours 49mm of rain was recorded, and in the following seven hours another 38mm fell. The Grey River, however, did not rise appreciably.

26 - 27 FEBRUARY 1940

After two months of almost continual rain a steady downpour resulted in widespread and heavy flooding. Some 69mm of rain fell in twenty-four hours at Greymouth, but the fall was greater in the Alps and the headwaters of the rivers. The Grey River rose 6m above normal in the Brunner Gorge to flow at 5 m/s, and was discharging at the rate of 5300 cumecs. The Ahaura at the state highway bridge was discharging an estimated 2520 cumecs. Floodwaters invaded Greymouth. Some damage was done to streets, and water flowed across the top of the wharf. Several houses in Cobden were also flooded and some damage was done. The Hokitika River was in heavy flood, and at the Kaniere Bridge was estimated to be discharging 4530 cumecs; the Arahura River at the combined road and railway bridge was discharging an estimated 1250 cumecs, and the Taramakau River 2525 cumecs at Kumara Traffic Bridge. The streets of Hokitika were flooded, but no serious damage was done. At Otira the downpour was accompanied by a vivid electrical storm, with winds reaching velocities up to 145 to 160 km/h. One of the most extensive slips in the history of the Midland railway occurred at Jacksons and completely obliterated the road and railway for a distance of 40 to 60m. The slip buried both the railway bridge and the road culvert at Nellies Creek. Several other minor slips occurred in the area, and slips and washouts were prevalent in other parts of Westland. Several bridges were washed away including the Kumara Traffic Bridge. The combined road and rail bridge from Ngahere to Blackball over the Grey River, survived the flood, but it was pushed out of alignment and sank 1.2m. The Karangarua River Bridge suffered severe damage when a large section of the northern approach was washed out. In the Buller district damage was extensive. Washouts blocked some roads. At Karamea the rivers were in high flood, but they were effectively contained within their banks and caused no damage. The peak discharge at the Rotoroa outfall was 133 cumecs. The Lewis Pass route was blocked by a series of washouts and slips. Damage to roads was as follows: Westland county £3,000 and main highways £2,200; Grey county £3,000 and main highways £580; Buller county £500 and main highways £90.

27 AUGUST 1940

After a heavy downpour of rain the Ngakawau River overflowed its banks and flooded the business area of the town. Accumulation of deposits at the mouth of the river interfered with its flow. Some shops were flooded to a depth of 45cm or more.

17 - 18 OCTOBER 1940

Heavy rain brought all rivers on the West Coast into high flood. In eleven hours 57mm of rain was recorded in Greymouth, and a further 19mm fell in the following nine hours. Telegraph and telephone communication with the rest of the country was broken. The Grey River was in high flood, running between 4.5 and 5 m/s. At Rewanui 102mm of rain was recorded overnight, and an extensive slip came down on the railway line to the mines. The Otira Gorge road was cut by a washout at Otira and water came over the railway line at Rotomanu. In the Buller district heavy continuous rain caused minor flooding. Stormwater drains in some parts of Westport could not cope with the flow of water when the downpour was particularly heavy, and the footpaths were under water in places. Some residences were damaged at Ngakawau and Hector when creeks overflowed. Minor washouts also occurred in some places, and a slip on the Granity-Millerton road interrupted traffic.

23 - 24 OCTOBER 1940

Two spans of the Wanganui River Bridge were washed away on the 23rd by a large flood, and two more piers were washed away the next day (Berry 1987).

3 FEBRUARY 1941

A serious blockage of road and railway routes was created by an exceptionally heavy overnight downpour, which was accompanied by a high north-west wind. At Greymouth 93mm of rain fell in twelve hours, at Rewanui 191mm fell in twenty-four hours and 214mm fell at Otira in the same period. Flood waters backed up in low-lying areas in Greymouth streets, but no damage occurred. Several slips occurred on the Midland railway and flood waters were over the track between Ngahere and Ahaura, near Reefton. Extensive slips also occurred on roads, and the Lewis Pass was the only main route unaffected.

10 JUNE 1941

An exceptionally heavy rain, accompanied by a violent northerly gale, caused floods in the Hokitika area. Backed up by spring tides, an extremely heavy flood occurred in the Hokitika River, which flooded the low-lying parts of the town. No serious damage occurred, however. At Greymouth 29mm was recorded in twenty-four hours. Though there was only a slight rise in the Grey River, the smaller streams in the district rose rapidly and low-lying parts of Greymouth were flooded. Damage was mainly from the gale-force winds which accompanied the storm.

19 NOVEMBER 1941

Continuous heavy rain over two days brought rivers in the Hokitika area into high flood. At Hokitika the river rose to a high level, and backed up by the tide, water inundated many streets. The Arahura River caused some damage at the new Malfroy Bridge under construction, and in the Kokatahi Valley flood waters spread over the land in the vicinity of the rivers. In South Westland extensive flooding occurred and some damage was reported to roads and bridges.

Rainfalls recorded in twenty-four hours included: Haast Pass 188mm, Karangarua 188mm, Whataroa 218mm, and Lake Kaniere 153mm. Damage to state highways in the Greymouth area amounted to £1,600.

4 - 8 APRIL 1942

A succession of northerly storms, in which 109mm were recorded in the five days before the 4th, brought floods to the whole area. In six days 235mm fell in Greymouth, and it was estimated that 25mm of rain fell in three hours on the morning of the 4th. At Karangarua 124mm of rain fell in 24 hours. All rivers were in flood, the Grey River in particular being at a high level for over two days. No flooding of the town occurred, however, but at one stage the river threatened to top the wharf at high tide. Numerous slips and washouts occurred on the roads. The most serious damage occurred with slips on the railway line to Rewanui causing the stoppage of coal production from the Liverpool State Mine. At Hokitika the river was in high flood, but it did not cause any damage, though some minor flooding occurred in the borough. One bridge was washed away in the Hokitika Gorge. In South Westland swollen rivers caused considerable damage to bridge approaches, and roads were severely damaged by scour, slips, and washouts.

Heavy rain in the Buller and Murchison areas caused severe flooding, and much damage was done to roads by slips and washouts. In the Murchison area all rivers were in high flood, Lake Rotoroa discharging 330 cumecs at the outfall and the Buller River rose to within 1m of the decking of the Longford Bridge. Numerous roads were blocked, one bridge was washed away and another was buried by debris. In the Buller Gorge the road was blocked by water at several places, and at Westport the river was only 1.5m from the top of the decking of the merchandise wharf. Damage to Murchison County roads was £3,700, to Grey County £850, and to state highways in the district £2,400.

5 MAY 1942

With heavy falls of rain, aggregating 69mm in twenty-four hours, semi-flood conditions were experienced at Greymouth. The rain, which was accompanied by a strong north-west wind, was torrential at times, and, though the Grey River developed only a moderate fresh, all creeks in the area were swollen. Slips came down on the railway between Stillwater and Brunner, and also on the Greymouth - Westport coast road at Twelve Mile. The approaches to the bridge over Blackball Creek were damaged.

12 - 13 JULY 1942

Heavy rain in the Grey district caused flooding, and numerous slips and washouts blocked roads. At Greymouth 118mm of rain was recorded in twenty-four hours and 160mm for forty-eight hours, and at Rewanui 188mm fell in twenty-four hours and 296mm in forty-eight hours.

Other twenty-four hour falls included: Karamea 81mm, Millerton 148mm, Westport 93mm, Rotoiti 64mm, Murchison 93mm, and Reefton 106mm.

At Greymouth the Grey River rose to within a metre of the wharf, but it dropped quickly on the cessation of rain. Some minor flooding occurred in the lower portions of Greymouth and some small slips came down in the area. In the surrounding districts many roads were blocked by water, slips, and washouts. The Midland railway was also affected in like manner, with snow on the higher places causing delays. Several coal mines were idle due to slips and washouts occurring on their lines.

Heavy rain also fell in the Buller area and caused much flooding in the lower lying parts of Westport. A total of 93mm fell in twenty-four hours, and the Buller River was in high flood, being very near the decking of the wharf at high water. Some 2.7m of water covered the Nelson road at Inangahua, and the Buller Gorge road was blocked both by water and a slip. Many other roads in the area were also blocked by slips. Damage to Grey county roads amounted to £1,662, and to roads in the Inangahua county £1,100.

23 - 24 OCTOBER 1942

Heavy rains and high winds caused serious damage on the West Coast and completely isolated the area for a short time. At Greymouth 229mm of rain was registered in three days, 98mm being recorded in twenty-four hours. At Otira 300mm was registered in twenty-four hours, 159mm at Kaniere, and more than 178mm at Arthurs Pass in the same period. All rivers were in high flood, the Grey River running a "10 knotter" (5 m/s). Two spans of the bridge over the Big Wanganui River at Harihari were swept away. This isolated south Westland. At Hokitika low-lying parts of the town were extensively inundated, there being 1 metre of water around the post office. The lower parts of Greymouth were also under water as a result of the Karoro Lagoon backing up. Numerous roads were blocked by slips and washouts, but no serious damage occurred.

18 DECEMBER 1942

Heavy and continuous rain over a period of two days culminated in flooding, and extensive damage resulted throughout the district. At Greymouth 82mm of rain fell in twenty-four hours and 132mm in forty-eight hours. Flooding occurred in Greymouth when Sawyer Creek overflowed at two places. Numerous slips and washouts occurred on roads, and the Rewanui line became blocked by two slips, stopping work at the mines. At Hokitika surface flooding occurred, particularly on the aerodrome, and air services were suspended.

6 FEBRUARY 1943

Heavy rain which fell in northern Buller County and Nikau area caused some flooding. A mile (1.6km) of railway line between Seddonville and Hector was washed out. Five farms were also damaged by a creek which changed its course and swept down trees and boulders. Among the buildings destroyed were milking sheds, shearing sheds, and a large sawmilling plant. The Mokihinui River was in high flood, and the Little Wanganui River experienced its highest flood for twenty-one years. There were heavy losses of stock in the area. Rainfalls recorded in twenty-four hours included: Karamea 76mm, Millerton 142mm, and Westport 65mm. Damage to roads in the Karamea and Seddonville districts amounted to £600.

5 - 6 MARCH 1943

Very heavy rain fell in the Jacksons Bay - Haast area and 279mm of rain were recorded in thirty-six hours. The area most affected was the coastal strip, and the Okuru, Turnbull, Waiatoto, and Arawhata Rivers reached their highest level in twenty-two years. The Haast River, however, rose only to moderate proportions. Considerable damage was done to bridge approaches and protective works, and the highway at the Arawhata Bridge was flooded to a depth of 1m. Several large slips occurred in the vicinity of Jacksons Bay.

17 - 19 SEPTEMBER 1943

Heavy rain over nine days, particularly in the Ikamatua area, caused high floods and some serious damage. At Greymouth 220mm of rain was recorded in nine days, with 45mm falling in twenty-four hours. Other twenty-four hour falls included: Rotoroa 52mm, Rotoiti 45mm, Murchison 55mm, Reefton 86mm. A span of a bridge over the Little Grey River at Ikamatua was washed away and a sawmill was isolated. A large slip also came down at Brunnerton, blocking the railway line and a large slip at Bealey blocked the Midland railway route. The Grey River was in moderate flood and very discoloured. Heavy rain also occurred in the Buller district, and the Buller River rose in moderate flood, the peak discharge at the Rotoroa outfall being 77 cumecs.

12 NOVEMBER 1943

Although only 41mm of rain was recorded in twenty-four hours at Greymouth, there was an unexpected flood in the Grey River, the result of abnormal rain at Otira, some 178mm in seven hours. Low-lying areas of Greymouth were flooded by backed-up water. Both the Otira Gorge and Lewis Pass highways were blocked by slips, but no serious damage occurred to the railways. At Reefton 57mm of rain fell in twenty-four hours, and the swollen Inangahua River flooded low-lying land, causing loss of stock. Houses at Crushington were flooded to a depth of 46cm.

18 - 19 JANUARY 1944

Heavy rain after a prolonged spell of dry weather caused numerous slips on both the Midland railway and road, effectively blocking traffic. Most of the slips occurred in the 10km between Otira and Jacksons, and an estimated 15300 cubic metres was reported as having fallen. The railway was re-opened after six days of heavy work. Several other roads suffered damage from washouts.

2 - 3 FEBRUARY 1944

Torrential rain throughout the West Coast brought heavy floods, and serious damage occurred to roads and railways. In Greymouth 144mm of rain was recorded in twenty-four hours. The Grey River had only a moderate rise, but several creeks in the vicinity were in high flood. At Runanga the lower parts of the town were flooded and water entered several homes. The most serious damage, however, occurred on the Midland railway, where slips of similar dimensions to those of 18 January came down at the same places. The railway services were again seriously interrupted.

10 FEBRUARY 1944

The third heavy rain to occur in three weeks caused serious damage, the railways suffering heavily. At Greymouth 89mm of rain was recorded in twenty-four hours, and at Rewanui 163mm fell in the same period. Slips again blocked the Midland railway, and train services were disorganised. A train was derailed when it ran into a slip about 20km from Westport. No one was injured, but thirteen wagons of coal were lost. Several roads were also blocked by slips and washouts. At Hokitika the river was in high flood, the water being only 60cm from the wharf at the peak but no serious damage occurred. The damage to roads in the Grey county from the floods of the previous three weeks amounted to £1,500.

29 JULY 1944

As a result of heavy rain the Buller River rose in high flood, and at low tide it was running at 4.5 m/s. Several low-lying portions of the district were flooded, but no losses of stock were reported, though a large quantity of winter food and early spring crops were destroyed through immersion in the flood waters. One stretch of the Westport-Cape Foulwind highway was under water, and the Buller Gorge road was blocked by a series of slips.

12 NOVEMBER 1944

A storm, which brought 44mm of rain to Greymouth in forty-eight hours (32mm of which fell in twenty-four hours), was experienced over a wide area on the West Coast and Canterbury. Its most serious effects were the disruption of rail traffic on the Midland line and between Hokitika and Ross. The Waimakariri River washed away the line between Cass and Cora Lynn, and serious washouts left 260m of railway line suspended between Ross and Hokitika. No damage was done to roads.

15 DECEMBER 1944

Heavy overnight rain brought floods, particularly to the Grey district. At Greymouth 59mm of rain was recorded in twenty-four hours; at Rewanui 213mm fell in the same period. Some coal mines had slips on their lines and work was interrupted. Water also blocked some roads. The Grey River was in high flood, being 76cm from the wharf at high tide, but no damage was done other than local flooding in some streets of Greymouth. Stock losses were slight. The Buller River also carried a slight fresh, the peak discharge at Rotoroa outfall being 73 cumecs.

13 JANUARY 1945

Extensive damage to roads in the Reefton area occurred following a heavy rainstorm, and the township of Waiuta was isolated for thirty-six hours when a bridge over the Blackwater Stream was washed away. The bridge, a hardwood structure 15m in length, was turned completely over and washed a considerable distance downstream. Slips and washouts blocked other roads. At Reefton 83mm of rain was recorded in forty-eight hours.

18 JANUARY 1945

Heavy rain in the Hokitika district brought the river to a high level, and low-lying parts of the town were inundated. Several roads in the district were also impassable due to flood waters. At Hokitika 92mm of rain fell in forty-eight hours, of which 58mm fell in twenty-four hours.

3 FEBRUARY 1945

Several areas were affected by flooding and slips as a result of exceptionally heavy rain. At Westport 76mm of rain was recorded overnight, and numerous slips came down on the road to Karamea. Considerable damage was also done to the road leading to the timber mills in the Seddonville district and in the lower Mokihinui, where flood waters entered some of the houses.

23 JANUARY 1946

Heavy rain brought rivers into flood and severe damage was done to the Ikamatua Sawmilling Co. Ltd.'s bridge across Rough River when several spans were washed away. In eleven hours 89mm of rain was registered at Greymouth, and at Rotomanu 165mm was recorded in the same period. At Rewanui 163mm of rain fell in twenty-four hours, and 107mm at Kaimata in the same period. At Greymouth some minor street flooding occurred, and at Runanga several properties were invaded. The Midland railway was damaged when a culvert overflowed at Nellies Creek. The Grey county suffered £2,676 damage to roads.

1 FEBRUARY 1946

A heavy downpour of rain caused further trouble at Nellies Creek, and overflows occurred on parts of the permanent way (track) of the Midland railway. Slips also came down on the line in the area, but no other serious damage was reported.

15 - 16 FEBRUARY 1946

Although rain in the Grey district caused a number of slips, these were not of a serious nature. Considerable flooding, however, occurred in Hokitika and surrounding districts where 102mm of rain was recorded in twenty-four hours. The Hokitika River rose 4 metres above its normal level and was running at 6 m/s. Street flooding was general, and rowing boats formed the principal mode of transport in the main streets of the town. Many homes and business premises were entered by water, and damage was serious. Exit roads from the town were inundated. Considerable scouring of road surfaces took place. Rainfalls recorded in twenty-four hours included: Ross 157mm, Kowhitirangi 257mm, Whataroa 221mm, and Rimu 217mm.

12 - 13 AUGUST 1946

The whole of the West Coast was swept by a north-west gale accompanied by a severe electrical storm and heavy rain. The area experiencing the most severe storm was Otira, where 190mm of rain was recorded in twenty-four hours. The torrential rain was associated with a wind of cyclonic force, which ripped the roof off the Otira school, overturned a transformer house and railway huts, and tangled overhead wiring systems. In Greymouth the rainfall was much lighter, only 47mm being recorded in the twenty-four hours, and only minor damage was done by the wind. The Grey River was in moderate flood, although at Kaimata, where 58mm of rain fell in twenty-four hours, the Arnold River was in high flood. The most serious damage was the washing away of two complete spans of the combined road and rail bridge at Larrys Creek, north of Reefton. Numerous slips occurred on the Reefton-Westport line, and one occurred on the Midland line at Nellies Creek, near Jacksons. Both the Otira Gorge and the Lewis Pass highways were blocked by slips, but the interruptions were of only a short duration.

27 - 28 NOVEMBER 1946

After torrential rain the Grey River rose to a high flood, being only 1.8m from the top of the wharf, and it held this peak for five hours. At Brunner the peak discharge was 3540 cumecs, the velocity being 6 m/s. In twenty-four hours 57mm of rain fell at Greymouth, most of this falling four hours. Damage was done to the Midland railway through slips and washouts near Otira. At Reefton 81mm of rain was recorded in thirty-six hours, 59mm of this falling overnight, and 58mm fell at Waiuta in twenty-four hours, 83mm at Totara Flat, and 73mm at Murchison.

9 - 10 DECEMBER 1946

Continuous rain over two days caused little or no damage in the Grey district, but widespread flooding occurred in the Hokitika district. The Hokitika River was in very high flood, and large areas were inundated and many roads were blocked. At Greymouth over 76mm of rain fell in two days, with more than 57mm falling in twenty-four hours. Some local flooding occurred in the town. The Buller River was in moderate flood, and the peak discharge at the Rotoroa outfall was 120 cumecs. At Downertown 289mm fell in twenty-four hours, 140mm at Millerton and 59mm at Westport.

18 JUNE 1947

Heavy rain and hail, following an electrical storm, brought freshes to Westland rivers, but no damage was reported. Heavy snow fell on the divide. At Reefton 32mm of rain were recorded in twenty-four hours.

1 SEPTEMBER 1947

Backed up to a record height of 5m above normal low-water level by a sand-bank, the Hokitika River broke its banks and caused one of the worst floods in the recent history of the town. For several hours the water flowed in torrents into the low-lying business area of the town, turning the streets into miniature rivers and inundating shops and homes to depths from 30cm to 1m. In some shops the water almost reached to the level of counters, and heavy damage resulted. With the widening of an opening in the sand-bank, however, the water level rapidly dropped. At Hokitika aerodrome 1.3m of water flooded the hangars, offices, and waiting rooms.

Heavy rain with a gale-force wind struck Reefton but caused no serious damage. In twenty-four hours 43mm of rain was recorded, and the Inangahua River rose 1.2m above normal.

22 OCTOBER 1947

Country districts experienced heavy rain though little fell in the Greymouth area. The Arahura River was running bank high, and the Hokitika River was also at a high level, but no damage was reported from any area. At Karangarua 211mm of rain fell in twenty-four hours.

26 - 27 DECEMBER 1947

Heavy rain in the Alps brought much flooding to the West Coast, but only slight damage was reported from any district. At Greymouth 50mm of rain was recorded in twenty-four hours and a total of 61mm for the storm.

Other twenty-four hour falls included: Otira 198mm, Ross 84mm, Whataroa 149mm, and Jacksons Bay 138mm. Some surface flooding of the railway occurred at Inchbonnie, and slips blocked some roads. At Hokitika the river rose to within 1m of the wharf, and flooding occurred in the low-lying parts of the town.

16 JANUARY 1948

Heavy showers throughout the province caused some minor flooding, but no serious damage resulted. At Greymouth 30mm of rain fell in twenty-four hours. A large rock, apparently loosened by the heavy rain, fell on the railway line between Dunollie and Rewanui and damaged the centre rail. At Reefton the rain was heavier and 51mm was recorded in twenty-four hours. The Inangahua River rose 60cm above normal, and minor flooding was reported in various parts of the district. A few small slips also occurred, but no traffic was held up.

23 APRIL 1948

After a period of exceptionally dry weather heavy rain fell throughout the West Coast, a total of 44mm of rain being recorded at Greymouth in twenty-four hours, bringing the total for the month to 95mm. Some local flooding occurred in several streets of Greymouth, and the Grey River rose slightly and was flowing at 3m/s.

As a result of the heavy rain which fell for two days in the Buller district, the small township of Waimarie was almost submerged. The flooded Mokihinui River clashed with a rising tide and water backed up until the local hotel and nearby houses were inundated with 30cm of water. No stock losses occurred, however. The Buller River was also in moderate flood, but it caused no damage. At Westport 70mm of rain was recorded in twenty-four hours, and at Murchison 53mm fell in the same period.

30 MAY 1948

A period of wet weather reached its peak when a fall of 47mm was registered in twenty-four hours at Karoro. Surface flooding occurred in many localities around Greymouth, and the Otira Gorge road was closed. At Hokitika over 76mm fell in twenty-four hours, including 25mm in half an hour. At Rimu 83mm fell in twenty-four hours. Several houses in the town were flooded. The Hokitika River rose in only moderate flood.

19 JANUARY 1949

With a fall of 32mm in three hours at Greymouth, minor street flooding occurred in the town, but no damage was reported. Electrical storms were also reported from a number of country centres.

11 - 12 FEBRUARY 1949

Widespread flooding in the Hokitika district, which resulted in fairly severe stock losses in the Kokatahi-Kowhitirangi district, followed heavy rain which fell over the whole of the West Coast. In Hokitika there was a good deal of street flooding, water entering some buildings, including the Post Office, and the river came to within 1.2m of the top of the wharf. The effects of the downpour were most severe in south Westland, where serious damage occurred to roads and bridges. Apart from a slight rise in the Grey River no flooding occurred in the Grey district.

23 FEBRUARY 1949

The Grey River, fed by heavy rain which fell over the length of the West Coast, came within 60cm of crossing the wharf and flooding Greymouth. The river flooded many properties in the Grey Valley, and stock losses were serious in some areas. In Greymouth parts of the town were flooded, but no serious damage was reported. The falls of rain in the back country ranged from 51mm to 229mm in twenty-four hours. At Hokitika the river rose and water backed up in some streets, but no damage was done. At Otira 229mm of rain fell in twenty-four hours, 73mm at Reefton, and 48mm at Greymouth.

General flooding also occurred throughout the Buller district following the very heavy rain. At Westport, 38mm of rain fell in twelve hours, and at Stockton the fall reached 220mm in fourteen hours. In twenty-four hours 160mm fell in the Buller Gorge and 56mm at Murchison. As a result all rivers were swollen, the Buller rising to a level approaching that of the 1926 flood. Roads were under water at several points, and considerable damage was done at Karamea. The most serious flooding was at Mokihiui, where the river swept through the township to enter nearly every house, farm, and building. There was 2.3cm of water in the hotel. Damage to Murchison county roads totalled £1,530.

5 - 6 OCTOBER 1949

Torrential rain accompanied by winds of gale force, brought all rivers and streams on the West Coast into high flood. At Greymouth 138mm of rain was registered in forty-eight hours, of which 91mm fell in twenty-four hours and 46mm in ten hours.

Other twenty-four hour totals included: Otira 307mm, Kaniere 222mm, Inchbonnie 225mm, Rewanui 145mm, and Ross 126mm.

The Grey River rose to a peak level of 1m from the top of the wharf, but no serious flooding occurred in Greymouth. Stock losses, however, were serious, particularly in the Grey and Taramakau valleys. Several roads were blocked by flood waters, the Otira Gorge road being impassable due to slips. At Hokitika some serious damage was averted when the river broke through a sand bar at the harbour entrance, enabling the water level to subside somewhat.

Heavy rain also fell throughout the Buller district and caused blockages on many roads. At Reefton 105mm of rain was recorded in sixty hours, of which 51mm fell in twenty-four hours, and at Downertown 263mm was recorded in twenty-four hours. The Inangahua River was in heavy flood and rose 1.2m above normal at the town bridge at Reefton. A slip caused a temporary blockage on the Lewis Pass road.

25 - 26 DECEMBER 1949

Torrential rain, accompanied by an electrical storm, caused some flooding in the streets of Greymouth and Hokitika. At Greymouth more than 63mm of rain fell in three days. Most rivers were in high flood, and one person was drowned in the Taramakau River near Otira. Most of the damage reported was caused through the high wind which blew for a short period during the storm.

Considerable damage was also caused throughout the Buller district following the violent storm. A cloud-burst near Granity brought large stones down from the hillside. They fell on the roofs of houses below and caused serious damage. Three houses were flooded by water and silt when a creek overflowed. In the Buller Gorge a series of washouts blocked the road, and similar damage was done to the railway on the other bank. At Waiuta 40mm of rain fell in twenty-four hours.

10 JANUARY 1950

Flood waters caused by heavy rain brought road and rail blockages throughout the district and caused interruptions to services over a short period. At Greymouth 57mm of rain was registered in twenty-four hours, of which 51mm fell in twelve hours. The Grey River was in moderate flood flowing at 3m/s, but no serious damage was reported in the Greymouth area. The heaviest damage occurred in the Otira area when two slips came down in the Gorge. Several minor washouts also occurred. Slips occurred on other roads, and in Kumara flood waters stopped traffic. At Hokitika, where the river rose 3.5m above normal, 44mm of rain fell in twenty-four hours, and some low-lying business and residential areas in the town were flooded.

25 - 26 MAY 1950

Torrential rain, which fell over the whole of Westland and Buller, brought the rivers on both sides of the Alps into high flood. The rain was particularly heavy in the Otira area, where 406mm of rain fell in twenty-four hours and 813mm fell in four days. At Reefton 254mm fell in four days, and at Greymouth 72mm fell in twenty-four hours and 180mm in four days. Rainfalls (in millimetres) for twenty-four hours were as follows: Hokitika 110, Inangahua 184, Downertown 264, Otira 412, Greymouth 72, Reefton 99, Murchison 76.

The Grey River ran very high, being level with the top of the wharf at its peak. The river water did not flow into the town as in 1936, although water backed up in all the low-lying streets and invaded a few shops. At the peak of the flood the Hokitika River did not top its banks, but most of the business area was inundated by water, some shops and houses being entered. Rivers in South Westland were in high flood, some reaching record peaks. The Haast and Arawhata Rivers rose to approximately 60cm above the highest previous records, the discharge in the Haast being estimated at 7360 cumecs. At Haast the river overtopped its banks and flooded the airfield to a depth of "several feet". Damage to highways was widespread and severe. The old road bridge across the Taramakau at Kumara had two gaps 60m long torn in it, and many other smaller bridges were washed away. Numerous slips and washouts occurred, particularly in the Otira Gorge, where the road was blocked for several weeks. One man was killed when he fell through a bridge at Reefton. The railways suffered severe losses when 45m of the Blackball combined road and rail bridge over the Grey River collapsed, and the Waitahu combined bridge near Reefton lost a complete span and 12m of approach. The whole of Westland was effectively isolated, radio being the only means of communication.

In the Buller area rivers were very high, a gauging at the Berlins Suspension Bridge showing the discharge of the Buller River as 12460 cumecs from a catchment area of 5910 square kilometres. The Inangahua River at the Landing bridge was also gauged, the discharge there being 3540 cumecs from a catchment of 1004 square kilometres. The Maruia River at Higgins bridge was discharging 1910 cumecs from a catchment of 1020 square kilometres. These discharges did not, however, eclipse the previous records, though the 1950 flood level in the Inangahua River was about 30cm higher than in 1926 at Rotokohu and 60cm higher at Landing bridge where all the water is confined. The peak discharge at the Rotoroa outfall was 110 cumecs from a catchment of 383 square kilometres. The damage due to the floods was estimated at £150,000, including stock losses which were considerable. Grey county roads suffered damage totalling £1,527, and those in Inangahua county suffered to the extent of £3,455.

23 JULY 1950

Surface flooding occurred on parts of the West Coast following thirty-six hours of steady rain. At Greymouth 78mm of rain was recorded in twenty-four hours and 118mm in thirty-six hours, including 25mm in three hours.

Other twenty-four hour falls were: Inchbonnie 211mm, Kokatahi 196mm, and Kaniere 270mm.

A large slip came down at Aratika where the Midland line skirts the Kaimata dam. The Grey River rose somewhat but caused no alarm. Roads escaped serious damage, and, with the exception of the main road at Harihari, all were open.

9 DECEMBER 1950

Rain, which approached cloud-burst proportions in some areas, caused some damage in the Lake Brunner area. At Mitchells severe damage was done to the hotel, and road blockages occurred in three places. At Greymouth just under 50mm fell in three days, but though creeks were in high flood no serious damage was reported in the area.

28 DECEMBER 1950

Heavy rain brought flooding to most parts of the West Coast, but little damage was reported. In twenty-four hours 114mm of rain fell at Greymouth, 76mm at Hokitika, and 67mm at Reefton. At Whataroa in South Westland 267mm fell in forty-eight hours. Several slips and washouts occurred on roads in South Westland. The Hokitika River rose to within 60cm of the wharf, but it fell rapidly with the tide and only the lower parts of Hokitika were under water.

28 MAY 1951

Greymouth experienced a brief but intense electrical storm in the late evening, and damage by lightning to installations at the Dobson diesel station and in other areas caused a power failure over the whole of the town district. At the height of the storm minor flooding occurred in low-lying parts of Greymouth, but the water quickly subsided. At Karoro 47mm of rain fell in twenty-four hours, of which 28mm fell in an hour during the storm.

17 - 18 JULY 1951

Gale force winds and heavy rain brought all rivers in the Grey district into flood. For twenty-four hours 211mm of rain fell at Otira, and at Karoro 107mm fell in the same period. The Grey River rose to within 1.5m of the wharf at full tide, but it caused no damage. The Otira Gorge was blocked by slips, and surface flooding also blocked other roads, but no serious damage was reported from any district.

28 - 29 NOVEMBER 1951

Heavy rain, particularly in the Alps, caused flooded rivers along the coast. The Grey River was particularly high, but it was well within safety limits, however. Roads throughout the district suffered somewhat from slips and flood waters, but no serious damage was reported. At Otira 159mm fell in twenty-four hours, and at Greymouth almost 38mm fell in the same period.

30 JANUARY 1952

Heavy rain in the Alps did not bring the flooding which was anticipated, and the level of the Grey River did not rise a great deal above normal high tide. At Otira where 152mm of rain fell in five hours, Kellys Creek carried away telephone and telegraph lines as well as washing out both approaches to the bridge. At Greymouth only 12mm was recorded in the twenty-four hour period.

10 - 11 MAY 1952

Some minor flooding occurred in the Greymouth area following two days of heavy rain, but no damage was reported. The Grey River was at a high level and several roads were awash. At Karoro 86mm of rain was recorded in forty-eight hours, of which 58mm fell in twenty-four hours.

25 JUNE 1952

Heavy rain, accompanied by electrical storms in some areas, caused flooding, but no serious damage resulted. At Otira, where 127mm of rain was recorded during the day, damage was done to electrical installations and slips came down on several roads. The Taramakau River rose rapidly, and in South Westland, where the storm was the worst for some years, the Haast River rose 30cm in ten minutes at one period.

3 SEPTEMBER 1952

Flooding near the mouth of the Arahura River, north of Hokitika, occurred when heavy seas drove a shingle bank across the mouth and effectively blocked the outlet of the river to the sea. Farmlands were inundated, but no serious damage was reported.

17 - 18 OCTOBER 1952

The Waitangi(-taona) River, swollen by three days' heavy rain, broke through the recently constructed stopbank on the northern side of the river on the main south highway beyond Whataroa, blocking traffic. At Whataroa 99mm of rain was recorded in twenty-four hours, with 162mm falling in forty-eight hours. A severe wind storm accompanying the rain, did some serious damage to buildings and structures in the area.

21 DECEMBER 1952

With 57mm of rain falling in twenty hours, of which 28mm fell in the morning, some minor flooding occurred in Greymouth, but no serious damage was reported.

26 MARCH 1953

Described by settlers at Whataroa as the heaviest rain they had ever experienced, about 432mm of rain fell in ten hours in South Westland. Rivers rose rapidly, and the northern approach to the Waitangi(-taona) River bridge was washed out. The river changed course through the gap, and soon no water flowed in the normal channel. Slips occurred on several roads and traffic was interrupted.

18 APRIL 1953

As a result of very heavy rain the Hokitika River rose in high flood, and some low-lying areas in the town were temporarily flooded. The sand-banks at the mouth were soon scoured out, however, and the position was relieved.

29 - 30 APRIL 1953

Heavy rain in parts of the district brought flooding, ;and in one instance a house near Nikau was invaded and silt was deposited in the rooms to a depth of 20cm. Roads were impassable for a period because of flood waters and slips, but no other damage was reported.

13 MAY 1953

Widespread flooding occurred in Westport following a heavy and sustained fall of rain, in which 82mm of rain fell in twenty-four hours. In parts of the town the water was several centimetres deep, but no damage was reported. The Buller River rose considerably and was running at 5.5 m/s at Westport, peaking at 3640 cumecs at Berlins.

23 JULY 1953

Serious street flooding occurred in Greymouth following an early afternoon thunderstorm. Several streets were awash and heavy damage was done to gardens and footpaths. No premises were invaded, however, except one low-lying house.

24 NOVEMBER 1953

The heaviest rainfall for some time was recorded at Kowhitirangi when 114mm of rain fell in twenty-four hours, and at Haast 103mm was recorded in the same period. Flood conditions were experienced in this area, and the road to Jackson's Bay was blocked by slips and minor washouts. At Hokitika the river was in high flood, and minor surface flooding occurred in some parts of the town.

28 NOVEMBER 1953

Although over 51mm of rain fell in twelve hours, there was comparatively little damage to transport routes. Some surface flooding occurred in Westport, and in one area residents had some difficulty in getting to and from their homes. Further north, however, the Little Wanganui River overflowed its banks and flooded a large area of land. At Lake Rotoroa 76mm of rain fell in twelve hours, and 61mm fell at Murchison in the same period. The peak discharge at the Rotoroa outfall was 96 cumecs. The Mangles River rose 2.2m above normal in twelve hours at the gauging station. State highways in the district suffered damage totalling £1,320.

31 JANUARY 1955

Breaching a stopbank at the height of a flash flood, the Waitangi-taona River flooded much farmland and one house had to be hastily evacuated. In the Whataroa district 178mm of rain fell overnight and within hours the river was in high flood, rising from a near record low level to which the river had dropped as a result long dry spell. At day break the river was bank high; the velocity increased rapidly under the traffic bridge where the river is confined and struck the true left stopbank downstream. Within minutes the river had destroyed much of the bank. About 48cm of water entered the farm house that had to be evacuated and the main highway near Whataroa was cut-by floodwaters (G.E.S. 31/01/1955).

In Greymouth 38mm of rain fell during the day. Slips closed the Midland Railway at 8.15 p.m. for five hours near Aickens and the Otira Gorge. The traffic bridge over Rocky Creek subsided 254mm. Flooding also covered the line between Poerua, Rotomanu and Te Kinga, but did not disrupt the service in these areas (G.E.S. 01/02/1955).

16 - 19 FEBRUARY 1955

Several days of heavy rain brought all rivers and creeks on the West Coast into flood. Between the 14th and 19th Greymouth received over 229mm of rain (G.E.S. 21/02/1955). At Inangahua 90mm fell in less than forty-eight hours to the 17th (The Press 18/02/1955).

Flooding in the Buller Gorge was the heaviest for several years (G.E.S. 21/02/1955). At low tide at midday on the 17th, the Buller River was flowing at about 4m/s. Many low lying areas were flooded, including the esplanade at Westport. The road between Inangahua Junction and Westport was blocked by slips and washouts near Berlins as was the road to Nelson between Inangahua Junction and Lyell. The Buller Gorge road was blocked at Husband Hill by slips (The Press 18/02/1955). Flooding and slips also caused trouble on the northern Karamea road (G.E.S.18/02/1955), and the Lewis Pass road.

The Grey River was in high flood, flowing at 5m/s and coming within 48cm of overflowing the Greymouth Wharf between 5.00 a.m. and 6.00 a.m. on the 18th. However the danger of overtopping passed by midday (G.E.S. 19/02/1955). Sawyers Creek in Greymouth was running bank high for two days but no properties were flooded as the creek had been recently cleared of weed, allowing the flood waters to escape more easily (G.E.S. 18/02/1955).

Much damage occurred to roads and bridges throughout the Grey district. State Highway 7 between Greymouth and Reefton was closed by the washout of a span of the Big Grey River Bridge at the Ahaura end; a gap 2.1m wide developed between the road and the bridge and other spans of the bridge were weakened by the force of the water. The road between Ikamatua and Blackball was severed when the Craigieburn Stream Bridge was completely washed away (G.E.S. 19/02/1955), and at Taylorville the road was blocked by water 60cm deep. Rising creeks on the way to Runanga touched the bases of the road bridges but did not cross the road in this area (G.E.S. 18/02/1955). The Otira Gorge road was cut by many slips and flooding.

In Greymouth heavy surface flooding occurred, being worst around the corners of Guinness, Herbert and Boundary Streets. Considerable flooding on Waterwalk Road isolated Blaketown for a period. The cellars of the Park Hotel were flooded and water lapped the doorway of Kennedy Brothers Garage (G.E.S. 19/02/1955).

Railway links were also affected although not as badly as the road connections. On the night of the 18th the rail car in the Buller Gorge ran into a large slip, passengers had to cross the gorge via a swing bridge and were taken to Greymouth by bus, arriving six hours late (G.E.S. 21/02/1955). The line from Greymouth to Christchurch was temporarily blocked by flooding and power cables blown across the tracks between Cora Lynn and Cass on the Canterbury side (G.E.S. 19/02/1955).

25 - 27 FEBRUARY 1955

Widespread flooding, being particularly severe between the Buller and Hokitika Rivers, occurred after three days of heavy rain. In twenty-four hours to 9.00 a.m. on the 26th, 114mm of rain was recorded in Greymouth following 25mm the previous day.

The Grey River rose rapidly on the night of the 25th and came within 60cm of the Greymouth Wharf at high tide at 1.00 a.m. on the 26th. As the tide dropped the river actually increased its level and at noon was only 30cm below the Wharf, even though it hadn't rained for six hours. At its peak on the 27th there was a 5m/s flow in the river (G.E.S. 28/02/1955). Parts of the business district of Greymouth were flooded as silted water backed up through the drains (G.E.S. 26/02/1955). Several Marsden Road properties and hotel cellars were flooded by Sawyers Creek which was bank high (The Press 26/02/1955).

New River burst its banks on the 25th flooding one house at Camerons (G.E.S. 26/02/1955). On the 26th the river subsided some what on the cessation of rain but rose again on the 27th when rain re-commenced, as did most rivers (The Press 28/02/1955). The river overtopped the road and rail bridges, flooding nearby farmland and Camerons Settlement again. At least five houses were flooded. One had water up to the level of the window sills through it whilst the others had nearly a metre flow through them. Flood waters occupied the houses for twelve hours and deposited much silt through them. Five bridges leading to the bush from Ogilvie's Sawmill were destroyed or badly damaged. The overflow water from New River cut a chasm 3m deep and 6m wide down Beach Road. Water flowed down this and into the Taramakau River (G.E.S. 28/02/1955).

The Hokitika River also burst its banks on the 25th, flooding many farms in the Kowhitirangi district and during the night the river threatened to overflow its banks at Hokitika but this did not eventuate (The Press 26/02/1955). The Arahura River and Stillwater Creek were so high as to be flowing over the top of the bridges crossing them. Stillwater Creek covered the bridge to a depth of 1.8m.

Westport suffered badly from surface flooding water being about 60cm deep in many parts of the town. Some residents in the State Housing block were completely isolated from 7.00 p.m. on the 27th as water surrounded and entered some of the houses (The Press 28/02/1955).

Road and rail routes were severely impaired as damage initiated on the 25th was accentuated when rain recommenced two days later. From 7.00 p.m. on the 25th, it was only possible to travel 16km out of Greymouth in any direction (The Press 26/02/1955). The Greymouth - Hokitika highway was blocked by the flooding at New River which left the road badly scoured. The Coast Road to Westport was closed because of slips at Costello's Hill south of Charleston, Meybille Bay and White Horse Hill (G.E.S. 28/02/1955). The road to Runanga was flooded to its deepest level since 1937 and bridges at Canoe Creek near Barrytown and the Punakaiki River both had one of their approaches washed out (G.E.S. 26/02/1955). The Buller Gorge Road was also blocked because of slips. State Highway 7 between Greymouth and Reefton was cut because of deep flooding at Stillwater, and approaches to both the Nelson Creek Bridge and Matai Creek Bridge were washed out. The renewed span of the Big Grey River Bridge was also swept away, more of the approach was eroded, and a pier undamaged in the previous flood was undermined and damaged. About 160m of road was badly scoured on the Lewis Pass route between Springs Junction and Maruia Springs and the Otira Gorge road was still closed from the flood of the 16th-19th (G.E.S. 28/02/1955). All roads in the Mitchells - Greenstone - Kumara area were closed (G.E.S. 26/02/1955). The Greenstone Bridge required a new approach as a creek crossed the road, burst over a culvert and ran down the road for some distance, scouring it to a depth of nearly 2m (G.E.S. 28/02/1955). The Atarau - Ikamatua road was blocked because of flooding between Matai and Blackball (G.E.S. 26/02/1955). Country roads also suffered damage ranging from minor to severe (G.E.S. 28/02/1955).

All rail services on the coast were cut until slips and flooding were cleared. The railway line in the Buller Gorge was obstructed by a large slip at Cascade and a smaller one at Tiriroa. The Greymouth-Hokitika line was blocked by flooding and washouts in three places; between Gladstone and Camerons washouts left the line suspended, the Arahura River flowed over the road/rail bridge, and flooding covered the line at Hou Hou Creek. Deep flooding closed the Midland Line to Christchurch between Rotomanu and Te Kinga, where water covered the tracks for a 40m stretch and was 60cm deep. A bridge between Inchbonnie and Poerua was inundated to a depth of 1.8m with the line being badly scoured in this area. A major slip and washout near Kaimata left the line suspended over a large cavity and telephone lines were carried away. Slips also removed part of the line at Aratika and covered the line at Aickens and Omoto. Deep flooding at Camp Creek delayed services on the Rewanui line until the water subsided (G.E.S. 26/02/1955).

Serious damage occurred to the Cascade Mine at the back of Denniston. Slips buried buildings and equipment valued at £1000 (The Press 01/03/1955), and over 11km of fluming leading to the mine was carried away by the slips (G.E.S. 28/02/1955).

13 OCTOBER 1957

River levels in Westland and Canterbury rose after a night of heavy rain (G.E.S. 14/10/1957). In the twenty-four hours to 9.00 a.m. 93mm of rain was recorded at Greymouth (G.E.S. 07/06/1958). The rivers of the Grey catchment were the most affected in Westland. The Grey itself was high and flowing at 3m/s. About half of the roadway between Taylorville and the Brunner traffic bridge slipped into the river, leaving an 18m sheer drop along the road. Three culverts under the road were completely destroyed. Nelson Creek beyond Ngahere overflowed its banks and badly scoured the road; water was about 30cm deep on the road in this area and quite deep flooding covered the road at Stillwater. In both cases traffic was delayed. Snow fell down to unseasonably low levels, blocking both the Lewis Pass and Otira Gorge, and was covering the Rahu Saddle, although this remained open (G.E.S. 14/10/1957).

25 - 28 NOVEMBER 1957

A heavy spell of rain peaked on the night of the 26th - 27th with Greymouth recording over 178mm of rain in one week. The brunt of the storm was concentrated around Blackball. The Grey River was in high flood, flowing at 4.5m/s, but was 2.4m below the Greymouth Wharf. Most other West Coast rivers were in medium flood, and twice during the week the Haast River ran bank to bank (G.E.S. 27/11/1957). The Aickens River was also running at danger level (G.E.S. 25/11/1957).

Parts of the Omoto Racecourse were flooded and both the railway and main highway were cut by flooding, washouts and slips in the Blackball/Ngahere region. The Balderstone and Party Mine at Blackball was flooded when a creek burst its banks. Electrical equipment at the mine was badly damaged. Severe surface flooding occurred at Blackball, with torrents of water running down the main streets. This resulted in most roads in the Blackball-Ngahere-Redjacks area needing grading and remetalling. Much debris was strewn across roads and farms (G.E.S. 27/11/1957).

At Matai, the lower bridge over Callaghans Creek was washed away and one house was flooded. The railway line between Matai and Ngahere was affected by slips. Flooding damaged newly developed farmland as silting occurred and fences were destroyed. A slip 100m long occurred on the Haupiri Road near Nelson Creek but was quickly removed. Despite the damage in the Blackball-Matai area, the Grey County in general suffered little (G.E.S. 28/11/1957).

1 DECEMBER 1957

Flood danger levels were issued after the Grey River and other streams rose rapidly. The Omoto racecourse was partially submerged and at Matai where the worst flooding occurred, a homestead was inundated. Little damage was done and the Grey dropped as quickly as it rose.

In the twenty-four hours to 9.00am Greymouth received 38mm of rain (G.E.S. 02/12/1957).

4 - 5 DECEMBER 1957

Between 4.00 p.m. and midnight on the 4th, 63mm of rain fell at the Karoro Meteorological Station. The Grey River was running at 3.5m/s but did not rise as much as expected.

No major flood damage was reported although the heavy rain caused several washouts on the railway between Te Kinga and Rotomanu, and some surface flooding was reported in Greymouth when stormwater channels and drains overflowed. A number of slips blocked the Midland Railway line in the Otira - Aickens area for a short period (G.E.S. 05/12/1957).

14 DECEMBER 1957

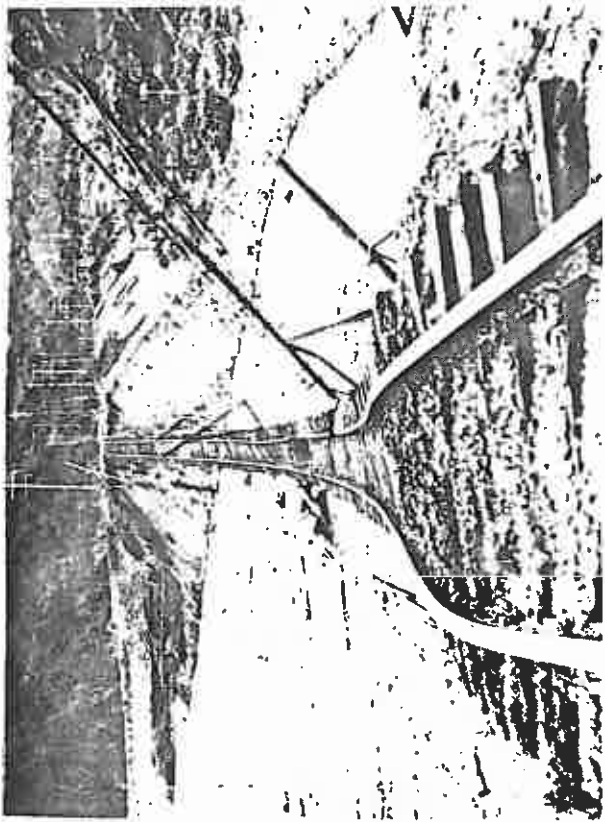
In the twenty-four hours to 9.00 a.m. Greymouth received 29mm of rain. A slip on the Midland Railway Line between Aickens and Jacksons delayed rail services, and a washout at the Rocky Creek Bridge near Aickens blocked State Highway 73. The Grey River was flowing at 4 m/s and closed the Greymouth Harbour to shipping activities (G.E.S. 14/12/1957).

26 - 28 DECEMBER 1957

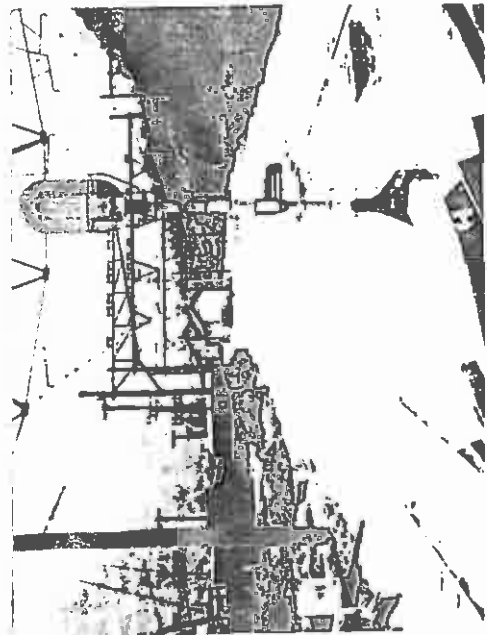
Intense rain caused all the major rivers in North Westland to flood, with the Grey River running at its highest level for approximately 18 years. At its peak on the 27th, the river was lapping the top of the Greymouth Wharf but dropped very quickly after this. The Ahaura River was 60cm above its previous highest level.

The Omoto Racecourse was flooded to the extent that water covered the railing around the back straight and was lapping the steps leading to the main stand. The Thomas Brunner memorial was being lapped and the Taylorville swing bridge was barely above river level. Deep water over the road at Stillwater cut road access to Reefton and elsewhere in the Grey Valley. A protection groyne at Inchbonnie was washed away and considerable damage to several properties eventuated. The Crooked River flooded near Rotomanu leading to several hectares of farmland being inundated and pasture being damaged by silting. Blackball and Ngahere were flooded but no damage was reported. The business district of Greymouth was flooded by surface water. Water backed up through the drains as it was unable to escape due to the high level of the Grey River.

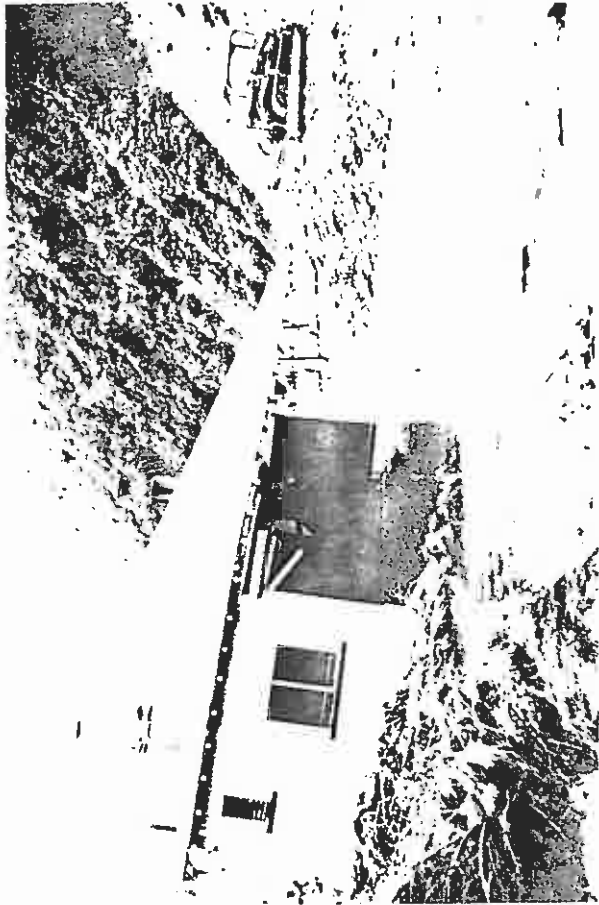
Damage was reported from further afield. The Taramakau River was in high flood and washed away a 30m span of the road bridge between Kumara and Mitchells. It was feared that the Taramakau may have broken its banks and spilled water into the Orangipuku River which leads into Lake Brunner, down the Arnold River and ultimately to the Grey River. However, this did not eventuate (G.E.S. 27/12/1957). On the 27th a landslide completely blocked the Otira River. Within minutes the river dammed up behind the obstruction and diverted towards the stopbank near the hydrostation. At 3.00 a.m. on the 28th (G.E.S. 28/12/1957), over 180m of the bank was breached (G.E.S. 13/01/1958). The river flowed through the railway yards, covered the station platform and flooded the township, causing severe damage. By mid morning the river changed course again, leaving the railway station and surged around 40 houses of the Railways housing area. One house was wrecked as over half of it was washed away (G.E.S. 28/12/1957). The river waters broke the town's water pipes, scoured the streets, and destroyed power transformers from the substation.



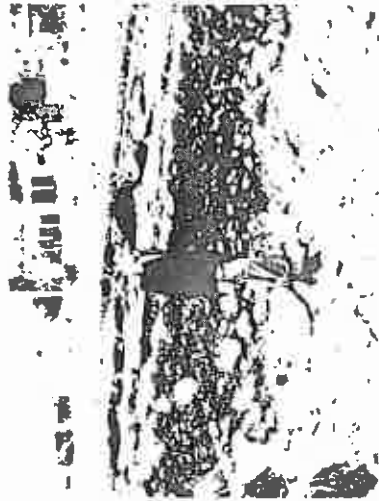
a) Suspended Railway Line, 0.8km West Of Otira Tunnel Portal.



c) River Flowing Through The Railway Yards.



b) A House Wrecked By The River.



d) The Street Which Took The Main Force Of The Water.

Residents had to carry water from the river until the water mains were repaired (G.E.S 28/12/1957). The township was completely isolated as the railway line was left suspended, the gorge road was blocked by slips and the bridge approaches to the town were washed out. The highway remained closed for five months after the storm. Washouts occurred at five points. The road at Lake Misery (near the top of the pass) was under 3m of water. The river bed aggraded between 6m and 8m and buried stretches of the highway. A large debris slide at Candy's Bend destroyed a section of the highway, and at Goat Creek near Otira the bridge was buried under shingle (Whitehouse and McSaveney 1989). The Hokitika River was in high flood, being nearly 18cm higher than the 1935 level. Just after 12.00 a.m. on the 28th sandbags were placed along the wharf; some streets were flooded as water backed up through the drains but no premises were entered. State Highway 6 between Hokitika and Ross was out when the river flowed through its old channel at Remarkable Gap, into Grove's Swamp and then Lake Mahinapua. The bridge approaches at Mirror Creek were washed out damaging a 4m section of highway, and two spans of the Tatare River Bridge were washed away. A temporary stopbank on Poerua Road at Harihari was washed out as were two minor bridge approaches in the area. At Okarito Forks the road was closed due to severe scouring caused by a blocked culvert.

Note: Flooding also occurred in Otago, Nelson and Canterbury. Large floods were recorded in the Waimakariri, Rakaia and Rangitata Rivers (G.E.S. 27/12/1957).

12 - 13 JANUARY 1958

A quick rise in the Otira and Rolleston Rivers and streams in the surrounding area, occurred during the night. Although there was some anxiety in Otira township, the Otira River was safely contained within the partially restored stopbank, that had previously been damaged in the Christmas 1957 flood. The Otira Gorge Road remained closed since the Christmas storm, with more slips and washouts developing and in some cases the road fell away completely (G.E.S. 13/01/1958).

A slip crossed the road at Fourteen Mile and the approaches to Bakers Bridge at Barrytown were damaged but the Coast Road to Westport remained negotiable.

23 - 24 JANUARY 1958

Heavy rain was recorded in the Grey catchment on the 23rd and 24th. In twelve hours 127mm of rain was recorded at Greymouth whilst some rural areas received over 200mm in the same period. The major rivers did not flood but many small creeks broke their banks causing isolated damage.

Saltwater Creek was at its highest ever level as it lapped the decking of the one lane traffic bridge and flooded the area where it joins New River. New River broke its banks and invaded Camerons, flooding four houses and drowning some livestock. The road and rail south of Camerons was cut by flood waters as both ends of the Chesterfield rail bridge were scoured and the approaches to the bridge at Camerons were washed out. Other bridges also suffered. The approaches to Serpentine Creek Bridge were washed away as were two spans of the Kaniere River Bridge. Both approaches to the Dry Creek Bridge vanished and the bridge at Smith Creek on Weheka Hills was washed away completely.

In the twenty four hours to 9.00 a.m. on the 24th 216mm of rain was registered at Hokitika (G.E.S. 11/03/1967), resulting in major surface flooding as water from Aerodrome Hill flowed into the lower parts of the town and the high level of the Hokitika River prevented the town's drainage system from working. The Hokitika water supply was cut due to flood damage to the pipe near Lake Kaniere. Surface flooding also occurred in Greymouth, Cobden and on the Kaiata highway. No further damage was reported (G.E.S. 24/01/1958).

14 FEBRUARY 1958

Intense rain during the night (152mm in six hours) caused many slips in the Cobden-Greymouth area. Fresh slip scars channelled rain water into rivulets and this combined with the surface flooding to inundate the shopping area to an unprecedented extent, except for when the Grey River burst its banks. Sawyers Creek burst its banks and flooded many properties although no damage was reported.

Mud and silt from numerous slips was deposited over a wide area in Greymouth and Cobden and slips destroyed a number of sheds and damaged two houses (G.E.S. 15/02/1958).

10 MARCH 1958

Widespread flooding occurred in South Westland after a period of incessant rain. In twenty-four hours to 9.00 a.m. on the 10th, 152mm of rain was recorded at Paringa (G.E.S. 10/03/1958). Between 10.00 a.m. and 10.30 p.m. on the 10th a further 205mm was recorded in South Westland, raising many rivers to record levels.

State Highway 6 was closed for a number of days because of washouts and slips damaging roads and bridges. At Whataroa Bluff an 80m stretch of road south of the Whataroa Bridge was washed out and a mechanical digger near the bridge was swept away and written off. A bridge approach in Whataroa township was destroyed by floodwaters and substantial slips occurred on the road in the Mt Hercules area (G.E.S. 11/03/1958). At Mt Bonar 300m of road were badly scoured and the Evans Creek Bridge was closed to heavy traffic as two piers were scoured out. Over 18m of the bridge approaches to the Little Waitaha River were washed away (G.E.S. 12/03/1958).

Most farming land in the Kokatahi and Kowhitirangi Valleys was flooded to levels higher than those of the Boxing Day 1957 or January 24 1958 floods. Paddocks were severely silted and debris was strewn high in fences. In this area stretches of highway channelled torrents of water down them and many bridge approaches were damaged. From the bottom of the hill at the junction of State Highway 6 and the road to Lake Kaniere, a solid sheet of water extended almost to the Longford Hotel. The Greymouth to Hokitika section of State Highway 6 was also badly flooded between Arahura and Awatuna and the bridge approaches to Serpentine Creek were partially scoured (G.E.S. 11/03/1958).

13 MARCH 1958

The period of bad weather continued and much of Westland was flooded for the second time within a week.

The Grey River rose rapidly overnight and threatened to overtop the wharf and flood the commercial centre of Greymouth in the early hours of the morning. However, this did not eventuate as the flood peaked just below the level of the wharf. Nevertheless, many streets were flooded and silted as water backed up through the towns drainage system. Mud also came down from the hill above the railway station as temporary streams flowed down the slip scars created in the February event. Many hotel cellars in Greymouth were flooded, having to be pumped out by the Fire Brigade and much of Blaketown was inundated as the lagoon overflowed. At Omoto floodwaters lapped the inside rails of the race track and horses had to be released and lead through water over a metre deep to higher ground. At Mitchells several slips caused much damage to a number of cars (burying three of them), and several houses.

Farmland in the Kokatahi-Kowhitirangi area, and between Harihari and Whataroa was again flooded with similar minimal effects to the flood of the 9-10th occurring (G.E.S 14/03/1958). The Waitahu River broke through its banks at the road/rail bridge and flooded some farmland although no serious damage was reported (G.E.S 15/03/1958).

Every major road and railway on the West Coast was blocked by a combination of floodwaters, slips and bridge damage resulting in many small settlements being completely isolated. The Otira River was in high flood, with the railway there being blocked by floods and slips in six places around Otira township. State Highway 6 in South Westland had not been opened since the flood on the 9th - 10th. This prohibited dairy farmers in the area dispatching their cream to the factories. The cream was stored in a freezer at Whataroa, but floods put the freezer out of action and 8 tonnes of cream were destroyed. At the Glaciers a large number of tourists had been stranded there since the 10th, and many cars were stranded in scattered locations throughout Westland (G.E.S 14/03/1958).

8 - 10 MAY 1958

Widespread flooding occurred after two days of heavy rain fell over the area. In twenty-four hours to 9.00 a.m. on the 9th the following rainfall recordings were made: Karoro 91mm, Greymouth Tiphead 121mm, Blackball 126mm (G.E.S. 09/10/1958).

The Grey River rose to high levels, coming within 60cm of overtopping the Greymouth Wharf late in the day on the 9th (G.E.S. 10/05/1958). This was about 30cm lower than the March 1958 flood (The Press 10/05/1958). The river level dropped quickly the next day and was only slightly above normal level (G.E.S. 10/05/1958). In Greymouth Sawyers Creek burst its banks but no houses were flooded and no damage was reported. Some streets of Cobden were surface flooded as muddy water poured off the quarry. Elsewhere in the Grey Catchment the highway to Reefton was closed by flooding and subsidence at Dobson, and the Nelson Creek road was blocked by flood waters. The major slip that damaged houses at Mitchells in March was re-activated and several new slips covered the road. More slips and washouts also occurred in the Poerua area; the Midland Railway was blocked between Poerua and Rotomanu at Rocky and Nellies Creeks. At the Ngahere end of the Blackball-Ngahere road/rail bridge, the embankment was undermined and badly eroded by the Grey River, and floodwaters surrounded a house near Blackball. The Brunner area was extensively flooded and in Taylorville, Sulky Creek rose to very high levels (G.E.S. 09/05/1958).

The Otira River rose at an alarming rate, threatening to break through the recently repaired stopbank which protects the town (The Press 10/05/1958), but the river dropped nearly as quickly as it rose. New River broke its banks and flooded Camerons but no damage occurred (G.E.S. 09/05/1958). The Kowhitirangi and Arahura Valleys were badly flooded. Vine Creek inundated much farmland at Kowhitirangi and Doughboy Creek breached a new stopbank. Kawhaka Stream in the Arahura Valley broke its banks and washed out 80m of road, leaving a 3.6m high scarp face (G.E.S. 10/05/1958).

In Runanga creeks were reported to be at record levels. Water entered several houses, being about 1m deep in one of them; the creeks peaked at 3.00 a.m. on the 8th. About 30cm of water flowed down the streets adjacent to the creeks and the cellars of the Dunollie Hotel were flooded and had to be pumped out by the Fire Brigade. The rail line to Rewanui was blocked by slips (G.E.S. 09/05/1958). To the north, the Karamea road was also closed by slips on the 8th; in the twenty-four hours to 9.00 a.m. on the 8th, the Westport area received 30mm of rain (G.E.S. 10/05/1958).

28 MAY 1958

A storm of cyclonic force struck the West Coast. The Midland Railway line was cut by washouts and slips at Rocky Creek and Coomb's culvert was also washed out. At the Reefton Saddle, a slip blocked the entrance to the Tawhai Rail Tunnel. Strong winds cut power and telephone lines and de-roofed many houses over a wide area (G.E.S. 28/05/1958).

30 MAY 1958

Heavy rain continued falling and Rocky Creek flooded again, blocking the Midland Railway for the second time in two days, as much of the embankment was scoured. More damage also occurred to the railway at the Tawhai Tunnel, when the embankment became saturated and subsided, throwing the tracks out of alignment (G.E.S. 31/05/1958).

9 - 11 AUGUST 1958

On the 9th Greymouth received 92mm of rain, Blackball 135mm and Arthurs Pass 210mm. Roads around Hokitika were flooded and blocked and the Nelson highway south of Inangahua Junction was closed. Surface flooding was general in Greymouth, being severe in some places. The Grey River rose rapidly but the rain eased off before the river could flood the town. Flooding was generally more of a nuisance than damaging (G.E.S. 11/08/1958).

Farmlands at Totara Flat were almost completely submerged when the Big Grey River broke its banks. Thirteen farms were affected and many homesteads were surrounded by water. Melting snow and heavy rain brought the Big Grey into high flood and broke its banks about 1500m from the new rail bridge south of Ikamatua. The river flowed right through Totara Flat, destroying fences, buildings and cars. The current was not strong but water was about 1m deep. The church was surrounded by water, as were some houses although water didn't enter any (G.E.S. 12/08/1958).

3 DECEMBER 1958

A flash flood occurred in the Taramakau Valley after a period of heavy rain. In the forty-eight hours to 9.00 a.m. on the 4th, 58mm of rain was recorded at Karoro. Of this, 55mm fell in the twenty-four hours to 9.00 a.m. on the 3rd.

The flood in the Big Honohu River carried a 10.6m pile driving frame, timber and other equipment 300m downstream. This delayed work on the new bridge for about a fortnight. It was suggested that the Big Honohu was near its maximum flood level. New River carried a large volume of water and broke its banks near Camerons, to flood the main highway between Greymouth and Hokitika to a depth of 60cm to 1m and for a distance of 90m. This caused a traffic jam involving 129 vehicles. The road was scoured to a considerable degree resulting in £500 of damage, but this was quickly repaired. (G.E.S. 04/12/1958).

12 DECEMBER 1958

A downpour brought some trouble to the Otira region. The Otira River rose to bank high levels which threatened the town, and crossed the railway between Otira and Aickens. A slip at Candy's Bend blocked the Otira Gorge road (G.E.S. 13/12/1958). Moderate river bank erosion occurred along the Kowhitirangi River (W.C.B. slides).

10 MARCH 1959

A brief rainstorm during the night brought the Grey River into minor fresh. No damage was reported (G.E.S. 10/03/1959). W.C.B. photographs show the Kokatahi area in flood, but no further accounts of this were found.

28 - 30 JANUARY 1960

South Westland was hard hit by an intense electrical storm, although no flood damage was reported. During the storm, 30mm of rain was recorded in Greymouth in the twenty-four hours to 9.00 a.m. on the 28th, producing a slight fresh in the Grey River. The heavy rain was considered responsible for causing a large slip which completely blocked the Haupiri River Gorge. Rocks and other debris was piled about 6m high across the gorge; the Haupiri River backed up for a considerable distance before overtopping and removing the obstruction. "It appeared as if a tributary has brought the slip down into the main flow, and Fisher's Track was flooded". In South Westland telephone links were cut in the Kokatahi-Kowhitirangi-Harihari region (G.E.S. 02/02/1960).

17 APRIL 1961

Between 4.40 a.m. and 5.30 a.m., 19mm of rain was recorded in Hokitika. Washouts on the road and rail lines in South Westland between Hokitika and Ross delayed rail traffic movements (G.E.S. 18/04/1961). The Waitaha and other South Westland rivers were in a state of fresh (W.C.B. slides).

11 JULY 1961

Millions of litres of water poured down the hillside to the east of Reefton from a disused mine dam that burst. The water inundated streets, lawns and gardens in the eastern portion of Reefton. The water was flowing down the hill between 3.00 p.m. and midnight (G.E.S. 13/07/1961).

26 - 28 SEPTEMBER 1961

The Grey and Taramakau Rivers were running quite high after a period of rain. In the twenty-four hours to 9.00 a.m. on the 26th, 23mm of rain was recorded at Karoro and 34mm was recorded at the Greymouth Harbour. On the 26th the Grey was flowing at 2m/s (G.E.S. 26/09/1961) and on the 28th the Taramakau was flowing hard against State Highway 73 at Harris's Swamp (W.C.B. photo). No damage was reported.

7 - 10 NOVEMBER 1961

Persistent rain brought widespread flooding to the West Coast although most damage reported was minor and repaired quickly. In the twenty-four hours to 9.00 a.m. on the 7th the following rainfall recordings were made: Karoro 38mm, Greymouth Harbour 33mm, Otira 178mm-203mm (G.E.S. 08/11/1961), and Fox 152mm (G.E.S. 10/11/1961).

On the 7th slight flooding covered State Highway 7 in three places between Greymouth and Reefton, and the Midland Railway line was washed out at Rocky Creek (G.E.S 08/11/1961). A bridge approach at Fox was washed away and sections of the Kokatahi-Kowhitirangi highway were scoured. Along Wanganui Flat Road damage occurred to three bridge approaches and to the road itself. On the 8th some surface water lay on the road just south of Mt Hercules between Lake Ianthe and Harihari.

Rivers attained high levels the next day; in the twenty-four hours to 9.00 a.m. on the 9th, 78mm of rain was recorded at Blackball and 43mm was recorded at Reefton. Blackball Creek was very high, as was the Grey River which weakened a pier on the Blackball road-rail bridge, closing it to all but pedestrian traffic. Much of Coal Creek Flat was inundated and stock were moved to higher ground that afternoon. By 7.00 p.m. water was encroaching the road near Wingham Park, and the bridge at the end of the straight was impassable by 10.00 p.m. A slip demolished a span of a bridge leading to the Rewanui Mine which halted the Liverpool Mine's production until the bridge was repaired. Extensive flooding occurred along the margins of the Little Wanganui River, north of Karamea and a large slip obstructed the Karamea Bluff road just south of the township. Both the Buller Gorge road and railway were cut by flooding and slips. State Highway 6 at Costello's Hill and the Cobden Quarry was also closed because of slips.

A further 33mm of rain fell at Karoro in the twenty-four hours to 9.00 a.m. on the 10th, with falls up country reported to be heavier. The Grey River peaked at 5.00 a.m. that morning, attaining a level 4.2m above normal at Dobson (4.6m on the gauge). This was the highest level since 14 March 1958. In Greymouth the river came within 76cm of overtopping the Wharf and was flowing at 5m/s. The river backed up through the town's drainage network causing deep surface water to lay in Leonard and Boundary Streets. At Stillwater Creek the bridge was submerged and closed for most of the night of the 9th and morning of the 10th. A detour on the eastern side of Ngahere also became impassable (G.E.S. 10/11/1961).

6 JANUARY 1962

Heavy rain brought most West Coast rivers into flood, the rivers in South Westland being particularly high. The Hokitika River at Kaniere peaked at 6.2m, the highest level since the March 1958 flood which peaked at 7m. Recently completed works on the Waitaha River were severely damaged. Most of the destruction was caused by considerable and extensive degradation combined with severe subsidence of the rip rap (at Lemon's property). The left bank of the Wanganui River was badly eroded, which led to the river overflowing and going inland through several properties on the Harihari Flats (26/02/1966). The Grey River was only in slight fresh (G.E.S. 06/01/1962).

12 JANUARY 1962

Most rivers were again in flood with the southern ones being at higher levels than those in the north. No damage was reported (G.E.S. 26/02/1962).

21 JANUARY 1962

Heavy rain all day flooded West Coast rivers for the third time in two weeks. In the twenty four hours to 9.00 a.m. on the 22nd, 80mm of rain was recorded at Karoro; the rain was accompanied by lightning and thunder. On the Canterbury side of the main divide, Arthurs Pass township recorded 221mm of rain in the same twenty four hour period (The Waimakariri River rose 2.1m).

Surface flooding occurred in Greymouth around the business district and low lying residential areas as stormwater drains overflowed. A slip at Candy's Bend closed the Otira Gorge road for a short period. River levels were not excessively high (G.E.S. 22/01/1966).

(DAY MONTH UNKNOWN) 1963

Black's Creek bridge was swept away in a flood when Clearwater Creek broke into the course now occupied by Black's Creek (G.E.S. 14/04/1963).

27 - 28 MARCH 1963

Between the afternoons of the 27th and 28th, Otira received between 300mm - 355mm of continuous and torrential rain. The Otira River was in high flood and the Taramakau, Grey and Hokitika Rivers were greatly swollen. Many small creeks also flooded heavily. The Hokitika River at the Kaniere road bridge gauge peaked at 6.4m and at the Hokitika Wharf gauge peaked at 4.27m (W.C.B. data).

Serious flooding and slipping occurred on many roads throughout Buller and Westland - particularly the Otira Gorge Road. Blocked roads occurred from Karamea in the north to Fox Glacier in the south. Severe slips affected the road between the glaciers.

In the twenty-four hours to 9.00 a.m. on the 28th, Blackball received 130mm of rain. Blackball Creek overflowed, and the bridge across the creek was covered by 8cm of water. Between Blackball Hill and the railway, water covered the road in four places, and the road between Blackball and Roa was flooded in five places. A house in Blackball had to be evacuated and two more were threatened with flood waters. The Kotuku-Bell Hill and Mitchells-Inchbonnie roads were blocked and the Moonlight/Atarau road was closed because of washed out bridge approaches. The railway line between Greymouth and Christchurch was also blocked by water and slips. Rocky Creek was in heavy flood, leaving a number of rocks on the lines about 1.6km on the Greymouth side of the creek. Flooding was also reported on the road at Birchfield between Westport and Ngakawau and minor slips occurred around Westport (G.E.S. 28/03/1963).

3 SEPTEMBER 1963

The Arahura River was in flood (W.C.B. photographs) but no damage was reported.

6 SEPTEMBER 1963

Severe surface flooding occurred in Cobden (G.E.S. 08/11/1963). No other records found.

29 - 30 OCTOBER 1963

Heavy overnight rain brought the rivers of North Westland into flood. In the twenty four hours to 9.00 a.m. on the 30th, 80mm of rain was recorded at Blackball, 47mm at Karoro and 52mm at the Greymouth Harbour Board Offices.

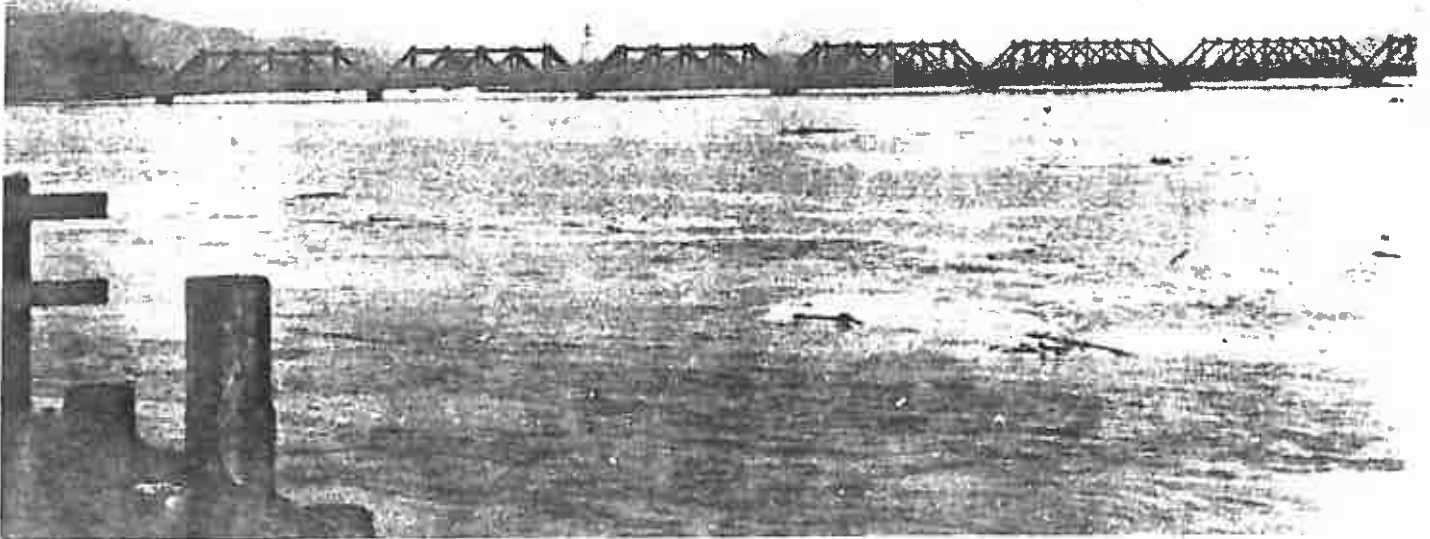


PLATE 9. HOKITIKA RIVER FLOODING. LOOKING UPSTREAM FROM GIBSON QUAY WHARF TO OLD BRIDGE, 27/03/1963. (W.C.B.).

The Grey River at Dobson was 3m above normal and flowing at 4.5m/s. Kaiata and Omoto were flooded extensively as the Grey backed up through a small creek adjacent to the Jockey Club's property, and flooded the southern end of the back straight of the race course (G.E.S. 30/10/1963). About 200 sheep at Omoto were drowned (G.E.S. 31/10/1963). In Greymouth fishermen had to shift their boats from the Wharf into Erua Moana Lagoon because of the high state of the river. The road/rail bridge at Blackball was closed due to a suspect pier, which halted both road and rail traffic until the river dropped and the bridge was inspected (G.E.S. 30/10/1963). A telephone pole near Atarau was washed out, cutting phone links in the Atarau-Moonlight district (G.E.S. 31/10/1963). The river was reported to have risen very quickly.

Further afield the Taramakau and Arahura Rivers were also high although no damage was attributed to them (G.E.S. 30/10/1963).

6 - 9 NOVEMBER 1963

Winter-like conditions prevailed for a number of days over the West Coast. The region experienced heavy rainfalls, hail and lightning, and snow fell down to 450m (G.E.S. 06/11/1963). The following rainfall recordings were made: Greymouth 101mm in thirty-six hours to 9.00 a.m. on the 7th (The Press 09/11/1963), Blackball 100mm in twenty-four hours to 9.00 a.m. on the 8th, Karoro 66mm in five hours to noon on the 8th and 31mm of this fell within the last three hours. In sixteen hours to noon on the 8th, 81mm fell at Karoro (G.E.S. 08/11/1963).

Major flooding occurred in the Buller and Grey districts. The flood in the Buller peaked on the night of the 6th. Stock losses were severe in the Umere and Arapito Valleys and around Karamea; sheep, cattle and pigs were all lost. A farmer in the Inangahua Valley also lost a number of stock. On the 7th two families at Seddonville had to be evacuated by boat as water entered their houses and a number of others. Water was over 1m deep in one of the evacuated houses. Several people took refuge in the Empire Hotel, which itself became an island as it became surrounded by water and could only be reached by boat. Stock losses in the Seddonville area were light (The Press 09/11/1963). At Crushington, a woman and her four young children were trapped inside their house which was threatened by the Inangahua River. The river broke its banks and established a second channel around the other side of the house, completely surrounding it and washing away the access bridge. The five people were rescued by jet boat which itself had difficulty manovering due to the velocity of the river (G.E.S. 09/11/1963).

The Grey River began rising slightly on the 6th, when it was flowing at 2 m/s, twice the normal speed (G.E.S. 06/11/1963). By 1.30 p.m. on the 8th, the river had risen 3m above normal and flowed at 3.5 m/s. In the previous three hours the river rose 1m; the Ahaura River rose 46cm in the one and a half hours to 1.30 p.m. on the 8th (G.E.S. 08/11/1963). By 7.30 p.m. the Grey was registering 5.6m on the Dobson gauge (4.5m above normal) and flowing at 4.5 m/s. The river finally peaked between 9.00 p.m. and 9.30 p.m. on the 9th, discharging an estimated 5663 cumecs. This was the highest the river had been since the March 1958 flood. The Ahaura River peaked between 8.00 p.m. and 9.00 p.m. rising 3.3m above normal level. By midnight the Grey had dropped 46cm.

Up the Grey Valley the highway to Reefton was blocked as the bridge at Stillwater Creek was "several feet" under water and the Mirfins Creek Bridge near Ikamatua was washed out. Snowy River broke its banks and flowed down the road for a distance of 1.6km (G.E.S. 09/11/1963). Heavy rain in the back country caused some flooding in the Te Kinga - Rotomanu area but this was not serious (G.E.S. 08/11/1963).

In Greymouth many streets were flooded badly by surface water. Cobden was most affected around Richmond Street and Barclay Place where water was knee deep in places. This was of similar magnitude to the flooding of 6 September 1963 and was attributed to an inadequate street drainage system. Around the centre of the town and to the south near the Post Office, Whall, Albert, Mackay, Nelson Streets and Marsden Road were all flooded by muddy water backing up through the drains (G.E.S. 08/11/1963).

The Nelson road was cut because of flooding between Inangahua and Murchison and a large slip at Riordans Creek closed the Lewis Pass. About 2000 tonnes of material had to be removed from the road.

7 - 9 JANUARY 1964

An intense electrical storm over much of Westland climaxed eight days of virtually incessant rain. The Grey River rose 2.4m in twelve hours to 9.00 a.m. on the 8th, and was flowing about 3m above normal at Dobson. The gauge at Dobson read 4.2m, and the river discharged 2548 cumecs. By 11.00 a.m. the river level on the Dobson gauge had dropped to 3.9m and the discharge had decreased to 2124 cumecs. The force of the water weakened a pier of the Blackball road-rail bridge closing it to all traffic on the night of the 7th - 8th (G.E.S. 08/01/1964). The pier was scoured around the piles and one of the piles subsided 60cm (G.E.S. 08/01/1964). The pier also moved downstream slightly (G.E.S. 09/01/1964).

A large washout at Dublin Terrace in the Buller Gorge closed the road for several hours and buses between Nelson-Westport and Nelson-Greymouth had to be rerouted through Shannandoah. The road to Karamea was flooded by the Little Wanganui River and slips covered parts of the road in the Karamea Bluffs but the road remained passable.

Heavy rain continued throughout the day and night of the 8th; 17mm fell at Greymouth in the twenty-four hours to 9.00 a.m. on the 9th. This brought the months total to 132mm. During the morning the Grey River rose again by 46cm and by 11.45 a.m. the Dobson gauge was reading 2.9m - about 1.8m above normal (G.E.S. 09/01/1964). The bad weather persisted the next day which caused the cancellation of the Kumara Races and other sporting activities. The Otira Gorge road was closed between 11.00 a.m. and 4.00 p.m. because of scouring and slips. A small slip covered the Rewanui rail line but did not hinder rail movements. Two washouts occurred in the Buller Gorge - another at Dublin Terrace and one at Newton's Flat. Several cars were trapped between the washouts and traffic to Nelson again had to be directed through the Shannandoah route. A further 29mm of rain fell in the twenty-four hours to 9.00 a.m. on the 11th; 172mm had fallen in the first 11 days of the month (G.E.S. 11/01/1964).

14 - 15 JANUARY 1964

Heavy continuous rain from the north west brought widespread flooding although most cases were minor. In the twenty-four hours to 9.00 a.m. on the 15th, 39mm of rain was recorded at Greymouth and 36mm at Karoro in the same period. During the 15th, 100mm of rain fell at Inchbonnie and 76mm at Rotomanu. In 13 of the first 16 days of January, Inchbonnie recorded 576mm (G.E.S. 16/01/1964).

New River rose appreciably in this period and scoured the southern bridge approach, closing the highway between Greymouth and Hokitika. Just to the south, a culvert was washed away and the road was stripped of tarseal. At Camerons settlement, just off Bundi Road, two people had to be rescued by boat between 7.45 p.m. and 8.00 p.m. when a tributary of New River burst its banks and flooded their property.

Most smaller creeks and rivers north of Hokitika were in high flood but the larger rivers only attained medium flood levels. Sawyers Creek in Greymouth was very high at 7.00 p.m. being less than 1m from lapping the decking on the Marsden Road Bridge - minor surface flooding of some properties occurred in this area. To the south of Hokitika all rivers and creeks were in high flood although little damage was reported. Low lying residential areas and some streets in the business centre of the town were affected by surface water after 57mm of rain fell between 6.00 a.m. and 2.15 p.m..

The Kokiri-Moana road was closed when the eastern approach to the Kokiri Bridge was scoured badly and the Moana-Mitchells road near the Arahura Gold Dredge work shops was covered by a slip. The Grey River peaked in the early hours of the 16th at 3.9m on the Dobson gauge (2.7m above normal) but by 9.00 a.m. the river level had dropped 84cm. A flow velocity of 3m/s was recorded (G.E.S. 16/01/1964).

22 JANUARY 1964

Yet another storm of gale force winds, lightning and heavy rain passed over the West Coast. In the twenty-four hours to 9.00 a.m. the following rainfalls were recorded: Greymouth Harbour 51mm, Karoro 44mm, Hokitika 35mm, and the glacier region 78mm.

A strong flow of 3.5m/s was recorded in the Grey River but no damage occurred. The Buller Gorge road was closed again by a slip at Dublin Terrace, the problem here was a 48m long water drive (tunnel) on the terrace where the slip had come down, resulting in a large build up of rocks and other debris. After heavy falls of rain, the already large volume of water in the drive was substantially increased, and fill used to repair the road was washed out (G.E.S. 22/01/1964).

24 - 25 MARCH 1964

Gale force winds and heavy rain covered Buller and North Westland. In twenty-four hours to 9.00 a.m. on the 24th, 43mm of rain was recorded at Karoro and 41mm was recorded at the Greymouth Harbour.

A slight fresh was running in the Grey River and flooding blocked the road at Camp Creek. The water level dropped almost as quickly as it rose. Slips blocked the Otira Gorge road but were quickly cleared, and the Buller Gorge railway 28km west of Inangahua. The strong winds also brought down some telephone lines (G.E.S. 25/03/1964).

12 - 14 MAY 1964

A torrential rainstorm passed over the West Coast bringing widespread flooding. In the twenty-four hours to 9.00 a.m. on the 12th, 33mm of rain was registered at Greymouth (G.E.S. 12/05/1964). During the day the rain intensified and in the five hours between 9.00 a.m. and 2.00 p.m., Karoro recorded 27mm (G.E.S. 13/05/1964). Between the evenings of the 12th and 13th a period of about twenty seven hours, 399mm of rain was recorded at Arthurs Pass township and 338mm at Otira (G.E.S. 15/05/1964).

Minor damage associated with surface flooding occurred in Greymouth around the business district and New River scoured its southern bridge approach. On the 13th damage became more severe and widespread as all rivers and streams reached moderate to high flood levels. Heavy flooding occurred in Harihari as local creeks overflowed and the Otira Gorge road was blocked by severe flooding and slips. At Kelly's Creek, 8km west of Otira, over 1m of water lay across the road and in the gorge itself five major slips blocked the road (G.E.S. 13/05/1964). Lake Misery at the top of the gorge rose 4.5m and covered the road with 1.5m of water. The water was up to the cross bars of the telephone lines along the road side. The most serious damage inflicted on the road was at Reids Falls where tonnes of water poured onto the road, bringing rocks and debris with it, which shattered the timber half bridging and reduced the already narrow road to 1.7m wide (G.E.S. 15/05/1964). Minor flooding occurred in the Otira rail yards, but did not affect train movements (G.E.S. 13/05/1964).

The Grey River peaked at 5.00 a.m. on the 14th, holding its peak level for four hours. At Dobson the river was 4.5m above normal (5.4m on the gauge) and at 9.00 a.m. was flowing at 5m/s. The velocity was thought to have been faster in the early hours of the morning. High tide at Greymouth was at 12.23 p.m. and at this stage the river hadn't dropped significantly, which posed a threat to the town. Other rivers were still high but were dropping at a much quicker rate than the Grey. In Greymouth water backed up through the drains and considerable surface flooding occurred in Boundary, Leonard and Mackay Streets. Substantial flooding of the Coal Creek Flat occurred with water being over 30cm deep at Wingham Park. State Highway 7 to Reefton was closed as water was up to the handrail on the Stillwater Bridge, a flood depth of 1.2m. A number of slips covered the road between Stillwater and Ngahere but these could still be passed.

Outside the Grey Catchment, the Otira road was badly scoured between Otira and Wainihinihi, with water being nearly 1m deep. State Highway 6 between Greymouth and Westport was scoured in numerous places and four slips covered the road between Ten Mile and Twelve Mile. The only reported damage of W.C.B. protection works was on the Taramakau River near Inchbonnie (G.E.S. 14/05/1964).

4 - 5 JULY 1964

An intense electrical storm centred around the Greymouth area combining gale force winds, lightning and heavy rain (58mm in forty-eight hours), produced a good fresh in the Grey river. The river was flowing at 2m/s. No flood damage was reported but wind tore down power and telephone lines (G.E.S. 06/07/1964).

22 JULY 1964

Stormy weather dominated for much of the month with over half a metre of snow falling on the Otira Gorge in the forty-eight hours to 9.00 a.m.. In the same period 75mm of rain was recorded at Greymouth. A fresh in the Grey River was flowing at 2m/s. Although no direct flood damage was reported, water seeping through the ground cut telephone connections between Greymouth and Runanga, the snow at Otira delayed rail movements and the fresh in the Grey hindered shipping movements (G.E.S. 22/07/1964).

6 AUGUST 1964

The largest slip ever recorded on the Rewanui Railway line occurred on the branch road leading to Mt Davy on the east side of Rewanui Station. The slip blocked a creek which dammed up considerably before it was able to break free and return to normal level (G.E.S. 07/08/1964).

13 - 15 MARCH 1965

Between the 13th and the 15th, 610mm of rain were recorded at Paringa. Of this 203mm fell on the 13th and 407mm fell between the morning of the 14th and mid day on the 15th.

At Lake Moeraki a bridge approach was washed out and a huge landslide came down near the lake. In the Weheka Hills between Fox and Franz Josef several slips occurred and an approach to the Bullock Creek bridge was washed out, blocking the road (G.E.S. 15/03/1965).

18 MARCH 1965

A house and surrounding low land was flooded with 15cm of water when the Porarari River backed up against very high seas. According to the house owner, this was at least the fourth time this type of flooding had happened in three years.

The high seas also flooded the streets in Waimarie township. However no buildings were flooded and no damage was reported (G.E.S. 18/03/1965).

16 DECEMBER 1965

A storm combining heavy rain and gale force wind produced a fresh in the Grey River which was flowing at over 2m/s. No flood damage was reported, but the high winds cut telephone and power lines and broke windows in Greymouth. In Wellington winds of hurricane force were recorded (G.E.S. 17/12/1965).

18 - 19 DECEMBER 1965

Flooding occurred in the Waiho River after a huge block of ice fell off the Franz Josef Glacier. The ice fall was approximately 305m long, 30m deep and 91m wide (832650 cubic metres) and weighing about 2000000 tonnes. The ice fall was attributed to torrential rain in the area - during the 16th-17th, over 279mm fell at Franz Josef. After the rain, the flooded river lifted the ice on the 18th. The subsidence of the river on the 19th, allied with the pressure build up in the crevasses would have caused the fall.

The river changed into a sea of huge ice chunks, right from the terminal face of the glacier to the river mouth about 16km away (G.E.S. 20/12/1965). The ice extended right across the river bed and up to 30m high in the bush on the valley sides (G.E.S. 21/12/1965). The ice changed the course of the Waiho River, making it flow over enormous rocks and produced a waterfall 12m high (G.E.S. 20/12/1979).

Experts were staggered by the amount of aggradation in the Waiho Gorge "They feel that it is impossible for it (the rock debris) to have all come from the visible areas, and a theory which is being adopted is that a great proportion of the debris came from beneath the glacier itself" (G.E.S. 22/12/1965). The Chief Park Ranger estimated the valley floor rose 9.1m (30ft), 800m downstream from the terminal face to the parking area, a distance of 2km. Mr W. Sara, of the Geological Division, D.S.I.R. said that sometime previously a lot of rock came down on the western side of the glacier and would have been pushed down by the ice (G.E.S. 22/12/1965).

Note: The glacier had been advancing at 1.6m/day for a number of weeks prior to the ice fall. Two other significant ice falls have been recorded at the Franz Josef Glacier. In his book "A Glacier Crumbles", Frank Alack noted similar happenings in the 1920's, where house sized blocks of ice were floating down the Waiho River. In 1949 another ice fall was recorded but was much inferior to either the 1920's fall and the 1965 fall; a natural lake was formed in front of the terminal face and absorbed most of the fallen ice (G.E.S. 20/12/1965).

21 - 24 FEBRUARY 1966

Between 9.00 a.m. on the 19th and 9.00 a.m. on the 23rd 170mm of rain fell at Greymouth, 54mm falling in the last twelve hours.

The Grey River was flowing at 3.5m/s on the 21st and loosened piles on the Blackball Bridge. The next day the velocity had dropped to just over 1m/s (G.E.S. 23/02/1966). Nevertheless, the damaged section of the Blackball Bridge collapsed, leaving a 160ft gap (G.E.S. 07/04/1966). The river rose again on the 23rd, peaking at a velocity of 5m/s and holding it's peak for four hours (G.E.S. 24/02/1966).

A large slip came down at Meyville Bay, containing 150-230 cubic metres of debris. This slip was only just cleared when another slip again closed State Highway 6 just north of the Fox River. This slip contained about 300-380 cubic metres. Several county roads were badly scoured. The main problem area was the Greenstone road where blocked culverts caused water to back up and cover the road with debris to a depth of 12ft (G.E.S. 23/02/1966).

The Grey River was still high on the 24th, flowing at over 3m/s. A huge slip closed the Buller Gorge road at Dublin Terrace. Debris came down from 45m up the hill side, covering the road with 4600-6000 cubic metres of debris (G.E.S. 24/02/1966).

26 - 27 APRIL 1966

Torrential rain brought flash floods to rivers in North Westland and Buller. Those of the Grey catchment were most affected. In the twenty-four hours to 9.00 a.m. on the 26th, 164mm of rain was recorded in Greymouth. Most of this fell shortly after midnight (G.E.S. 26/04/1966). In the same period 63mm fell at Westport and 51mm at Inangahua Junction (G.E.S. 27/04/1966).

By 5.00 a.m. the Grey River was running at over 5m/s and 5m above normal (G.E.S. 26/04/1966). By evening the velocity had decreased to 2m/s (G.E.S. 27/04/1966). Coal Creek Flats were completely inundated to the greatest depth for a number of years (G.E.S. 26/04/1966), and Big River overflowed, severely scouring Slatey Creek Road. Minor erosion occurred along Atarau Road and at Moore's Creek near Blackball the bridge abutment was badly damaged (G.E.S. 27/04/1966). Runanga was isolated for a short period due to flood waters on the road at Coal Creek and a slip between Cobden and Wingham Park.

In Greymouth surface flooding was severe, particularly around Leonard and William Streets and Victoria Park. At the Post Office water was lapping the stairs. Sawyers Creek rose at an alarming rate and inundated many sections and streets. One Marlborough Street home had 15cm of water through it. Many slips also occurred around the town. The worst was in Freyberg Terrace where a slip left a house overhanging. The material from under the house slid downhill and rested hard against a house on Rochfort Street below it. A slip in Ashmore Avenue in Cobden blocked a drain. Water backed up and flooded the adjacent property. Slips also occurred in Lydia Street and on Arnotts Hill. At the Liverpool No. 3 Mine a slip badly damaged a conveyor belt (G.E.S. 26/04/1966).

The Buller River was flowing at 4.5m/s and 2.7m above normal level but no flood damage was reported. A slip closed the Buller Gorge rail line near Rahui.

On the 27th, water was still lying in some Greymouth streets. Damage was in excess of £1000 (G.E.S. 27/04/1966).

2 - 3 NOVEMBER 1966

Greymouth and Cobden suffered from surface flooding on the 2nd after 37mm of rain was recorded at Karoro in twenty-four hours. No damage was reported in Greymouth but a bridge over Duck Creek at the main Upper Kokatahi highway subsided because of the swell in the creek. Some county roads were scoured and storm drains at Waitaha overflowed, causing flooding in that area (G.E.S. 03/11/1966).

On the 3rd, a 2.5m/s flow was recorded in the Grey River. The Hokitika and many other rivers were in a state of fresh. The only damage reported was the slumping of the rockwork on the Kokatahi River and a few minor slips on the road at Franz Josef (G.E.S. 04/11/1966).

18 NOVEMBER 1966

Despite heavy rain for a week the Grey River rose to only moderate fresh levels, flowing at 2m/s. No damage was reported (G.E.S. 21/11/1966).

30 NOVEMBER - 1 DECEMBER 1966

An overnight deluge blocked the Midland Railway and State Highway 73. The main problem area was at Rocky Creek between Aickens and Jacksons. A lake at the top of the hill from where the creek originates overflowed and spilled down the hillside, swell Rocky Creek and causing it's banks to burst. The rail bridge across the creek was completely submerged and scoured and the road bridge approaches were washed away. The problem according to a retired engine driver is "...the flow of water down the hillside sweeps all rock and rubble before it and instead of taking the normal channel under the road and rail bridges it banks up behind the bridges blocking the passage way. This in turn, forces the water to go over the top, flooding the bridges". All trains and rail cars were cancelled and the road was closed because of 60cm of floodwater across it at Nellie's Creek and slips between Rocky Creek and Otira (G.E.S. 01/12/1966).

24 - 25 JANUARY 1967

Extremely heavy rain fell for three days bringing all rivers south of the Grey into flood. In seventy-two hours to 9.00 a.m. on the 25th, daily rainfall recordings for Paringa were 187mm, 83mm and 258mm respectively. In twenty-four hours to 9.00 a.m. on the 25th, Fox received 136mm of rain and Harihari 145mm.

Thousands of pounds worth of damage resulted. The Bailey Bridge over Douglas Creek was damaged and the Fox River Bridge (South Westland) was closed as the hangers became unsafe. Many culverts and fords were badly damaged in South Westland and the highway at Boulder Creek was closed because of floodwaters. At the Waiho River about 320m of stopbank was washed away and a large slip of about 1500 cubic metres blocked the main highway south of the Whataroa River Bridge.

The Grey River flooded low lying land at Matai, Ahaura and Totara Flat, although no damage was reported from these areas. However, a Bailey Bridge at Mossey Creek was damaged. Some flooding of the railway occurred at Camp Creek and a slip blocked the line at Rewanui. In Greymouth Sawyers Creek burst its banks and flooded some Marlborough Street and Marsden Road properties (G.E.S. 25/01/1967).

30 JANUARY 1967

State Highway 6 was closed for the second time in a week after 165mm of rain fell in twenty-four hours to 9.00 a.m. on the 30th at Haast.

At Moeraki Bluff between Paringa and Moeraki, debris and gravel spilled out onto the highway causing blockages. At Boulder Creek water diverted by debris and rocks flowed down a channel further to the north which cut across the main road.

A bridge at Mossey Creek was completely washed away (G.E.S. 30/01/1967).

15 - 16 FEBRUARY 1967

Minor damage occurred to several roads throughout Westland after a night of moderate rainfall. In the twenty-four hours to 9.00 a.m. on the 16th, 36mm of rain was recorded at Karoro.

A slip in the Weheka Hills near the Waikukupa River Bridge blocked the Haast Highway, but it only took one hour for workmen to clear the debris. The Otira Gorge was cut by a slip at Deception Point and Kelly's Creek. The Upper Buller Gorge was also closed for a short period between Inangahua Junction and Murchison. The Kumara-Mitchells road was closed by scouring.

South Westland streams and rivers rose quite rapidly although no damage was reported. The Wanganui River and Poerua were reasonably high and the Waitaha River was in "decent flood". The Grey River was flowing a 2 m/s (G.E.S. 16/02/1967).

10 - 12 MARCH 1967

Storm conditions brought heavy rain to a widespread area of the West Coast. In the twenty-four hours to 9.00 a.m. on the 11th, Blackball recorded 175mm of rain, Hokitika registered 166mm in forty-eight hours and Greymouth 41mm in one hour.

The Hokitika River had its worst flood for nine years as the river ran bank high and many low lying areas were flooded. However, this was mainly surface flooding. The Hokitika River broke its banks in the Lower Kokatahi area and access to the farming district was cut. The Hokitika-Ross railcar was stopped because of floodwaters and the highway from Kaniere had water over it for 3km (G.E.S. 11/03/1967). A number of cattle drowned in the swollen rivers, especially the Hokitika. The Kokatahi River was at its highest since 1935 and river waters entered several homes at Lower Kokatahi - the first time in living memory.

The Waitangi-taona river overtopped and breached a stopbank just downstream of the State Highway Bridge (McKie et.al.1983). "In doing so, the river changed from one side of its alluvial fan to the other, and took a radically different course to the sea, via Lake Wahapo (6km away), Zalas Creek, Okarito River and the Okarito Lagoon, on the way it flowed through a flourishing stand of Kahikatea, killing a large number of trees by raising the water table around their roots, covering the forest floor with gravel, and developing new channels through the stand; It changed Lake Wahapo from a clear to a turbid lake, while the greatly increased outflow from the lake began seriously to erode the river bank, along which the main road ran, at the point where it joins Zalas Creek" (Soons, 1982). The main Haast highway was closed at Havelock's Creek, as the creek flooded the road. In this area 203mm of rain fell in the twenty-four hours to 9.00 a.m. on the 9th (G.E.S 09/03/1967).

The Grey River was 45cm from the wharf top and damaged the wharf in several places. Shoaling in the Grey River meant the loss of months of dredging work and the Blaketown Lagoon overflowed onto Airport Road and onto the airport itself (G.E.S. 13/03/1967). Severe surface flooding occurred in Greymouth and Sawyers Creek lapped the backs of houses on low lying land. At Redjacks houses were also surrounded by floodwaters (G.E.S. 11/03/1967), and the whole of the Coal Creek Flat was flooded (G.E.S. 14/03/1967). The Ahaura River reached a record level of 7.4m (G.E.S. 23/10/1968).

In many places road and rail links were cut by floodwaters and washouts. The Otira Gorge was closed due to flooding at Harris's Swamp and scouring in several other places. The Upper and Lower Buller Gorges were also blocked temporarily due to slips (G.E.S. 11/03/1967).

Note: The heavy rains between late January and early March made major changes to the river beds of the Fox and Franz Josef Glaciers. The chief park ranger of the time (G.E. Nicholls) noted "at Franz the whole river bed has been raised throughout a great part of it's length, even down past the main Waiho traffic bridge". Measurements made by W. Sara of the Geology Division, D.S.I.R. showed "the rise is in excess of 100 feet (30m) near the terminal face and in excess of 50 feet (15m) in the area where once 50 steps went up to the rock formation" (G.E.S. 10/03/1967).

24 MARCH 1967

Sixteen people of the West Coast Alpine Club were stranded on their way to Welcome Flat (up the Copeland River Valley), when they were caught between two streams which rose very quickly after heavy rain. Although they had to spend the night in the open, no harm was done (G.E.S. 31/03/1967).

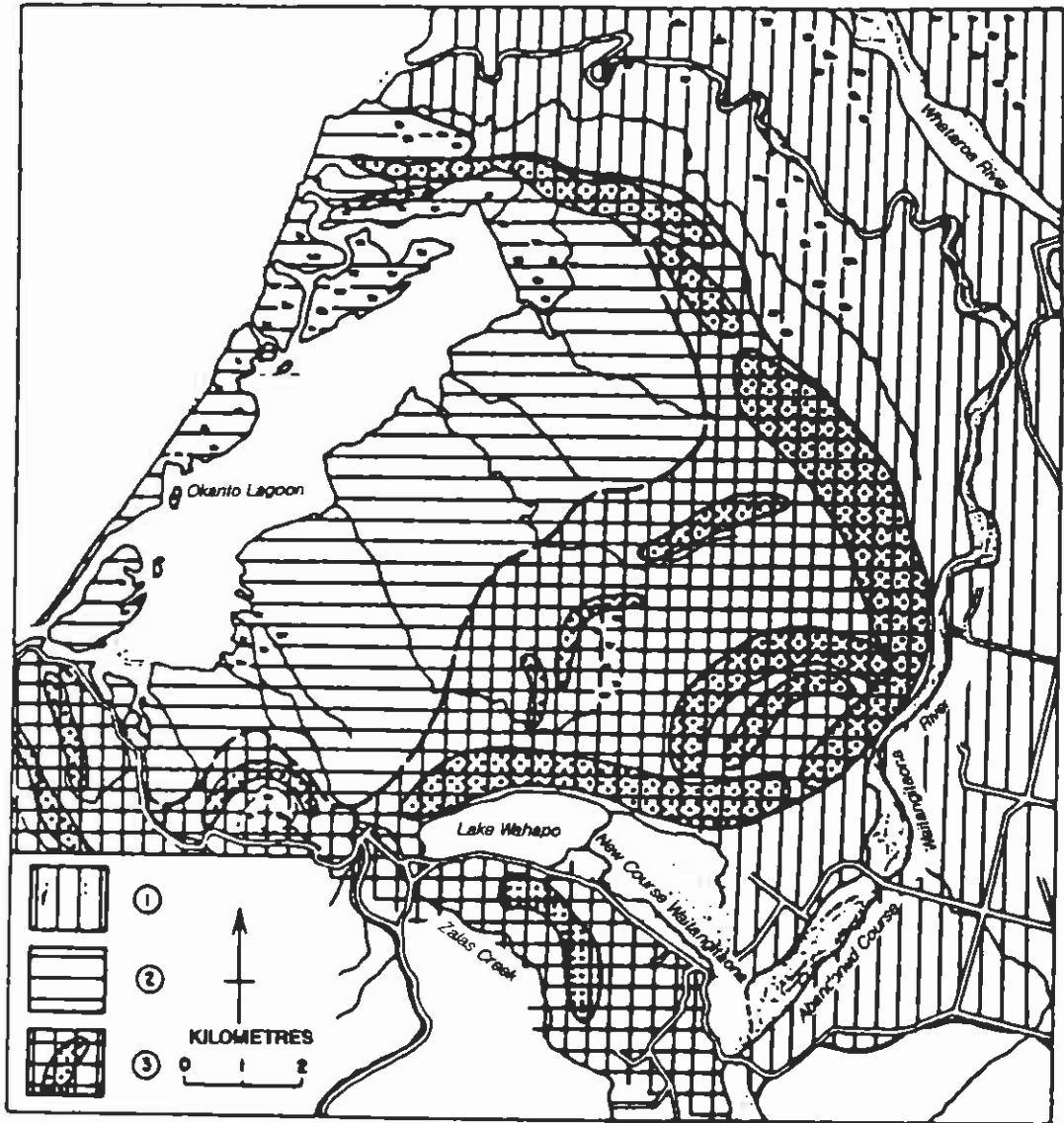


FIGURE 3. WAITANGI-TAONA RIVER DIVERSION, MARCH 1967.

1. Recent river gravels.
2. Beach and Lagoonal deposits.
3. Glacial deposits, mainly marine. Individual moraine ridges indicated by dotted areas.

(Soons 1982).

Diagram used with permission from J. Soons and Longman Paul Ltd.

1 - 2 APRIL 1967

Heavy rain caused the closure of the Upper Buller Gorge road in the Newton's Flat vicinity on the 1st and 2nd. Minor washouts occurred on other roads. The railway between Fairdown and Birchfield had several sections washed out; 19km from Westport water cut a trench 2m deep by 36m wide. This was the worst flood damage on the Buller-Seddonville line for a number of years (The Press 03/04/1967).

7 - 9 APRIL 1967

Heavy rain over much of the West Coast brought most rivers to high flood levels, particularly in South Westland. In the twenty-four hours to 9.00 a.m. on the 8th, 118mm of rain was recorded at Greymouth (G.E.S. 08/04/1967), 114mm at Hokitika, 172mm at Harihari and 171mm at Kaniere. Of the Kaniere total 104mm fell in the last twelve hours (G.E.S. 10/04/1967).

On the 7th the road between Mitchells and Kumara was closed for a short period because of slips and the approaches to the new bridge over Arnold Creek at Kokiri were very soft. A small slip also fell on the Coast Road near the Fox River but the road remained open to traffic (G.E.S. 08/04/1967).

Near Whataroa, the Waitangi-taona River burst temporary stopbanks and again spilled into the old flood channel leading into Okarito Lagoon. Despite this the main highway was hardly damaged and there was no interruption to traffic. However, State Highway 6 was closed for a short period on the 9th when the Tatare River near Franz Josef spilled across the road about 400m south of the bridge. The Waiho River scheme being constructed at the time was badly damaged as the river burst through a guide bank and through the newly constructed stopbank. The Kokatahi area was flooded, when the Kokatahi River breached a stopbank at Lake Arthur.

Minor slips occurred in the Buller and Otira Gorges without disrupting traffic flows (G.E.S. 10/04/1967). Some scouring of the railway occurred between Greymouth and Otira although little damage was reported. Rivers dropped rapidly on the cessation of rain (The Press 10/04/1967).

26 - 27 APRIL 1967

Stormy weather prevailed for a week bringing widespread flooding to Buller and Westland on the 26th. The Waitangi-taona River was in high flood which raised the level of Lake Wahapo. The lake overflowed at its northern end and flooded State Highway 6 to a depth of about 1m closing the road. The road was also closed by slips at Clarke's Bluff further south, and the high level of the Haast River blocked the road between Haast Junction and Haast Township.

At Ruby Creek between Taylorville and Blackball, the bridge approaches were washed out (G.E.S. 26/04/1967), and the Otira Gorge route was closed by flooding at Turiwhate, Harris's Hob, Lake Misery, on the gorge road itself and between Graney's Creek and Bealy on the Canterbury side. The Lewis Pass road was blocked by a large slip near the summit and a series of slips closed the railway between Tiriroa and Rahui and between Westport and Inangahua Junction. Flooding also occurred around the Inangahua-Rotokohu area. The Midland Railway was closed because of flooding and scouring at Poerua and slips at Deception Point, and all air services were completely disrupted.

By the 27th most roads were re-opened although State Highway 6 was still blocked by a slip at Solitude Stream between Haast township and the Pass (G.E.S. 27/04/1967). Toll links to Christchurch were cut when a tree fell across the lines at Kumara (G.E.S. 26/04/1967).

5 - 11 MAY 1967

All highways in Buller and Westland remained open after several days of heavy rain. However, some surface flooding did occur at Hector and the roads of the Buller Gorge, Rahu Saddle and Coast Road were muddy. The Grey River was in fresh, flowing at 3 m/s (G.E.S. 11/05/1967).

23 MAY 1967

A small washout of the railway embankment occurred in the Buller Gorge after several days of rain, but rail services maintained a normal schedule (G.E.S. 24/05/1967).

Note: For most of May the Grey River was in a state of minor fresh - velocities between 2 - 4 m/s were regularly recorded.

24 - 25 JUNE 1967

Rain over the weekend caused a fresh to run in the Grey River. It was hoped that the fresh would scour the bar at the mouth which was shallow at the time, but this did not happen. No damage was reported (G.E.S. 27/06/1967).

2 - 4 JULY 1967

A long dry period was broken by a storm which brought severe flooding to South Westland. In the twenty-two hours to 9.00 a.m. on the 3rd, 254mm of rain was recorded at Franz Josef, 41mm of rain was recorded in Greymouth (G.E.S. 03/07/1967), and 76mm was registered at Inangahua in twenty four hours (G.E.S. 04/07/1967).

State Highway 6, 11km south of Whataroa, was closed as about 60cm of water covered the road; the Waitangi-taona River, flowing into Lake Wahapo since the March 1967 flood, overflowed onto the road and the river itself also flooded the road at another point. At the latter site the road was badly scoured. About £800 worth of damage was done to the Amethyst Power Board's facilities (G.E.S. 04/07/1967). Over 1km of power lines situated in the Waitangi-taona River bed were washed away and the power house on Amethyst Creek was undermined (G.E.S. 03/07/1967). The powerhouse was isolated as the 12m long access bridge at Okarito Forks was washed away at 5.45 p.m. on the 2nd. Power was cut between the forks and Docherty's Creek, a distance of 24km (G.E.S. 04/07/1967). A family were stranded in their house at Okarito Forks for a number of days as they used the same access bridge as the power house - a wire cable had to be strung across the Okarito River to provide the family with essential supplies. A farm adjacent to the Whataroa River was severely affected by the flooding. About 162 hectares out of 178 hectares was submerged. Gravel covered many of the paddocks to a depth of 1.8m. The river had taken a new channel across the farm and cut rapidly into the newly formed section of State Highway 6 (G.E.S. 05/07/1967).

In North Westland and Buller flood damage was minimal. Apart from Sawyers Creek being high and some shallow surface flooding in the streets, there was no sign of flooding in Greymouth. A 1.5m/s velocity was recorded in the Grey River in the early morning of the 3rd and this had increased to 3m/s by 11.00 a.m. (G.E.S. 03/07/1967). A few small slips occurred in the Buller Gorge although no flooding was reported (G.E.S. 04/07/1967).

16 - 17 NOVEMBER 1967

All the Westland-Buller rivers were in moderate to high flood after twelve successive days of rain. The Buller River was worst affected running at 5660 cumecs. The Maruia River cut two large trenches in State Highway 7 between Maruia Springs and Reefton. In the Lower Buller Gorge the deck of a Bailey Bridge across the Ohikanui River was 1.2m underwater for several hours and State Highway 6 at Lake Wahapo was covered by 1.5m of water. At Dobson the Grey River was 3.6m above normal level. Little damage was done although telecommunications were cut by a slip at Deception Bend. Greymouth had received 222mm of rain in twelve days (G.E.S. 17/11/1967).

17 - 18 JANUARY 1968

During the night of the 17th 54mm of rain was recorded at Greymouth, and the Grey River rose 3.6m. However, only minor surface flooding occurred and numerous minor slips closed the Brunner-Blackball Road for a couple of days. Also closed were the Arnold-Stillwater railway and the Rewanui Incline (G.E.S. 18/01/1968).

8 - 10 FEBRUARY 1968

After a number of days of heavy rain the Grey River rose in a "flash flood" on the 9th. The centre pier of the Blackball Bridge was moved 1.2m downstream thus closing the bridge to all traffic. A number of stock were also lost in the area.

In the Buller district 42mm of rain fell in the twenty-four hours to 9.00 a.m. on the 9th, causing flooding in the Karamea, Hector and Seddonville areas which disrupted road traffic. The Mokihinui River was in its highest flood for a number of years, reaching 1.5m from the bridge level before it broke its banks and spread over nearby properties. Seddonville was cut from the main highway for a number of hours when a road near the township was heavily flooded. At Little Wanganui near Karamea the road was submerged up to 60cm deep, and Westport's water supply was cut because of silting in the reservoir (G.E.S. 10/01/1968). The bridge over Dirty Mary Creek collapsed on the night of the 8th and piles were scoured at the Mai Mai Creek Bridge (G.E.S. 08/02/1968).

29 FEBRUARY 1968

Heavy rain during the night caused surface flooding and scouring in several places. No damage was reported from Greymouth, Westport or Hokitika, but near Mitchells a large slip and several washouts blocked the road. The old Waitangi-taona River bridge lost three 18.5m spans and bridge approaches at McCullochs Creek near Whataroa were washed out. The rail embankment was scoured between Jacksons and Aickens and several slips blocked the line at other places. Rail bridge approaches were scoured at the Poerua/Rotomanu area and the track itself was scoured between Rotomanu and Te Kinga (G.E.S. 29/02/1968).

9 - 12 MARCH 1968

Strong winds with heavy rain brought some surface flooding to Greymouth but caused no damage. All damage reported was due to wind (G.E.S. 09/03/1968). Minor flooding of the Grey River slowed repair work of the Blackball Bridge, and floodwaters washed away another span of the old Waitangi-taona River Bridge (G.E.S. 13/03/1968).

9 - 10 APRIL 1968

The "Wahine Storm" caused much damage to road and rail links on the West Coast. Greymouth recorded 53mm of rain in one hour. Many residents suggested the Grey River was at its highest level in memory (G.E.S. 09/04/1968). Recorded levels show the Grey River was discharging 5100 cumecs and was 5.4m above normal levels. The Hokitika River was 5.4m above normal at the Kaniere bridge and flowed at 3,030 cumecs. Sawyers Creek was at its highest level ever, at 2.9m and discharging 70 cumecs. The Mawheraiti River was also reported by residents to be at record height. The Inangahua River was in heavy flood although no damage was reported from the area. Other rivers in high flood were the Taramakau, Kaniere, Kokatahi, Waitaha and Poerua. All flooded rivers except the Inangahua damaged stopbanks and groynes (W.C.B. File 375). Four spans of the Totara bridge were washed away and residents suggested floodwaters there were the highest ever (G.E.S. 09/04/1968). Spans of the Blackball Bridge were washed away and the whole of the rail track at the end of the Kaimata tunnel fell into the Arnold River. Bridge approaches were washed out between Ahaura and Kopara and the bridge at Bell Hill was washed away completely (G.E.S. 10/04/1968). Approaches to the Canoe Creek Bridge were also washed out. Cemetery Creek and Sawyers Creek both overflowed and flooded parts of Reefton and Greymouth respectively. Greymouth, Cobden and Runanga all received severe surface flooding and slipping. The Denniston Escarpment Mine was badly damaged by a creek bursting its banks and flowing into the mine (G.E.S. 09/05/1968). The Brighton Coal Mine was written off as water and silt swept away all the surface buildings and plant equipment. New road seal at Dobson was destroyed by upwelling from an underground stream.

Although most of the major rivers caused relatively little damage, Ahaura and Totara Flat were severely inundated by the Grey River. The railway in this area was damaged severely by slips (G.E.S. 10/04/1968).

6 MAY 1968

Surface flooding occurred in the Greymouth area as the result of heavy rain produced by a thunder storm. In twenty-four hours, Karoro received 29mm of rain and Greymouth Harbour recorded 31mm.

Slips produced by the April storm were re-activated, one which blocked the Cobden Railway line. Little damage was reported (G.E.S. 06/05/1968).

24 - 25 MAY 1968

The upper Buller River rose considerably after it was blocked by a huge slip triggered by the Inangahua Earthquake. The rock avalanche blocked the river 3km upstream of Lyell. Material on the south bank was brought down from a height of over 600m and was carried about 50m up the north bank.

The river backed up and formed a lake behind the dam, until it eventually broke through. Reports from the Ministry of Works indicated that the river was blocked from 4.30 p.m. on the 24th until 1.00 a.m. on the 25th (Adams, et. al. 1968).

11 - 13 AUGUST 1968

When heavy rain commenced on the night of the 11th, rivers throughout Buller and Westland began to rise and roads were closed because of flooding and slips. The Upper and Lower Buller Gorges were closed because of slips, and State Highway 6 was closed to light traffic when Lake Wahapo overflowed. A number of slips also occurred in the area but these did not block the road. Surface flooding also occurred on a number of county roads throughout the district. In Greymouth drains and smaller creeks backed up onto a number of properties although no damage was reported.

In the twenty-four hours to 9.00 a.m. on the 12th, 69mm of rain was recorded at Greymouth. The Grey peaked later in the day, flowing at 2.25m/s (G.E.S. 12/08/1968), but dropped quite rapidly to a 1m/s velocity by early morning on the 13th (G.E.S. 13/08/1968).

22 - 23 OCTOBER 1968

A north-west storm brought heavy rain to most of the West Coast. Rivers rose to high levels with the Mawheraiti at Ikamatua rising 2.1m above normal, and the Ahaura River approached its 7.4m record level set in March 1967. The Hokitika River was in high flood and parts of Hokitika's business district and lower lying streets were flooded by surface water. Minor slips occurred on road and rail links but these were cleared quickly (G.E.S. 23/10/1968).

A "cloudburst" over the Cascade Mine caused ground shattered by the Inangahua Earthquake to slump and block Cascade Creek; water backed up and flooded the mine causing about \$20000 worth of damage. Bins, a compressor, electric pumps and other equipment was lost (G.E.S. 24/10/1968).

In the twenty-four hours to 9.00 a.m. on the 23rd, the following rainfall recordings were made: Greymouth 51mm, Otira 201mm, Hokitika 88mm, Milford Sound 220mm. From the Greymouth total, 33mm fell in two hours and from the Hokitika total, 58mm fell in three hours (G.E.S. 23/10/1968).

28 - 30 OCTOBER 1968

The second peak in a week of stormy weather occurred as the Grey River had been running bank to bank or overflowing its banks since the 23rd (G.E.S. 28/10/1968). At Dobson the river was 5.6m above normal and was only a "few feet" below the Dobson memorial on the island between Dobson and Taylorville. The Omoto Racecourse was flooded to the extent that tops of the power poles were only 1.5m above the water. Houses at Ikamatua and Ahaura were flooded as the Big Grey held its peak for a number of hours and lower parts of Greymouth were affected by surface flooding.

Only the Coast Road to Greymouth remained open out of Westport as all others were closed because of flooding or slipping. The Upper and Lower Buller Gorges were closed as water covered the road. At Fenwick's the road was covered with about 2m of water. Rail and road links throughout the area were also cut by flood waters and slips. At their peaks, both the Buller and Grey Rivers were running at 5m/s (G.E.S. 30/10/1968). The most inconvenient damage during the storm was to telecommunication links, done by high winds and not flood waters.

8 NOVEMBER 1968

Heavy rain produced surface flooding over a wide area. During the night Hokitika received 76mm of rain and winds up to 65 km/h.

The southern approach to the Ford Creek Bridge just south of Blackball was washed out cutting off access to the township except via Ikamatua. On the Otira highway water was up to the road at Harris's Swamp and in Greymouth water was over the footpath at Whall Street and at the Sawyers Creek end of Shakespeare Street. Surface flooding due to stormwater backup occurred in Leonard Street and on the town side of the Cobden Bridge (G.E.S. 08/11/1968). Minor damage was reported to river protection works from a number of areas (W.C.B. File 375). In the Fairdown and Granity areas a number of creeks overflowed onto the road and railway although they remained open (W.C.B. photographs).

25 DECEMBER 1968

Floodwaters washed out 80m of recently constructed stopbank on the Little Man River (Dry Creek), exposing a house and State Highway 6 to flood waters. No other damage was reported (W.C.B. File 375).

13 APRIL 1969

Inchbonnie received 168mm of rain in twenty-four hours causing the Grey River to rise 5.8m above normal at Dobson. Flooding at the Stillwater Creek Bridge closed the State Highway 7 and other county roads were also closed due to flooding and slips. Surface flooding occurred in Greymouth but no damage was reported. Further up the valley some cattle were washed away and minor damage occurred to river protection works. The most serious damage reported was that of a 90m section of the newly constructed Blackball foot bridge being washed away on the Ngahere side (G.E.S. 14/04/1969).

The Inangahua River rose 3.9m above normal which was considered to be the largest flood for many years although no damage was reported (W.C.B. File 375).

15 - 16 JUNE 1969

Stormy conditions covered much of the West Coast. Heavy rain fell in South Westland whilst in North Westland snow and hail prevailed. The Grey River was running a decent fresh and flowing at 2m/s. Slips occurred on the Blackball-Taylorville Road and deep snow settled on the Lewis, Arthurs and Haast Passes, although all roads remained open (G.E.S. 16/06/1969).

6 - 8 SEPTEMBER 1969

Gale force winds and driving rain struck Westland on the 6th. In South Westland the storm was considered the heaviest since 1958. Harihari recorded 267mm of rain in just over twenty-two hours, and Fox Glacier and Franz Josef recorded 297mm and 341mm of rain respectively in twenty-four hours. A further indication of the rainfall can be gained from the following data from the Rapid Creek (Hokitika River tributary) Lambrecht - the check gauge overflowed.

Table 2. Rainfall Intensities at Rapid Creek.

Rainfall (mm)	Time Period
9.4	10 minutes
33.7	1 hour
66.4	2 hours
180.6	6 hours
321.9	12 hours
547.2	24 hours
847.1	2 days
963.7	3 days
1042.7	4 days

(M.W.D. 1969).

All rivers were in high flood - there was a 4.5m/s flow in the Grey River and an 5.5m/s flow in the Buller River. The Inangahua River was only about 30cm from the road in many places (G.E.S. 08/09/1969). The Hokitika River breached its banks near Grove Swamp and flooded Mirror Creek. This cut through "Remarkable Gap" to Lake Mahinapua and on the way completely flooded the road 16km south of Hokitika, cutting a gap 30m wide and 3m to 4.5m deep. Lake Mahinapua rose about 2.4m (G.E.S. 09/09/1969). At the junction of the Hokitika and Whitcombe Rivers a major slip covered the water level recorder site, at one stage completely damming the river (M.W.D. 1969).

The Taramakau River was very high and washed away several whitebaiter's huts along its southern bank as well as some nets and at least one rowing boat. Many roads were closed right throughout Westland due to flooding and slips (G.E.S. 09/09/1969).

22 JANUARY 1970

Torrential rain in many parts of Westland caused rivers to rise although little damage was reported. Rainfall recordings for the twenty-four hour period to 9.00 a.m. on the 22nd were: Hokitika 75mm, Otira 174mm, Franz Josef 197mm, Haast 30mm.

Low lying parts of the Hokitika Central Business District were flooded and water over the rail lines near the station delayed train movements for a short period. The Grey River was swollen and muddy and running at 2.5m/s. Many creeks rose rapidly. Much surface flooding was reported from Greymouth and the Grey Valley, and Coal Creek was in high flood (G.E.S. 23/01/1970). The Camelback groyne which forms an integral part of the Hokitika River-Kowhitirangi Flood Control Scheme was badly damaged as 100m of bank was washed away by the Hokitika River. Flood damage was also reported to protection works at the Poerua and Little Man Rivers (W.C.B. File 375).

6 - 7 MARCH 1970

Heavy rain and swollen rivers in South Westland caused moderate damage to river protection works on the Totara, Waitaha and Arahura Rivers (W.C.B. File 375). Flood damage was not reported from elsewhere.

9 - 10 MARCH 1970

Minor flooding occurred in the Grey and Buller Rivers. The Grey River was running at 2.5m/s. Sawyers Creek was high on the 9th and approaches to the new Preston Road Bridge were severely scoured. In the Lower Buller Gorge scouring halted traffic as did slips in the Upper Buller Gorge (G.E.S. 10/03/1970).

28 - 31 AUGUST 1970

A north-easterly storm affected the whole area from Nelson to Fiordland. Winds gusted up to 112 km/h and heavy rain fell for a number of days causing widespread flooding. The Grey River peaked on the 31st at 6.4m and flowed at 4,820 cumecs (W.C.B. data) causing the most serious flooding since 1936. In the preceding six days 152mm of rain fell in the Grey Catchment area (G.E.S. 31/08/1970).

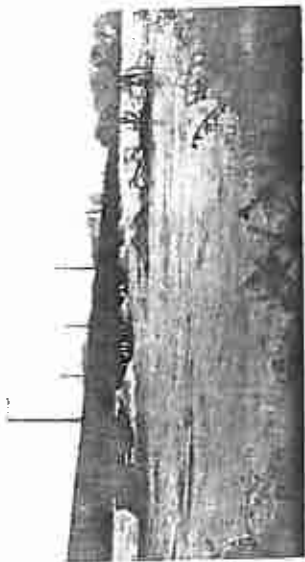
In Blaketown and Cobden the extent of flooding was similar to that of 1936 where flood levels were controlled by backwater from the lagoons and many homes were flooded. In the central business district of Greymouth flood levels were considerably lower than 1936 probably because of the railway embankment acting as a stopbank. This bank was grouted in 1936. Sandbagging along the wharf between the Commercial and Richmond Hotels also helped keep flood levels reduced (W.C.B. File 375).

Transport links with Greymouth were cut completely. The Stillwater Creek Bridge was totally submerged and water lay over 1m deep on parts of the road. At Wingham Park the road was blocked by deep water as was State Highway 73 at Harris's Swamp. Rail links to Greymouth were blocked by slips at Otira, Aickens Railway Station and between Greymouth and Westport. Floodwaters from the Taramakau River also blocked the Otira line (G.E.S. 31/08/1970).

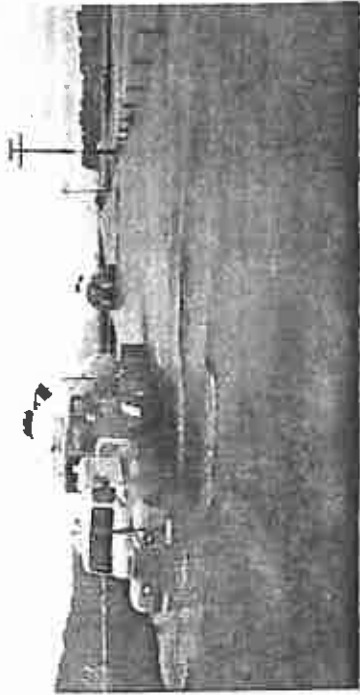
The Buller River rose to reach the top of the arch at Hawkes Crag but this was about 2.7m lower than the 1926 flood. At Berlins the water line was about 2.5m below the level of the road which was also about 2.7m lower than 1926 (W.C.B. File 375). A discharge of 8497 cumecs flowed down the Buller at Te Kuha (W.C.B. data), and about 140 cumecs flowed down the Orowaiti overflow to the north of Westport. This overflow saved the town from serious damage. At Te Kuha the Buller rose 11m (W.C.B. File 375). Transport links to Westport were limited. The Upper and Lower Buller Gorges were cut by flood waters and slips, as was the Westport-Airport-Cape Foulwind Road. The most serious problem in the district was the washout of the Waimea Bridge in the Karamea area, this isolating Karamea for some time.

The Inangahua River was in high flood and broke its banks at Perseverance Bridge. From the bridge right down to Rotokohu the right bank area was flooded from the river to the railway embankment (i.e. State Highway 6 was flooded). Flood waters backed up through the railway and flooded down the east side of the rail embankment and came out at the first bridge north of Landing Creek. Return flow damaged the downstream shoulder of the main highway. At Black's Point the river peaked at 3.2m. In Reefton several houses had to be evacuated. The Maruia River, in major flood, suffered much erosion to the banks along its length, but little damage was reported to river works although some repairs were necessary (W.C.B. File 375).

At Hokitika 122mm of rain fell in forty-eight hours bringing the Hokitika River into high flood, resulting in lower parts of the town being flooded although no serious damage was reported (G.E.S. 31/08/1970).



a) Buller Bridge, Looking Downstream.
(Morrel, ?.)



b) Carters Beach Road, Looking North From The Buller Bridge.
(Howard, ?.)



c) Colvin Street.
(Morrel, ?.)



d) Kawatiri Airport, Looking North.
(M.W.D.)

17 SEPTEMBER 1970

Heavy rain associated with northerly winds flooded most West Coast rivers to similar levels attained during the August flood.

At Dobson, the Grey River peaked at 6m on the gauge - 5m above normal (W.C.B. file 375) and at 4127 cumecs (W.C.B. data). In Greymouth, the flood peak coincided with the high tide, and the lower part of the town was again flooded extensively as the river level was 30cm higher than the top of the wharf. In the Grey Valley, the Ahaura river rose to 6.9m at the State Highway 7 Bridge (compared to 7.1m on 31/08/1970), the Big Grey River at the State Highway 7 Bridge rose to 1.9m (same as 31/08/1970) and the Mawheraiti River peaked at 2.2m (compared to 2.7m on 31/08/1970). Damage was more widespread in September, being aggravated by the breaching of protection works by the August flood (W.C.B. file 375). State Highway 7 at Stillwater was flooded to a depth level with the top of the handrails on the Stillwater Creek Bridge, and the Stillwater-Moana Road was extensively flooded, as were roads around Mitchells. Deep flooding also occurred on State Highway 6 at Wingham Park (G.E.S. 17/09/1970). The major hook groyne at Atarau was breached and required about 9200 cubic metre of rock to be replaced. A small stopbank on the Ahaura River was also breached (G.E.S. 18/09/1970).

In South Westland, major damage occurred to the Harihari Flat Protection Scheme. Over 160m of the stopbank on the Wanganui River was breached, near the downstream end of the scheme. Floodwaters covered a large area of farmland before returning to the river channel via La Fontaine stream (W.C.B. file 375). Many lambs were lost in this area as well as in other parts of South Westland (G.E.S. 17/09/1970).

The Buller River continued to attack protection works at Organ's Island so that Westport was left open to major flooding (W.C.B. file 375), and the Lower Buller Gorge road was closed because of flooding and slips (G.E.S. 17/09/1970). The Inangahua River again overflowed at Perseverance Bridge, enlarging the flood channel and thereafter permanently flowing down it (W.C.B. file 375).

Deep water blocked the highway to Otira at Harris's Swamp and most other major highways were also affected by flooding and slipping (G.E.S. 17/09/1970). Moderate to major damage to river protection works was widespread in both the August and September floods (W.C.B. file 375).

30 OCTOBER 1970

After a night of heavy rain minor surface flooding occurred on the Kaiata straight, at Omoto and some flooding of paddocks at Coal Creek happened. In Cobden, lower Richmond Street was flooded to a depth of up to 30cm. In the twenty-four hours to 9.00 a.m. 39mm of rain was recorded at Greymouth (G.E.S. 30/10/1970).

13 APRIL 1971

After a prolonged period of drought conditions 108mm of rain fell in the twenty-four hour period to 9.00 a.m. at Greymouth and 38mm fell at Inangahua.

In Greymouth two businesses were flooded by surface water backing up through the drains - one was in Guinness Street and the other was near the Boundary Street round-about. Deep scouring of the road occurred on Freyberg Terrace and minor street scouring was reported at Karoro. The Grey River was in minor fresh (G.E.S. 13/04/1971).

13 - 14 MAY 1971

The only inconvenience caused after a night of heavy rain was that the Grey River rose and hindered the drilling project for the new Cobden Bridge piles - the river was too swift for the drilling barge to stay steady (G.E.S. 14/05/1971). In the twenty-four hours to 9.00 a.m. 56mm of rain was registered at Greymouth, 127mm at Franz Josef and 13mm at Reefton (G.E.S. 13/05/1971).

31 MAY 1971

Sawyer's Creek in Greymouth was running high and a large quantity of surface water lay around town after a night of heavy rain. The following rainfall recordings were made in the twenty four hours to 9.00 a.m.: Greymouth 38mm, Hokitika 31mm and Otira 56mm (G.E.S. 31/05/1971).

31 AUGUST 1971 - 1ST SEPTEMBER 1971

The Grey River attained a high level and was very dirty after heavy rain, snow, and high winds overnight covered much of the West Coast. No flood damage was reported, but the wind brought down power lines and trees in many places. About 30cm of snow fell on the Otira Gorge and Porter's Pass, and about 20cm fell on the Lewis Pass (G.E.S. 01/09/1971).

5 SEPTEMBER 1971

The Grey River was flowing at over 5 m/s which was the fastest for nearly a year. The Greymouth bar was well scoured. No damage was reported (G.E.S. 09/09/1971).

2 - 3 OCTOBER 1971

Moderate flooding occurred throughout the West Coast with Buller being affected the most. More than 100mm of rain fell in two days in the area. The Buller River was in high flood and only took two hours to overtop a dam formed by a massive slip in the Upper Buller Gorge. Little damage was done when water finally broke through the dam, although some machinery was washed away at the Coal Creek culvert in the Lower Buller Gorge, and the Bailey Bridge at Ohika was submerged (G.E.S. 04/10/1971). Although no flow recordings were made, the Buller River was high enough to flow down the Orowaiti overflow and some minor flooding occurred on the right bank downstream of Organ's Island (W.C.B. File 375). Extensive surface flooding occurred near Reefton, on the Maruia side, and in the Buller County and Westport Borough some roads and streets were difficult to negotiate. Part of the Upper Buller Gorge road was washed away near Dublin Terrace.

At its peak the Grey River was flowing at 3.5m/s (G.E.S. 04/10/1971), 4.4m above normal and discharging 2690 cumecs (W.C.B. File 375). Some surface flooding occurred in Greymouth but little damage was reported. Damage to river protection works was reported from the Buller, Inangahua, Kaniere and Wanganui Rivers although this was generally light (W.C.B. File 375).

10 - 11 MARCH 1972

After a period of drought, moderately heavy rain fell in Westland. In the twenty-four hours to 9.00 a.m. on the 10th Karoro received 92mm of rain, Franz Josef 114mm, Haast 95mm, Hokitika 76mm and Otira 38mm (G.E.S. 11/03/1972). Moderate flooding occurred in South Westland rivers, particularly the Poerua and Wanganui Rivers. Levels in the Grey River and rivers further north were not very high. Minor damage occurred to river protection works on the Poerua River and at Three and Four Mile Creeks (W.C.B. File 375).

26 SEPTEMBER 1972

An intense electrical storm centred over Greymouth peaked at 7.00 a.m.. In the twenty-four hours to 9.00 a.m. Greymouth recorded 23mm of rain. The Grey River was in fresh, flowing at 2.5 m/s (G.E.S. 26/09/1972). At 10.00 p.m. the flow velocity peaked at 5 m/s but no damage was reported (G.E.S. 27/09/1972).

7 - 8 OCTOBER 1972

The Grey River peaked at 4,083 cumecs (W.C.B. data), and 5.8m after 325mm of rain in three days was recorded at Karoro. Flooding closed State Highway 7 between Stillwater and Coal Creek and two large slips closed the road at Upper Totara Valley and Omoto. Surface flooding occurred at Greymouth and the high level of the Hokitika River cut Hokitika's water supply from Lake Kaniere. Whitebaiters nets and some huts were washed down the Hokitika River (G.E.S. 09/10/1972).

High river levels were also recorded in the Buller, Maruia and Inangahua Rivers. Damage to river protection works was reported from the Grey, Maruia, Inangahua, Hokitika and Poerua Rivers and Doughboy Creek (W.C.B. File 375).

2 - 4 OCTOBER 1973

South Westland received the brunt of a weekend storm which covered much of the West Coast. The road to Haast was blocked between the night of the 3rd and the afternoon of the 4th because of a major slip between Grave and Breccia Creeks and a smaller slip on the Fox Road. Although surface water covered many roads, none were actually closed due to flooding. Power supplies were cut over a wide area in the south when a lightning strike knocked conductors into the swollen Mikonui River.

There was considerable rainfall in the headwaters of the Upper Grey River, although little fell in the Big Grey catchment. In Greymouth 59mm of rain was recorded in the twenty-four hours to 9.00 a.m. on the 3rd and another 38mm fell in the succeeding twenty-four hours. The Grey rose to its highest level since October 1972 late in the evening of the 3rd. At Dobson the river reached 5.2m on the gauge - 4.3m above normal. The Ahaura River rose to 6.4m above normal. No major stopbanks were breached and little damage attributable to flooding occurred (G.E.S. 05/11/1973).

6 NOVEMBER 1973

Heavy rain in South Westland caused surface flooding on some roads but none were closed. Surface flooding occurred around Harihari and on the road between the Waitangi-taona River and Lake Wahapo. There was 78mm of rain at Fox Glacier in the twenty-four hours to 9.00 a.m. on the 6th (G.E.S. 07/11/1973).

21 - 22 NOVEMBER 1973

Heavy rain over much of the West Coast caused moderate flooding in most rivers. In the twenty-four hours to 9.00 a.m. on the 21st Greymouth received 57mm of rain (G.E.S. 21/11/1973). The Grey River rose 5m above normal (G.E.S. 22/11/1973) and discharged 980 cumecs at Dobson (W.C.B. data).

Many roads and bridges in the Grey County were damaged. The access road to the new Cobden Bridge was completely washed out (G.E.S. 22/11/1973), a small bridge on the Greenstone Road was washed out, and floodwaters blocked the Arnold Valley Road and the Bell Hill-Kopara Road. Atarau Road was closed to light traffic because of scouring at the Slatey Creek Bridge and State Highway 7 between Reefton and Greymouth was closed because the approaches to Callaghans Creek Bridge were washed out. Rough River flooded the road and a number of stock were lost in the Ikamatua area. One farmer lost 150 stock (G.E.S.21/11/1973). Karamea suffered its worst flood in 40 years as floodwaters entered about 60 houses and other buildings (G.E.S. 22/11/1973). At Market Cross water was 230mm above floor level in Liedmans Garage and 350mm above floor level in the old Post Office. At the Lands and Survey bench mark in the centre of the main Karamea intersection (State Highway 6 and Wharf Road) water covered the road to a depth of 610mm (W.C.B. Level Book W18). The whole Karamea Valley floor was covered by floodwaters which were heavily silted. Silting covered most pastures and deposits affected drainage, particularly in the Arapito area. The Karamea River discharged approximately 3,680 cumecs and was considered a one in a hundred year flood (W.C.B. File 375). Seddonville and Waimarie were also flooded, and floodwaters blocked the road at Mokihinui (G.E.S. 22/11/1973). Numerous river protection works were damaged, especially in the Karamea area (W.C.B. File 375).

14 MARCH 1974

The Grey River rose slightly to low flood levels, peaking at 3,730 cumecs. (W.C.B. data). No damage was reported in North Westland or Buller as heavy rain was confined to South Westland. Minor damage occurred there; a culvert on the Paringa River was washed out and some scouring occurred at Doughboy Creek. Water was waist deep in the Jacobs Creek church (G.E.S. 15/03/1974). The Haast River peaked at 4615 cumecs on the 15th (W.C.B. Data), which equated to just under a ten year return flood (Stocker 1990).

4 - 5 APRIL 1974

After two days of heavy rain the Grey River rose 2.5m at Dobson. Work on the new Cobden Bridge was hindered as some equipment was lost and the causeway damaged. A pile was also washed away from under a Bailey Bridge on the site.

Heavy surface flooding occurred in Greymouth and Hokitika. In Cobden a school had to be closed for the day because of the water. A creek swelled and flowed through a house at Karoro and streets in Hokitika's business district were closed because of surface water. The road at Totara River near Ross was also closed. No serious damage was reported (G.E.S. 05/04/1974). Moderate damage occurred to protection works on the Arahura and Taramakau Rivers (W.C.B. File 375)

14 - 15 APRIL 1974

A torrential but short-lived rainstorm covered most of Westland and Buller causing serious flooding and slipping over much of the area. Reefton was worst affected with water entering houses and shops and vast amounts of silt were deposited. The Perseverance Bridge lost a 24m long section and Reefton's water, power and telephone lines were damaged.

Eight washouts occurred on the Midland Railway between Dobson and Stillwater, and trains too and from the Rewanui Mine were halted as a culvert under the line was washed out. The Grey River peaked 4.7m above normal but most damage to river protection works occurred in the Taramakau Valley where strong-heads and groynes were damaged.



a) Looking West, School In Upper Centre.
(W.C.B.).



b) Looking South Over Market Cross.
(W.C.B.).

Greymouth streets had to be hosed down to remove silt left by the wash-back of the flooded river, and Range Creek in Cobden was one of the worst affected areas in the Grey Borough as it flooded properties and scoured footpaths. In Runanga water flowed through two houses and through Dunollie Hotel. Slips were widespread and three people died as they were caught in a mud-slide near the Lewis Pass (G.E.S. 16/04/1974).

24 - 30 JUNE 1974

A violent electrical storm cut telephones and television transmitters over much of the West Coast (G.E.S. 24-30/06/1974). Moderate flood damage was reported from the Mt. Diedrichs Farm Settlement where outfalls were damaged (W.C.B. File 375).

19 - 24 JULY 1974

Another bout of electrical storm activity again cut telecommunication links and rail and power services. In the Upper Buller Gorge traffic was reduced to one lane as a massive slip covered the road at Wales Creek, and at Stillwater two power poles were washed out (G.E.S. 22-24/07/1974). More flood damage was done to the outfalls at Mt. Diedrichs Farm Settlement resulting in the need to replace 150 cubic metres of rock (W.C.B. File 375).

8 - 9 OCTOBER 1974

Greymouth received over 100mm of rain in the twenty-four hours to 9.00 a.m. on the 9th, with the Grey River peaking at 3.9m at Dobson. Low lying areas of Leonard and Williams Street were flooded but no damage was reported (G.E.S. 09/10/1974). Some river protection works in the Grey County were lightly to moderately damaged (W.C.B. File 375).

14 - 15 NOVEMBER 1974

The Grey River rose 3.8m above normal just after 8.00 a.m. as moderate rainfall fell throughout the night. Greymouth received 69mm of rain in the twenty-four hours to 9.00 a.m. on the 15th. The Westland Catchment Board advised farmers to move stock from low land as it expected over 100mm of rain in twenty-four hours (G.E.S. 15/11/1974), but this did not eventuate.

24 FEBRUARY 1975

Access to the Fox Glacier was cut when a bridge over Hendes Creek was washed away. Heavy rain over two days caused slips to come down in the Weheka Hills between Franz Josef and Fox Glacier during the night. At Chesterfield, south of Kumara Junction, a culvert was partially scoured out (G.E.S. 24/02/1975).

29 - 31 MARCH 1975

Landslips and bridge breaks cut communications in numerous places after torrential rain in the mountains swelled creeks and rivers. Westport was the worst hit of the major areas, recording 80mm of rain and 80km/h winds during the twenty-four hours to 9.00 a.m. on the 31st. In the same period the Lower Buller Gorge received 130mm of rain and Greymouth 108mm from Saturday 29th to Monday 31st morning.

The Lower Buller Gorge road was covered by many slips which closed the Westport-Inangahua Road for thirty-six hours. Slips and washouts destroyed roadworks, closing the Westport-Greymouth road, and damage was also reported at State Highway 7 between Reefton and Springs Junction, and the Westport-Kumara Highway. Several culverts washed debris onto the road and rail lines at Stillwater, which blocked access to Greymouth for the railcar. The Bailey Bridge at Mirror Creek was washed away and extensive slips in the Fox Hills reduced traffic to a single lane at Hendes Creek Bridge and Omoeroa. At Boulder Creek the water-course diverted behind the Bailey Bridge approaches and cut road links for a short period (G.E.S. 01/04/1975).

2 APRIL 1975

The second installment of the Easter storm was brought about by a north-westerly airstream associated with a very low depression moving across the bottom of the South Island. Torrential rain and gales up to 128 km/h were recorded in Buller and Westland (G.E.S. 02/04/1975).

The following rainfall data was recorded on the Upper Mai Mai Lambrecht:

Table 3. Rainfall Intensities at Upper Mai Mai.

Rainfall (mm)	Time Period
22	1 hour
59	3 hours
104	6 hours
153	12 hours
177	24 hours

(Lowe 1988).

The Grey River was in reasonably high flood, peaking at 4,075 cumecs, but did not flood Greymouth directly as the peak coincided with low tide (W.C.B. File 375). Surface flooding was the main concern in Greymouth as rain and blocked water-courses flooded low lying parts of the town.

At Stillwater 1m of water inundated the road, whilst at Mawheraiti 45cm of water covered the road. Floodwaters blocked the Coast Road from Greymouth to Westport as deep water ponded on the road at Wingham Park. Arthurs Pass and the Otira Gorge were blocked by numerous slips and washouts, with the bridge approaches at Rocky Creek being washed away. The Lewis Pass was also closed because of deep floodwaters between Greymouth and Reefton and for the second consecutive day the Bailey Bridge at Mirror Creek was washed away (G.E.S. 02/04/1975).

22 SEPTEMBER 1975

Greymouth Police and Army officers were called in to rescue a group of people stranded on the island just upstream of the Cobden Bridge. The group were stranded by the sudden rising of the river after heavy overnight rain (G.E.S. 22/09/1975). Minor damage to protection works was recorded on the Grey River (W.C.B. File 375).

14 JANUARY 1976

A torrential rainstorm in the North Island passed on to the South Island. As a result Greymouth recorded 65mm of rain in the twenty-four hours to 9.00 a.m. on the 14th. Apart from some surface flooding in Greymouth, virtually no damage was reported (G.E.S. 14/01/1976).

26 - 27 JANUARY 1976

Heavy rain fell on the 26th and 27th over much of Buller and Westland. Greymouth recorded 90mm on the 26th. In Greymouth some streets in the commercial centre were surface flooded but no damage was reported. Farmland at Coal Creek was flooded as was part of the Coast Road at Runanga. The Grey River rose 3.8m at Dobson. Small slips were reported from along the Coast Road and at Otira. The Buller River rose very quickly and washed away the causeway to the new bridge along with two caissons. This delayed construction for nearly three months (G.E.S. 27/01/1976). Moderate damage to river protection works was reported from the Wanganui River (W.C.B. File 375).

19 MAY 1976

An early morning storm produced 70mm and 66mm of rain at the Greymouth Harbour and Karoro respectively, in the twenty-four hours to 9.00 a.m. on the 19th. Widespread surface flooding, power blackouts and some property damage occurred.

The worst hit areas were Leonard and Arney Streets which were partly closed by flooding, and Paroa Road. Water ran through the Greymouth Motel courtyard and entered a block of motel units, damaging carpets and other furnishings. In other parts of the motel mud had built up above floor level but had not entered the accommodation. The overflow built up at the Nelson Street-Paroa Road intersection heavily silting the footpath, and water ran through Sweetmans Grocery damaging some stock. Water was knee deep along Leonard and Arney Streets and gardens near Victoria Park were completely covered with water although no houses were entered. Properties backing onto Sawyers Creek had their grounds flooded and at one point the creek was only 1m below the Marlborough Street Bridge (G.E.S. 19/05/1976).

3 JUNE 1976

Bad weather on the West Coast caused delays to road and rail services. The Christchurch to Greymouth railcar was delayed for an hour between Otira and Aickens because of flood waters on the line. The perishable goods train was held up four and a half hours at the same place. Arthurs Pass was closed because heavy rain on the Canterbury side made the ford at Greaney's Creek impassable and the Haast Pass was closed because of toppled trees (G.E.S. 03/06/1976).

4 JUNE 1976

Surface flooding occurred in Greymouth after a heavy bout of rain. In Leonard and Arney Streets traffic had to proceed cautiously and water ponded deeply around the Golden Eagle Hotel. The Greymouth Motel courtyard was filled with mud and water but the buildings were not entered.

The Grey River rose about 4.8m - the highest for several months but caused no problems as it rose slowly thus giving farmers ample time to move stock (G.E.S. 04/06/1976). Minor to moderate river bank erosion was reported from the Grey Valley (W.C.B. File 375). The Taramakau River was also in high flood but no damage was reported (G.E.S. 04/06/1976).

9 JUNE 1976

An intense electrical storm produced almost 25mm of rain in less than twenty minutes in Greymouth. In all, just over 50mm of rain fell in the twenty-four hours to 9.00 a.m. on the 9th. Mud and silt overflowed from blocked stormwater drains and entered two units of the Greymouth Motel ruining carpets and furnishings. Several streets were surface flooded but the water receded quickly by late morning. Sawyers Creek rose rapidly but did not threaten property. The Grey River was running at 2m/s. Generally little damage was reported (G.E.S. 09/06/1976).

27 JUNE 1976

Over 50mm of rain fell during the night sending a minor fresh down the Grey River. This stopped work on the Stillwater Bridge as a causeway was washed away. Ministry of Works staff had to wait until the river level dropped before work could commence (G.E.S. 27/06/1976).

15 - 16 JULY 1976

A storm covering much of the West Coast brought heavy rain to low lying areas and the heaviest snow fall for years on the ranges. The brunt of the storm was in the Buller region where up to 1.5m of snow lay on the Lewis Pass and Upper Buller Gorge. Murchison was also blanketed. Minor flooding occurred in the rivers and in Greymouth some surface flooding occurred as water backed up through the drains (G.E.S. 17/07/1976).

18 OCTOBER 1976

Surface flooding occurred in the Dobson, Taylorville and Marsden areas causing minor problems for road maintenance work (G.E.S. 21/10/1976). Rainfalls recorded on the 18th were 34mm at Karoro and 29mm at the Greymouth Harbour Board Office (G.E.S. 19/10/1976).

6 DECEMBER 1976

An intense electrical storm over Greymouth produced 58mm of rain in twenty-four hours to 9.00 a.m. on the 6th at Karoro Station. Most rivers were in flood and the Grey River again washed out a section of causeway at the new Stillwater bridge. The river was running at 4.5 m/s. The runoff from Arnott's Heights subdivision caused problems as over 5cm of water flowed through one garage and wood and silt was deposited over many streets. One Byron Street resident claimed it was the worst flood damage to that date.

A slip on the Ten Mile Valley Road occurred accompanied by some scouring and surface flooding. In general damage was very light (G.E.S. 06/12/1976).

9 DECEMBER 1976

The West Coast had its second heavy bout of rain in four days with 54mm being recorded at Karoro. Rivers were still running well above normal with the Grey running at 2m/s. Damage was again minimal being confined to isolated cases of surface flooding and scouring (G.E.S. 09/12/1976).

27 - 28 DECEMBER 1976

In the twenty-four hours to 9.00 a.m. on the 28th Greymouth recorded 139mm of rain at Karoro. Surface flooding occurred over much of Greymouth and many streets were closed. The Greymouth gas supply was seriously threatened as water came within a few millimetres of flooding the furnaces. Minor slipping, overflowing drains and damage to several streets occurred.

Sawyers Creek was running bank to bank and was only a few metres away from entering some properties. At 5.00 a.m. (flood peak) the creek was lapping the decking of the Marlborough Street Bridge and was almost as high at Marsden Road. At one stage water was about 40cm deep and 3m across outside the Australasian Hotel. Just south of the Australasian Hotel, Two Mile Creek spilled across the main highway to join with runoff from the Arnott's Hill subdivision. This again flooded Milton Road-Byron Street and the Nelson Street-Milton Road intersection was badly scoured. The nearby motels were flooded to the greatest ever levels with some of the guests having to be evacuated. A section of footpath and road at Freyberg Terrace was also washed away. According to Mayor Jackson some places in Greymouth were flooded that never had been before.

Some of the worst flooding was along the Coal Creek Flats where about 20cm of water entered a house when McLeans Creek overflowed its banks. The Greymouth-Runanga highway was blocked to all but heavy traffic by the flooding from McLeans Creek. At Omoto a slip restricted traffic to one lane (G.E.S. 28/12/1976).

18 - 19 JANUARY 1977

This was the worst flood in the Grey River since 1936 causing hundreds of thousands of dollars damage in the district. In the twenty-four hours to 10.00 a.m. on the 19th, 150mm of rain was recorded in Greymouth. In Greymouth the river burst it's banks opposite the Tainui Street-Mawhera Quay corner and by mid morning the water was only a few centimetres from the top of the wharf. At Dobson the river peaked at 6.4m (G.E.S. 19/01/1977), and discharged 4,770 cumecs (W.C.B. data).

Water eventually poured over the wharf to a depth of about 1m for a length of 400m flooding much of Leonard-Arney Street area, Blaketown and Cobden. These areas were flooded to a depth of more than 1.5m in places. Forty people had to be evacuated from the flooded area.

Most roads in the Grey County suffered from severe washouts and scouring. State Highway 7 at Stillwater and State Highway 6 at Coal Creek were washed out and closed, as were the bridges across Blackball and Slaty Creeks. The road between Greymouth and Runanga was closed because of floodwaters and the road from Greymouth to Westport was also washed out in two places. Several back roads were damaged. The Midland Railway was blocked by a slip at Kaimata, and the Stillwater-Westport railway was blocked by a washout between Ngahere and Ahaura and a slip between Tiroroa and Westport.

Although damage was widespread and costly to repair in Greymouth, most reported cases were of minor nature and were repaired quickly (G.E.S. 19/01/1977). Damage to protection works occurred in many of the river systems of Buller and Westland and was of a moderate to heavy nature (W.C.B. File 375).

28 JANUARY 1977

Two men had to be rescued by helicopter from the flooded Buller River about 1.6km downstream of Gowanbridge. They were in a party of four, attempting to go down the river in a 4m rubber dingy (G.E.S. 29/01/1977).



a) Looking South West Across Greymouth.
(W.C.B.)



b) Omoto Racecourse, Looking Across to Coal Creek.
(W.C.B.)

2 FEBRUARY 1977

Torrential rain brought further flood threats to Greymouth leaving sheets of surface water in several streets. Roads were closed around the Leonard Street area as wash from vehicles was entering some properties. Sumps and drains were blocked because of the suddenness of the downpour. Water again entered the courtyard of the Greymouth Motels but no units were entered. The Grey River was well down but still managed to wash a span of the Blackball Bridge (collapsed previously), about 100m downstream.

A torrential downpour in the Taramakau Valley and Hohonu Ranges washed away a portion of the road on the Kumara side of the Mitchell's Hotel, closing the road to all traffic (G.E.S. 02/02/1977).

3 MAY 1977

Greymouth was flooded in parts by surface water after three days of heavy rain. Milton Road had up to 30cm deep of rock debris and wood deposited across it, being washed down from the hills above. Some rocks were up to 30cm in diameter (G.E.S. 03/05/1977).

29 JUNE 1977

Torrential rain fell at Westport during the morning, flooding many streets. No damage was reported but the rugby game between the West Coast-Buller team and the British Lions was disrupted (G.E.S. 29/06/1977).

30 SEPTEMBER 1977

The Grey River rose after three days of heavy rain combined with snow melt. The river was photographed and studied by the Westland Catchment Board as part of its Greymouth Flood Protection study. No damage was reported anywhere (G.E.S. 30/09/1977).

16 - 17 DECEMBER 1977

After heavy rain, damage of about \$2250 was done to the Kongahu Drainage Scheme in the Karamea district. The scheme's contour channel was running bank high. The flood level was only 15cm below the deck of the new concrete bridge and floodwaters spilled over several lengths of the levelled spoil heaps which were left as banks on either side of the contour channel. Damage to fences and pasture occurred to adjacent properties. Within twenty-four hours the floodwaters had receded (G.E.S. 28/02/1978).

19 DECEMBER 1977

Heavy rain brought some surface flooding but little damage to Westland. Harihari received 64mm of rain in the twenty-four hours to 9.00 a.m. on the 19th, which surface flooded the State Highway between Harihari and Hokitika. The worst patches were at Ferguson's Bush and north of the Wanganui River.

Most rivers had a good fresh running but little damage to river protection works was reported (G.E.S. 20/12/1977).

18 - 20 JANUARY 1978

Rapid Creek in the Hokitika Gorge rose steadily during the night, stranding a group of people on an island in the flooded creek, who subsequently had to be rescued by helicopter. Flooding closed State Highway 6 three kilometres north of Ross and a couple of minor slips hindered traffic between Hokitika and Haast. The Kokatahi district experienced medium river and surface flooding but no damage was reported (G.E.S. 19/01/1978). Surface flooding occurred in traditional areas of Greymouth such as Leonard and Arney Streets, after 110-114mm of rain fell in the twenty-four hours to 9.00 a.m. on the 20th (G.E.S. 20/01/1978).

26 - 29 MARCH 1978

Torrential rain produced within a cold front caused havoc over the entire West Coast (and in Nelson, Canterbury, and Otago), culminating in a state of emergency being declared at Haast on the 27th. In the twenty-four hours to 9.00 a.m. on the 27th, Haast received 610mm of rain. The front moved northwards late that night, and in the next twenty-four hour period to 9.00 a.m. on the 28th, 91mm of rain was recorded in Greymouth (G.E.S. 28/03/1978).

Rivers began rising on the 26th and the first damage to occur was to the powerlines of the Haast Power Station and a washout of the Midland Railway line at Kaimata, near Moana (G.E.S. 29/03/1978). The next day all rivers were in high flood. Although transport and communication links were badly damaged, the main concern for emergency personnel was accounting for about 500 trampers who were in the area over the Easter break. One was swept down the Taramakau River when he and three others tried to cross the river between Otira and Jacksons. The remaining three managed to reach an island near the Otehake River Junction and remained there until the river dropped in height. The man swept away was assumed drowned, but walked into Otira on the 29th (G.E.S. 29/03/1978). The Waiho River broke its banks at Canavan's Knob near the glacier and four families in the area had to be evacuated - two by helicopter and two by car. Lake Wahapo overflowed its banks and blocked the road to the north of Franz Josef, and the Haast area was isolated by slips in the Weheka Hills and at the gates of Haast. Farmers whose properties were threatened by the rising Waiatoto River gained some relief when the river broke a sand bar into the sea and the river level dropped more than a metre. Electricity at Whataroa, Franz Josef, Fox and Haast was cut at various times during the day due to the Haast Power Station damage. State Highway 73, west of Jacksons was closed because of floods and slips and up to 30cm of water lay on the road at Branch Creek 14km east of Reefton, although the road remained open. Two people were rescued by helicopter from the Spasm Creek Hut; they had to remain on the top bunks until rescued to avoid the surging flood waters from the Upper Okuru River (G.E.S. 28/03/1978).

On the 28th helicopters again attempted to evacuate many people. A family of four was rescued from the north bank of the Fox River, after being trapped the previous night by the rising river level. The adverse weather prevented an unconscious trumper being airlifted out of the Douglas Hut on the Copeland Pass; twenty-two people were stranded in this hut and a further 60 in the Welcome Flat Hut (G.E.S. 28/03/1978). In the Murchison River a climber was swept away and drowned (G.E.S. 29/03/1978). The Inangahua River broke its banks in the early morning hours but by midday was 60cm lower than the banks, thus alleviating the flood threat at Reefton.

Surface flooding prevented the Christchurch bound railcar from leaving Greymouth (passengers were taken to Otira by bus), and in Greymouth surface flooding covered Smith and Albert Streets, the Marlborough-Shakespeare Street intersection, the southern end of Shakespeare Street and Barkley Place. The junction of Freyberg Terrace and Russell Terrace was badly scoured. Minor slips reduced parts of State Highway 6 to Haast to a single lane (G.E.S. 28/03/1978).

The Grey River peaked between 1.00 a.m. and 1.30 a.m. on the 29th, 1m below the top of the Greymouth Wharf. Water backed up through the towns drainage system added to the surface flooding already there but no buildings were entered. The W.C.B. checked water levels in the town every hour and noticed very little difference between 9.00 p.m. on the 28th and 1.00 a.m. on the 29th. The flood was described as "very flat" as the river rose very slowly. The Ahaura River peaked at 4.00 p.m. on the 28th, 6m above normal and was still that level at 9.30 p.m.. Farmers were advised to move live stock to higher ground on the 27th and storekeepers were advised to lift stock at 1.00 p.m. on the 28th (G.E.S. 30/03/1978).

13 -14 APRIL 1978

Between the evening of the 13th and midday of the 14th sustained periods of heavy rain occurred in Greymouth, Runanga, Karoro, Brunner and Stillwater. The rain was produced by a slow moving northerly frontal system moving south eastwards (W.C.B. file 377).

At the Greymouth Airport the following rainfall analysis was made:

Table 4. Rainfall Intensities at Greymouth Airport.

Rainfall (mm)	Time Period	Intensity (mm/hour)	Return Period Years
12	10 minutes	90	5
20	20 minutes	60	4
30	30 minutes	60	8
50	1 hour	50	10.7
80	2 hours	40	28
150	6 hours	25	200 - 400
210	12 hours	17.5	200 - 300

(Clarke 1978).

Smaller creeks flooded roads at culverts and larger creeks overflowed, flooding many houses. State Highways north and south of Greymouth were impassable due to slips and floodwaters, and rail links were blocked by numerous slips and washouts. Farmland at Coal Creek and McLeans Creek was inundated and Runanga was isolated from Greymouth. Damage was attributable to smaller water-courses as the Grey River did not rise above the levels expected in a minor fresh.

Sawyers Creek, blocked by a large slip, overflowed its banks and flooded a wide area of lower Greymouth. Many streets in Runanga were flooded as Raleigh Creek overflowed its banks at various points. Many other creeks also caused problems throughout the area (W.C.B. File 377).

12 - 13 MAY 1978

Heavy rain caused minor flooding over much of North Westland, most being surface water. State Highway 6 was closed in three places by about 60cm of water covering the road at Lake Wahapo, by river water running down the road on the south side of Franz Josef township, and by water running over the road at Snapshot Creek 6km up the Haast Valley from the township. Minor slips occurred on road and rail links in the Otira Gorge-Arthurs Pass region (G.E.S. 12/05/1978).

Surface flooding in Greymouth was aggravated by the collapse of a water main, and ponding occurred near the Nelson Street-State Highway 6 intersection. Scouring was reported from Dunollie, but flooding in the Grey District was limited with no significant rises in river levels. Flooding near Lake Wahapo and slips near Fox provided the most trouble in Westland (G.E.S. 13/05/1978). Damage to river protection works was widespread but generally of minor scale (W.C.B. File 375).

13 JULY 1978

Greymouth received heavy overnight rain, with 56mm being recorded at Karoro and 59mm at the harbour in the twenty-four hours to 9.00 a.m. on the 13th. Surface flooding occurred in Leonard Street and several sumps were blocked around the town. Debris was washed down from the hills and spread across several roads (G.E.S. 13/07/1978).

10 AUGUST 1978

After heavy rain, runoff from the surrounding hills combined with water from over-loaded drains, caused the worst surface flooding in Whataroa's history. The water level reached the second step of the Whataroa Hotel. However no serious damage was reported. Surface flooding was also severe in the Haast area (G.E.S. 18/08/1978).

15 AUGUST 1978

Surface flooding occurred in Greymouth after 44mm of rain fell in twenty-four hours to 9.00 a.m. Shelly Street was the worst affected but no damage was reported (G.E.S. 15/08/1978).

14 OCTOBER 1978

Flooding occurred in much of the southern part of the country after a night of torrential rain. In the twenty-four hours to 9.00 a.m., 140mm of rain was recorded at Paringa (G.E.S. 16/10/1978). In the same period only 1mm was registered at Greymouth (G.E.S. 14/10/1978). Most rivers in South Westland were in flood although reported damage was minimal. However, major slips blocked State Highway 6 between the Gates of Haast and the summit of the pass. At Knights Point near Lake Mapourika, slips reduced traffic to a single lane (G.E.S. 16/10/1978).

Note: Otago and Southland suffered major flooding. The floods in Southland were considered the worst this century (G.E.S. 16/10/1978).

21 DECEMBER 1978

A few cases of surface flooding in low lying areas of Greymouth were reported following heavy overnight rain. No damage was reported (G.E.S. 21/12/1978).

6 - 7 MARCH 1979

South Westland suffered the worst in a heavy rainstorm which caused washouts, flooding and slips. Water on the highway near Totara River Bridge was about 1m deep and washouts occurred at several bridge approaches in the vicinity. A creek at Whataroa burst its banks and entered the hotel and garage. About 400m of stopbank on the Whataroa River washed out and further north the Kokatahi-Kaniere Road was flooded heavily (G.E.S. 07/03/1979).

Twenty-four people had to be evacuated from Docherty's Creek as flood levels there and at Gibbs Creek were considered to be the worst in nearly 30 years. Stock losses were reported from the Totara Valley where a long term resident thought it to be the biggest flood in the valley for 15-16 years. Surface flooding occurred on the streets of central Hokitika and blocked the highway south of Hokitika (G.E.S. 08/03/1979).

6 - 7 MAY 1979

Northerly winds and heavy rain for two days made the Grey and Buller Rivers rise to the highest levels since January 1977.

The Grey River peaked at 3870 cumecs (W.C.B. data). It rose slowly during the day allowing plenty of time to construct a sandbag wall along the wharf in Greymouth when the threat of overtopping became apparent. Up to 1000 volunteers placed 10000 sandbags along the wharf. The river did not overflow into the town but Sawyers Creek rose rapidly and flooded some houses in the southern part of Greymouth. Several washouts of the railway occurred between Greymouth and Otira.

At 7.30 p.m. on the 6th the Buller River had risen to the extent that about 1m of water covered the road at Hawkes Crag. The flood peaked in the early hours of the 7th at 8.5m above normal, then began dropping at a rate of 150mm per hour. At Westport during the 6th and 7th, the river level was a constant 3.5m above normal resulting in surface flooding at Westport and its surrounding areas (The Press 09/05/1979).

Many roads were cut. State Highway 7 at Dobson and Stillwater, and the Lower Buller Gorge at Hawkes Crag were closed by flood waters, as was the road from Greymouth to Punakaiki. Four bridge approaches in the Grey County were washed out. Two were in the Greenstone area, one between Rotomanu and Bell Hill and one between Inchbonnie and Rotomanu. State Highway 69 between Reefton and Inangahua Junction was closed by a washout at the road/rail bridge; the Arnold road bridge was also closed because of flooding. Slips closed State Highway 67 at Karamea Bluffs and State Highway 6 at Meybille Bay and Knights Point. Greymouth, Westport and Hokitika suffered from heavy surface flooding; in Cobden and Greymouth 20 houses had to be evacuated (G.E.S. 07/05/1978).

1 OCTOBER 1979

A passing north-west front brought heavy rain to Westland. In the twenty-four hours to 9.00 a.m., Hokitika received 31mm of rain. In the same period Otira, Franz Josef and Fox Glacier recorded 175mm, 182mm and 187mm respectively. Minor slips throughout the region closed some highways for short periods and rivers were running high. No flood problems were reported and the region suffered very little damage as a result of the rain storm (G.E.S. 01/10/1979).

3 DECEMBER 1979

A violent storm hit much of the West Coast with heavy rain and north-west winds gusting up to 145km/h. Damage to most places was minimal except at Otira, which suffered the worst of the storm, and at Franz Josef. During the night Otira recorded 254mm of rain. In the same period Greymouth recorded 56mm, Hokitika 54mm, Westport 29mm (G.E.S. 3&4/12/1979), Franz Josef 85mm and Fox Glacier 116mm. (The Press 04/12/1979). At the Upper Mai Mai Lambrecht the following recordings were made:

Table 5. Rainfall Intensities at Upper Mai Mai.

Rainfall (mm)	Time Period
26	1 hour
58	3 hours
79	6 hours
117	12 hours
110	24 hours

(Lowe 1988).

Significant damage occurred to the Otira Gorge Highway. There were major washouts and the approaches to the Yorky's Point and Wallace Point Bridges were washed away; new gullies developed in the massive old landslide on which the Death's Corner and ZigZag sections of the highway are built; the bed of the Otira River was raised between 3m to 4m by aggradation and debris was deposited on the highway by rockfall. The highway was closed completely for a week and intermittently for about a month (Whitehouse and McSaveney 1989). The Lewis Pass Highway was also closed because of flooding at Stillwater, Mawheraiti and Rocky Creek, and the Haast Highway was closed due to numerous slips.

The Haast River rose between 6m and 7.6m, severely damaging the Haast highway. Damage was concentrated along the 1.5km stretch of road between Ninety Foot Falls and the Gates of Haast, where major slips occurred. Some road damage also occurred between Clarke's Bluff and Ninety Foot Falls. Subsidence around the bridge at the Gates of Haast left very little supporting the structure, as the hill on either side of the bridge slid into the Haast River, leaving the bridge 'perched' on a small promontory.

At Franz Josef, the Waiho River breached a 300m long gap in the right hand stopbank which protects the main highway and the Tourist Hotel (W.C.B. 1985). Flooding also occurred in all Canterbury Rivers and slips at Arthurs Pass blocked the highway, isolating the West Coast (The Press 04/12/1979).

At Dobson, the Grey River peaked at 5.8m and 3,960 cumecs (W.C.B. data). The Ahaura and Big Grey Rivers held their peaks of 7.3m and 1.5m respectively for six hours, and the Buller River rose 2.6m above normal causing extensive flooding at Inangahua Junction. Karamea was also badly flooded from the Karamea River. Other flood peaks recorded were: Hokitika at Kaniere State Highway bridge 6.3m; Hokitika at Collins Creek 6.5m; Kokatahi at the top bridge 2.4m; and Styx River at the lower bridge 2.9m. In Greymouth, the Grey River rose to within 10cm of the wharf (W.C.B. File 375).

The Taramakau River had its highest flood for at least a decade although little damage occurred from it. The only casualty was a D9 Bulldozer which fell into the river and was half buried when the bank it was on gave way.

Three boys had to be rescued by helicopter from the Matiri River Valley when the river rose rapidly, stranding them (G.E.S. 04/12/1979).

Most damage was due to wind breaking power and telephone lines, and slips blocking the Otira road and the Buller Gorge rail line (G.E.S. 03/12/1979). Damage to river protection works was recorded from the Matakītaki River to the Paringa River (W.C.B. File 375).

24 - 25 DECEMBER 1979

Flooding occurred in South Westland after a night of torrential rain fell in the region. In the twenty-four hours to 9.00 a.m. on Christmas Day 280mm of rain was registered at Fox, 81mm at Otira (G.E.S. 27/12/1979), and 254mm around Ross-Harihari (The Press 26/12/1979).

At 10.15 p.m. on the 24th, five families had to be evacuated from Docherty's Creek when the Waiho River changed course and flowed down the main highway and threatened their houses. The access road to the Franz Josef Glacier was destroyed (G.E.S. 27/12/1979), but the most serious damage done by the Waiho was the removal of the remaining 600m of the stopbank protecting the Tourist Hotel at the township (W.C.B. 1985).

A creek just behind Whataroa threatened to flood the town. Fortunately it did not overflow its banks, but heavy surface flooding occurred in the town (G.E.S. 27/12/1979).

The main flood problem areas were at Eban's and Bonar Creeks, 10km and 14km respectively from Harihari. At Eban's Creek floodwaters carried away about 20m of the bridge approach. Lake Wahapo overflowed and flooded the road to a depth of over a metre. Power lines throughout the West Coast were cut by the storm, resulting in the need for a portable generator to be taken to Harihari to help farmers with their milking (The Press 26/12/1979).

The Waiho River was still quite high on the 27th (G.E.S. 27/12/1979).

19 - 20 JANUARY 1980

Heavy rain produced deep surface flooding in Greymouth. Streets were closed off in the town during the night of the 19th until water receded at daylight the next day (Jackson 28/01/1980).

24 - 25 JANUARY 1980

Strong north-east winds accompanied by torrential rain brought the rivers of the Grey catchment into high flood. The Grey River at Dobson was running at 5.7m (G.E.S. 25/01/1980) and 4000 cumecs (W.C.B. data). The Ahaura and Big Grey Rivers were running very high after twenty-four hours of heavy rain.

The Grey River rose to 38cm above the wharf level, but serious damage in Greymouth was avoided by the construction of a 400m long sandbag wall on Mawhera Quay. Cobden and Blaketown suffered most with water being about 1m deep in some homes, and several houses had to be evacuated (G.E.S. 25/01/1980).

Up the Grey Valley, the flood was approximately the same as the 1977 flood. At 11.00 p.m. the Ahaura River peaked at 6.7m and the Big Grey River peaked at 2.6m (Jackson 1980). Stopbanks were broken and much silting of farm land occurred. One farmer between Ngahere and Stillwater suffered heavy stock losses and another had extensive property damage. Several county roads were flooded and damaged especially around Ahaura, Waipuna and the Clark River districts (G.E.S. 28/01/1980. The Buller River at Te Kuha was discharging 4875 cumecs (W.C.B. data).

27 JANUARY 1980

More heavy rain in the back country again brought the Ahaura River into high flood - the river rose 6.7m above normal. No damage was reported on this occasion (Jackson 28/10/1980).

21 MAY 1980

An intense electrical storm covered much of the West Coast during the night, bringing most rivers into flood in the early hours of the morning. In the twenty-four hours to 9.00 a.m. the following rainfall recordings were made: Otira region 152mm, Franz Josef 105mm, Fox Glacier 100mm, Hokitika 24mm and Greymouth 14mm.

The most serious flood damage was produced by the Otira River, which washed out a large section of the railway line between the township and the rail tunnel; the line was washed out for a distance of 50m and to a depth of 6m-10m. At 3.45 a.m. a train plunged into the river as the drivers were unable to see the washout because of the heavy rain. Three electric locomotives ended up in the river and one of the drivers was drowned. Lightning strikes in Otira cut all rail signals. The river level dropped shortly after the accident but heavy rain later in the morning brought the river level up again. Some minor slips fell on the road at Bluff Creek, 6km west of Otira but the highway remained open.

Powerlines south Mt. Hercules to Franz Josef were knocked out twice by lightning strikes and telephone lines to Haast and between Reefton and Ahaura were also cut (G.E.S. 21/05/1980).

15 - 18 AUGUST 1980

A rainstorm covered much of the West Coast on the night of the 15th, although no flood damage was reported. In the twenty-four hours to 9.00 a.m. on the 16th, Greymouth received 49mm of rain.

Slips blocked State Highway 6 at Mt Hercules and at Ninety Foot Falls near Haast. Toll circuits were cut between Reefton and Cronadun, and south of Franz Josef because of water seepage (G.E.S. 16/08/1980). A minor fresh was recorded in the Grey River and in Greymouth, Sawyer's Creek rose considerably on the 18th (G.E.S. 18/08/1980).

28 NOVEMBER 1980

Unexpected overnight rain totalling 64mm brought many Westland rivers and creeks into flood. At 9.00 a.m. the Big Grey River at Waipuna peaked at 2.1m above normal and the Ahaura River peaked at 6.8m above normal; the Ahaura rose at a rate of 22cm per hour. At Dobson the Grey River peaked at about 5m above its normal level.

At Omoto the race course backstraight was flooded by 9.00 a.m. and by 11.00 a.m. other parts of the track were flooded. Horses from the stables were led to higher ground and many sheep had to be rescued by jet boat. At the soccer fields below the racecourse, water was up to the level of the cross bars on the goals. The Taramakau River was bank high and the Arahura River overflowed its banks after a three hour deluge. Water about 30cm deep flowed through the Greyhound Tavern at 3.00 a.m.. The water drained away almost as quickly as it came, but the Hotel's floors were badly silted.

Numerous roads in Westland were flooded by surface water or were covered with slips. Damage however was minimal. After a large build up of gravel, Bluff Creek, 6km from Otira, overflowed the bridge crossing it and forced the closure of State Highway 73. Small slips occurred on State Highway 7 at Omoto and on State Highway 6 at Ten Mile but both roads remained open. Toll lines to Westport were cut when a tree fell across the lines near the town; the heavy rain was accompanied by gale force winds (G.E.S. 28/11/1980).

21 MARCH 1981

A localised downpour near Lake Kaniere produced 135mm of rain in one and a half hours. The twenty-four hour rainfall to 9.00 a.m. on the 22nd at Hokitika was 69mm and at Greymouth Airport was 21mm.

Coal Creek Bridge on the road between Hokitika and Lake Kaniere was so severely damaged by underscouring that it needed replacing. The Dorothy Falls Road was closed because of slips and the approaches to three bridges were badly scoured; this isolated a number of people. In the Kaniere-Kowhitirangi-Kokatahi area about \$100,000 of damage occurred to roads and bridges. About 400 subscribers were without telephones as water damaged cables and lines (G.E.S. 23/03/1981).

23 MARCH 1981

Torrential rain fell in the Franz Josef area bringing the Waiho River into high flood for several days. Twenty-four hour rainfall recordings for Franz Josef township and at Alex Knob up the valley were 195mm and 438mm respectively. Tributary streams of the Waiho became raging torrents and dumped much debris across the glacier valley road, blocking all access to the glacier (G.E.S. 11/04/1981).

29 APRIL 1981

Flooding occurred in many areas of the West Coast after a day of heavy rain. In the twenty-four hours to 9.00 a.m. on the 30th 79mm of rain was recorded at Otira, 72mm at Hokitika, 39mm at Greymouth and 14mm at Fox Glacier. Of the Hokitika total, 40mm fell in the two hours to 1.00 a.m. on the 30th.

The minor damage that occurred was centred in the Buller region. At 3.00 p.m. on the 29th, Dee Creek Bridge, just north of Inangahua Junction was washed out. One farm was completely isolated, and a family in their car on the bridge had to scramble to safety as the bridge gave way. Staff of the M.W.D were prevented from getting a Bailey Bridge to the creek because of the high level of the creek itself, and slips and washouts on State Highway 6 on the other side of the creek blocked access from the north. According to local residents, the flood in Deep Creek was caused by dams created by the 1968 Inangahua Earthquake giving way. A wall of water came down the creek initially damaging the bridge, then a second wall of water fifteen minutes later took the whole bridge away. Many slips and washouts were reported from the Inangahua Junction and Ngakawau areas (G.E.S. 29/04/1981).

A peak discharge of 4335 cumecs was recorded in the Buller River (W.C.B. Data). The Grey River recorded a flow of 2.5m/s (G.E.S. 29/04/1981).

20 SEPTEMBER 1981

A period of wet weather culminated in a heavy rainstorm in the Grey River catchment. In the twenty-four hours to 9.00 a.m. Greymouth received 90mm of rain. This was followed by heavy hail showers later in the day.

On the Dobson Gauge the Grey River reached 5.3m, 4.3m above normal. In Greymouth the flood peaked at 3.30 p.m. and came within a metre of the top of the wharf. Surface flooding occurred on State Highway 7 at Nelson Creek and in Leonard, Tainui, Mackay and Boundary Streets as water backed up through the drains. Waipuna Creek was in high flood and washed out an approach to the bridge near Ikamatua, isolating five households. About 10m of the approach was destroyed. Minor flooding occurred at Kelly's Creek near Otira and water damage to a telephone cable cut links between Greymouth and Runanga-Barrytown, affecting about 500 subscribers.

Minor slips occurred at Kaimata and near the Cobden Quarry, although no rail or road links were affected (G.E.S. 21/09/1981).

30 SEPTEMBER 1981

Although a spectacular electrical storm covered much of the West Coast, reported damage was minimal. Some radio and railway communication links were disrupted by wind and lightning and the only flood damage reported was a small washout of the line about half way between Runanga and Rapahoe (G.E.S. 30/09/1981).

3 - 6 OCTOBER 1981

Very strong winds and heavy rain covered the northern part of the South Island and the lower North Island. In the twenty-four hours to 9.00 a.m. on the 5th, 197mm of rain fell at Otira. In the same period Greymouth recorded 32mm (G.E.S. 05/10/1981).

Most Buller and Westland rivers were flooded, and many disruptive slips occurred throughout the region. Lake Misery at the top of the Otira Gorge overflowed onto the road reducing traffic to a single lane on the 5th. Later in the day the Midland Line was blocked by a slip between Kaimata and Kotuku. Next morning deep surface water on the road between Inangahua Junction and the township blocked the road to light traffic; cars had to be diverted around Brown Creek Road.

At 9.30 a.m. the same morning the Grey River at Dobson reached 4.8m on the gauge, 3.8m above normal. The Ahaura River peaked at 8.00 a.m. at 5.4m (4.4 above normal). The Big Grey peaked at the same time at 1.5m above normal, but dropped 8cm during the next hour and a half.

In Greymouth water backed up through the drains creating surface flooding at the Mackay-Boundary Street round-about. In the Otira-Arthurs Pass region at least five tramping parties were stranded until creek levels subsided. High winds caused much damage to roofs in Otira and many power and telephone lines were cut by flying debris (G.E.S. 06/10/1981).

22 - 23 JANUARY 1982

Heavy rain centred in the Otira region (104mm in twenty-four hours), brought most Westland rivers into flood. The Grey River peaked at 5.7m (G.E.S. 23/01/1982) and discharged at 3,920 cumecs (W.C.B. data). Muddy water flowed through the western end of Greymouth as water broke through Richmond Quay, and Nimmo Park was inundated by the flood waters. At its peak the river was only 45cm from the top of the wharf. Much surface flooding occurred in the central business district as water backed up through the drains (G.E.S. 23/01/1982). Heavy surface flooding also affected Runanga where several houses and a shop were entered (G.E.S. 25/01/1982).

The Taramakau, Hokitika and Arahura Rivers rose considerably. The Arahura broke its southern bank, cut off the main highway and flowed through the Greyhound Hotel (G.E.S. 23/01/1982). A big flood was reported in the Karamea River and much damage to river protection works occurred on the Wanganui River (G.E.S. 25/01/1982).

A flash flood occurred at Otira - within fifteen minutes Goat Creek spilled across the road and rail lines. The Otira highway was closed due to the flooding of the railway underpass and water entered the hotel and threatened many houses (G.E.S. 22/01/1982). A slip also closed the gorge road - a detour was made around this but was washed out, stranding many people. Electricity to Otira was cut sporadically and bad scouring of the railway embankment occurred (G.E.S. 25/01/1982).

26 - 27 JANUARY 1982

Otira was again the centre of a heavy rain storm and was flooded for the second time in four days. Otira recorded 252mm of rain in the twenty-four hours to 9.00 a.m. on the 27th, which was 12mm more than the previous flood. A creek burst its banks and flooded the Otira highway and surface flooding again hit the town.

Most Westland rivers were in flood. The Ahaura River reached 5.7m by midnight, dropped, then rose again to 5.1m by 9.00 a.m. on the 27th. The Big Grey River at Ikamatua dropped to 1m about 9.00 a.m. on the 26th but had risen to 1.8m during the night (G.E.S. 27/01/1982). The Grey River rose to within 70cm from the wharf, causing surface flooding in Leonard Street, Arney Street, and Preston Road as drains backed up. Moderate damage occurred to the Grey River protection works. The railway to Runanga was washed out at Coal Creek and surface flooding occurred on the road to Taylorville.

Intense rain in South Westland also caused trouble. In a twenty-four period Franz Josef recorded 330mm and Fox Glacier 288mm. State Highway 6 was closed because of numerous slips between Haast and the Glaciers (G.E.S. 27/01/1982), and bad damage was inflicted on the Waiho River scheme being constructed at the time (G.E.S. 28/01/1982). Elsewhere a slip closed State Highway 73 near Deception Point and surface flooding occurred on State Highway 7 near Maruia Springs (G.E.S. 27/01/1982).

10 - 12 MARCH 1982

Five days of wet weather culminated in a torrential rainstorm that caused severe flooding in all rivers south of Hokitika. Official rainfall recordings showed Franz Josef receiving 350mm of rain in the thirteen hours to 6.00 p.m. on the 12th (G.E.S. 12/03/1982) and 650mm for the three days from the 10th to the 12th. However, the official recordings are low as rain gauges in the Franz Josef area overflowed. But based on the consistency of the rain it was estimated that 1810mm (six feet) of rain fell in the three days at Alex's Knob up the Waiho Valley (G.E.S. 24/03/1982).

Damage was extreme and widespread throughout South Westland. Over half of the 10 year old Waitangi-taona River Bridge was destroyed as the river burst its banks and washed away three spans and a pier. The flood peak in the Waitangi-taona was estimated at about 700 cumecs and a mean velocity of 4 m/s. This was in the order of a 50 year return period (M.W.D. 1982). The north approach to the Fox River Bridge and 15m of the south approach to the Cook River Bridge were washed away. Numerous small bridges were also damaged or destroyed.

Flood magnitudes on the order of a 100 year return period were recorded in the Waiho, Whataroa, Paringa and Wanganui River (G.E.S. 13/03/1982). The Waiho River Scheme being constructed at the time was devastated, as the river throughout the length of the scheme burst its banks (G.E.S. 12/03/1982). A 500m stretch of the scheme adjacent to Waiho Flats Road was completely destroyed. The river changed course through the breach, spreading vast quantities of silt and gravel over farmland and killing thousands of ewes and lambs (G.E.S. 15/03/1982). The river bed below the Waiho Loop moraine aggraded 3m, and about 800 hectares of farmland between Docherty's Creek and the Waiho River were flooded. In this area county roads, buildings, fences and pastures were either badly damaged or destroyed (G.E.S. 24/03/1982). The Milton stopbank built in 1968 just below the Waiho Loop was also wrecked (G.E.S. 13/03/1982).

Telephone and power links south of Harihari were severed and State Highway 6 to Haast was cut by the washed out bridge approaches, the road at Lake Wahapo was 3m underwater and numerous slips closed the Haast Pass Road (G.E.S. 12/03/1982). Flood damage in South Westland exceeded \$2,000,000 (G.E.S. 17/03/1982), with \$700,000 being needed to repair river works in the Waiho, Cook, Whataroa and Jacob Rivers and Docherty's Creek (G.E.S. 24/03/1982).

Note: With a peak discharge of 700 cumecs and a catchment area of 75km² at the highway bridge, a specific discharge of 9.3 cubic metres per square kilometre was recorded in the Waitangi-taona River, the highest on record (See Appendix C).

20 MAY 1982

Most West Coast rivers were in flood after a night of torrential rain. In the twenty-four hours to 9.00 a.m. 55mm of rain was recorded at Franz Josef. From the time the rain commenced it moved quickly inland and intensified as it moved northwards along the Alps. In the same period Otira recorded 127mm, and of that, 80mm fell in six hours.

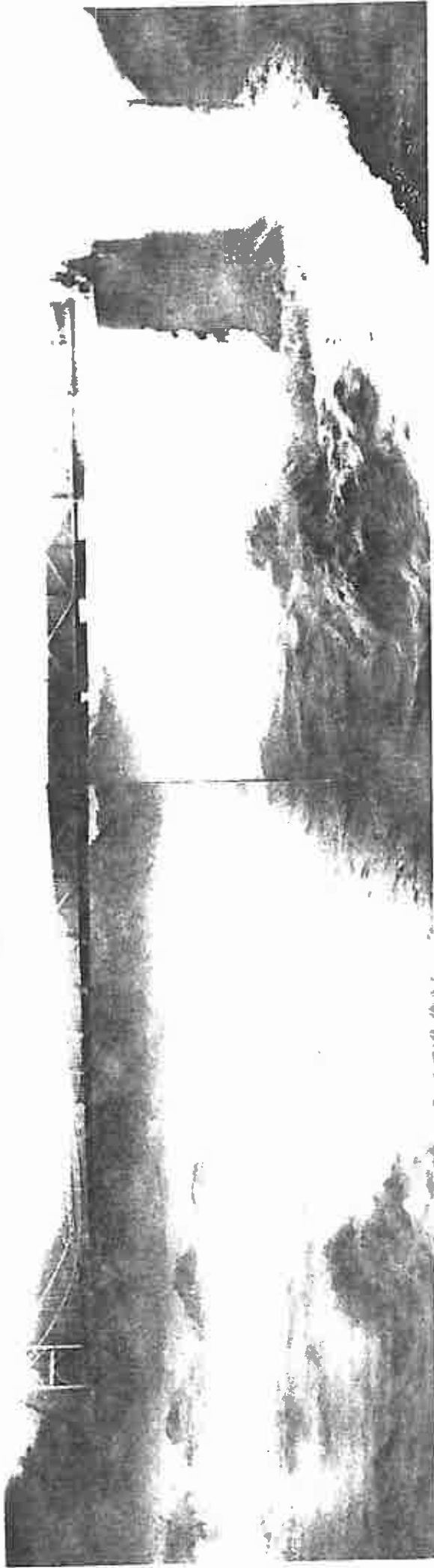


PLATE 13. FOX RIVER (SOUTH WESTLAND) FLOODING AT THE ROAD
BRIDGE 12/03/1982.
(Cutting, J.P.).

State Highway 73 remained open despite heavy surface flooding at Kelly's Creek and in the Otira Gorge. In South Westland the major concern was the high levels of the rivers from Hokitika south, particularly the Whataroa, Wanganui and Waiho Rivers. These rivers protection works were seriously damaged in the March 1982 flood. However there were no reports of farms being seriously flooded. Flood waters and slips affected some roads and toll lines south of Whataroa, although no serious damage to these facilities was inflicted (G.E.S. 20/05/1982).

2 DECEMBER 1982

An electrical storm centred on Greymouth with 84mm of rain being recorded at the Harbour in the twenty-four hours to 9.00 a.m. Other rainfall recordings during the same period were: Blackball 23mm, Otira 44mm, Punakaiki 3mm and Hokitika 3mm.

Greymouth suffered badly from surface flooding, slips and scouring (G.E.S. 21/12/1982). The most severe damage was in Freyberg Terrace where runoff from the hill scoured an embankment and damaged the stormwater drain. Street seal was scoured in several places and silt had accumulated in the sewer lines (G.E.S. 22/12/1982).

Elsewhere, surface flooding was severe in the central business district around Albert, Arney, Leonard and Guinness Streets. A slip on the Cobden Hill blocked State Highway 6, and State Highway 7 and the Midland Railway Line at Omoto were blocked by surface flooding and slips. Power between Camerons and the Upper Grey Valley was cut for a short period due to a lightning strike at the Dobson Power Station (G.E.S. 21/12/1982).

25 DECEMBER 1982

Heavy rain produced some flooding problems on Christmas Day. Some surface flooding occurred in Greymouth and the Midland Railway Line was cut by slips and washouts at three places between Jacksons and Otira.

9 - 10 MARCH 1983

The fringe of a storm which caused severe flooding in Otago produced heavy rainfalls in south Westland and Fiordland. In the twenty-four hours to 9.00 a.m. on the 10th, 360mm of rain was registered at Milford Sound, 181mm at Haast, 148mm at Franz Josef, 52mm at Otira, 44mm at Hokitika Airport and only 16mm at Greymouth.

Although some rivers attained high levels, damage was minimal. In South Westland, State highway 6 was closed at Bullock Creek near Fox Glacier, because of flooding and debris strewn across the bridge. Regular flooding at this location was described by an M.W.D. engineer as "Slip material in the Creek bed is brought up by the water and large amounts of debris are deposited across the road" (G.E.S. 10/03/1983). The Poerua River peak discharge was very high being 1028 cumecs at 1.00 p.m. on the 10th (W.C.B. data). In North Westland a slip closed the Coast Road (State Highway 6) at 12 Mile (G.E.S. 10/03/1983).

14 - 15 APRIL 1983

Intense rain brought the Karamea River into high flood, which threatened to flood Karamea township to a similar extent of the 1973 flood. Fortunately the peak of the flood did not coincide with the high tide. In the twenty-four hours to 9.00 a.m. on the 15th, 120mm of rain was recorded at Karamea. In the same period 43mm was recorded in Greymouth.

In Karamea water surrounded many, and entered several, houses on the 15th. The township became isolated as water poured through an overflow channel north of the State Highway 7 Bridge and flowed over the main road. Little damage was reported.

Elsewhere, State Highway 6 between Greymouth and Westport was blocked for a short period by slips at Twelve Mile and flooding caused some minor problems near Inangahua Junction. Moderate surface flooding occurred in Greymouth and Hokitika airport was closed on the 14th because of the adverse weather conditions (G.E.S. 16/04/1983).

10 JULY 1983

The Greymouth area recorded 205mm of rain in forty-eight hours on the 9th and 10th (G.E.S. 11/07/1983). Further up the Grey Valley at the Upper Mai Mai recording site the following rainfall intensities were registered.

Table 6. Rainfall Intensities at Upper Mai Mai.

Rainfall (mm)	Time Period
15	1 hour
41	3 hours
75	6 hours
134	12 hours
216	24 hours

Rainfall of this intensity at Mai Mai is estimated to have a return period in excess of 100 years (Lowe 1988).

The Grey River rose 5.7m at Dobson (G.E.S. 11/07/1983) and discharged 4,180 cumecs (W.C.B. data). The flood was described by the W.C.B. as being unusual because both of the main tributaries of the Grey (the Big Grey and Ahaura River) held their peaks for six hours. In Greymouth the river overtopped the decking of the wharf at it's lowest point near Boundary Street. However, the railway embankment prevented the water from entering the town. Water entered nearly 40 houses in Greymouth, Cobden and Blaketown, with some Blaketown families being evacuated on the night of the 9th. Between 2.00 a.m. and 3.00 a.m. on the 10th water began seeping through the railway embankment near King's Hotel on Mawhera Quay, damaging some of the tar seal along the road. By 8.00 a.m. the river had dropped considerably. At it's peak, nearly 60cm of surface water flowed through the Union Hotel and was level with the steps of Bannan's Store across the road. In the Regent Theatre, water was two thirds of the way up the foyer. Elsewhere, in the Grey Valley 45cm of water covered the road at Wingham Park and State Highway 7 was cut at Stillwater by floodwaters. The Mawheraiti River Bridge was also closed as the river nearly overtopped it.

Rivers in the Buller region were also in flood. The Buller River at Te Kuha peaked at 2.50 a.m. on the 10th, discharging 6541 cumecs. At Hawkes Crag the river was level with road (W.C.B data). Some surface flooding occurred at Black's Point near Reefton and two small bridge approaches were scoured at Burkes Creek Road and Boatman's Creek near Cronadun. State Highway 6 was closed by flooding near Inangahua and subsidence of the road at Meybille Bay on the Coast Road section of the highway. In the Upper Buller Gorge the highway was reduced to a single lane by slips.

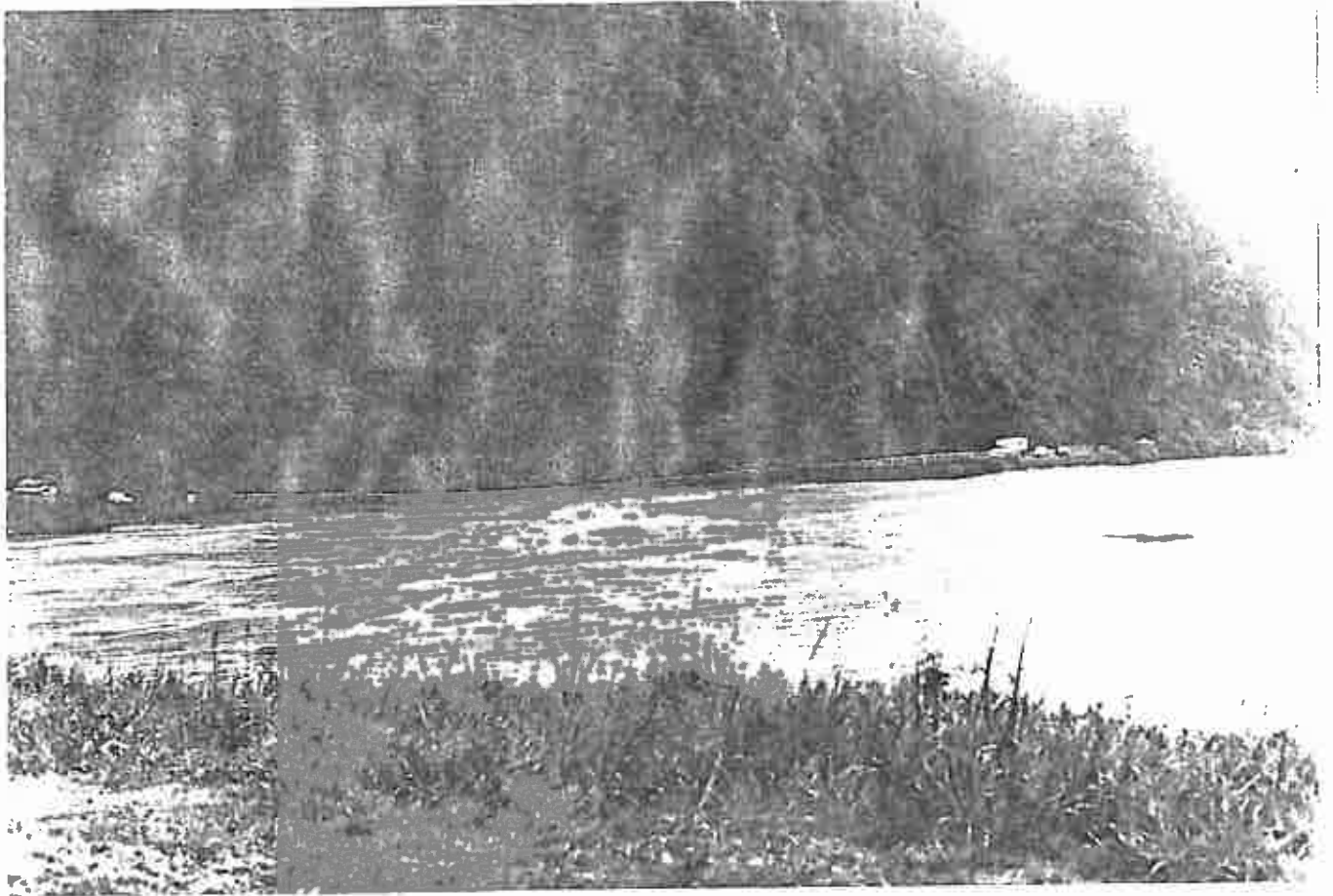


PLATE 14. BULLER RIVER FLOODING AT HAWKES CRAG, 10/07/1983.
(W.C.B.).

In the Taramakau River catchment the Kumara Power Station was closed down for the weekend as it became surrounded by water (G.E.S. 11/07/1983).

Note: Severe flooding occurred in Nelson province and Canterbury. In the Nelson area about \$20 million of damage occurred and roads and railways on the Canterbury side of the Alps were cut by washouts and snow (G.E.S. 11/07/1983).

20 - 22 OCTOBER 1983

Although an intense rain storm covered much of the West Coast relatively little damage was reported. The following rainfall recordings were made for the twenty-four hours to 9.00 a.m. on the 21st: Franz Josef 122mm, Otira 264mm and the Greymouth Harbour Board Office 62mm.

Creeks in the Poerua-Rotomanu area were at very high levels with many threatening to burst their banks. The county road at Poerua was cut by floodwaters overtopping the rails of one of the creek bridges in the area and at Mitchell's a flooded ford was impassable (G.E.S. 21/10/1983). Two railway culverts were washed out between Poerua and Inchbonnie, closing the Midland Railway. Some surface flooding occurred in the low lying areas of Greymouth (G.E.S. 22/10/1983). At 10.00 p.m. the Buller River reached its peak, discharging 6838 cumecs (W.C.B. data), which equates to a 20 year flood (Stocker 1990). However, little damage was reported.

During the night and early next morning, slips closed the Coast Road at Meybille Bay and further slips occurred on State Highway 73 at Rocky Point.

27 JANUARY 1984

State Highway 6 at Haast Pass was closed because of flooding across the road at Burkes Flat, 30km south east of Haast. Although some heavy showers fell in the far south, the predicted heavy rainfall never arrived in Westland. Severe flooding occurred in Southland (G.E.S. 27/01/1984).

17 - 18 OCTOBER 1984

Unsettled weather combining high winds and heavy rain raised many West Coast river levels. In the twelve hours to 9.00 a.m. on the 18th Greymouth received 60mm of rain (G.E.S. 18/10/1984). The Grey River at Dobson peaked at 3,720 cumecs (W.C.B. data), and was about 1m below the wharf. Reported damage was minimal. In Greymouth surface flooding occurred in traditional areas such as Leonard and Albert Streets due to overflow of the stormwater and sewage pipes. Streets in central Greymouth were closed to traffic for the day and in the county widespread surface flooding, minor slips and washouts occurred.

In the Buller County a section of the Little Wanganui subdivision was destroyed and had to be rebuilt after surging waters scoured the metalled road surface. A section of Nine Mile Road, 15km south of Westport, was washed away over night cutting a trench 3-4m wide and 2-3m deep. In other areas a culvert on State Highway 73 west of Jacksons was blocked by flood-waters and a slip covered the road. At Haast an approach to the Turnbull Bridge was washed away and flood waters reached the front door of the Greyhound Tavern at Arahura (G.E.S. 18/10/1984).

22 - 24 NOVEMBER 1984

Rivers and creeks began rising on the 22nd after a number of days of wet weather. The first flood damage to be reported was a collapsed culvert on the railway line between Omoto and Kaiata, and a washout of the line near Jacksons.

The Grey River and its tributaries rose to very high levels the following day. At 10.00 a.m. the Ahaura River was 6m above its normal level and the Upper Grey was also high although no measurements were made. A culvert at Whitmore's, between Rotomanu and Poerua, was washed out and deep surface flooding occurred at Dobson on the eastern side of the highway. The Omoto Racecourse was partly submerged also (G.E.S. 23/11/1984). During the day of the 23rd the Grey River continued to rise and a trench was cut in the beach behind the Cobden Rubbish Tip to try and alleviate some of the water pressure in Greymouth. The flood peaked at Dobson at around 11.00 p.m., 5.5m above normal level (G.E.S. 24/11/1984) and discharged 4750 cumecs (W.C.B. data). In Greymouth the peak occurred around midnight and combined with the high tide. Water 60cm deep overflowed the Wharf and into the town. A sandbag wall constructed along the entire length of Mawhera Quay prevented the main body of water entering the town but damage was still severe. More than half of Greymouth's stores were flooded to a depth of about 1.5m. Floodwaters in the town were reported to have risen within minutes and dropped nearly as quickly, as by 1.00 a.m. on the 24th, the danger had eased somewhat. Water was 23cm deep in the Duke of Edinburgh Hotel, which was 2cm higher than the Easter 1975 flood, and about 30cm of water flowed through the Golden Eagle Hotel. In the Regent Theatre, water reached the steps of the auditorium and was 45cm deep in the coffee shop. Many houses in Blaketown and Cobden were flooded; in Cobden about 30 people were evacuated by boat. Many claimed this was the worst ever flood in Greymouth, even surpassing the January 1980 event. In Cobden, water levels were 15cm higher than that flood. State Highway 7 was closed by flooding at Stillwater and a man spent nearly twenty-four hours in the cab of his truck when it fell into Moonlight Creek and was rolled downstream for 100m before wedging under a tree (G.E.S. 24/11/1984).

Flooding was severe in many other places. The Taramakau and Wanganui rivers were reported to be well above normal levels on the 23rd. On the same day, State Highway's 73 and 6 were closed by surface flooding. On State Highway 73, about 50m of the road was completely inundated west of the Temple Basin carpark as Lake Misery overflowed. State Highway 6 was closed by deep surface water at the Greyhound Tavern, Arahura. The Hokitika River was at its highest level for some time, flooding the Kokatahi Road with 45cm of water and scouring the road in many places. In Karamea the flood was described as one of the worst ever although little damage was reported (G.E.S. 24/11/1984).

Note: Rainfall figures for Greymouth are not available as the rain gauges at the Harbour Board Office and at the Airport were flooded (G.E.S. 24/11/1984).

19 - 20 DECEMBER 1984

Widespread flooding occurred in Westland after a night of torrential rain, especially in South Westland. In the twenty-four hours to 9.00 a.m. on the 20th Greymouth recorded 70mm of rain, Hokitika 89mm, Fox Glacier 145mm, Franz Josef 123mm and Okarito 235mm (G.E.S. 20/12/1984). In the succeeding twenty-four hours another 13mm of rain fell at Greymouth, 27mm at Hokitika, 227mm at Franz Josef and 172mm at Fox Glacier (G.E.S. 21/12/1984).

Surface flooding affected the road at Camp Overbridge between Runanga and Greymouth and slips closed the road between Kumara and Jacksons at Rocky Point (G.E.S. 20/12/1984). State Highway 7 at the Big Grey River was closed due to flooding and in Greymouth, Albert, Leonard and Arney Streets were affected by surface flooding (G.E.S. 21/12/1984). The Grey River at its peak was discharging 3,710 cumecs (W.C.B. data), and rose to 5.9m at Dobson (G.E.S. 21/12/1984), 4.9m above normal. The Ahaura and Big Grey Rivers rose to 6.1m and 1.8m respectively (G.E.S. 20/12/1984). Several Westland County roads were scoured, being worst affected in the Hokitika Gorge area (G.E.S. 21/12/1984).

In South Westland rivers rose to moderate flood levels. Serious damage occurred to the right stopbank on the Waiho River. About 400m of the bank was washed out in the vicinity of the airfield; the repair works were estimated at \$133000. The failure of the bank was attributed to the river water scouring the left bank at the rubbish tip site and rebounding off onto the right bank downstream of the State Highway Bridge. Based on a forty-eight hour rainfall of 483mm, this was considered a 20 year event (W.C.B. 1985). The Waiho changed its course and flowed down the Franz Josef airfield, destroying the airport and causing severe damage down the whole river valley. The access road to the Franz Josef Glacier was blocked at the Trident Falls and the Fox Glacier access road was blocked at the 1960 moraine. State Highway 6, south of Whataroa was closed because flooding in the Waitangi-taona River raised Lake Wahapo to cover the road with 41cm of water (G.E.S. 20/12/1984).

The highway was also closed at Jacob River as a metre of water inundated the road, and the Haast Pass section of the road was washed out at Chelsea Creek (G.E.S. 21/12/1984).

20 - 25 NOVEMBER 1985

High seas produced a sandbar which blocked the outlet of Okarito Lagoon. The lagoon backed up to a metre above normal levels, flooding the only road out of the township. This sort of flooding is reported to have been a problem since the 1880's (G.E.S. 26/11/1985).

14 - 18 JANUARY 1987

Several days of wet weather commenced with a storm on the evening of the 14th. The rivers of Buller and North Westland rose very quickly. The Fox River near Punakaiki rose so rapidly eight people were stranded in Babylon Cave up the river valley (G.E.S. 15/01/1987). They were not rescued until two days later when the river level subsided (G.E.S. 16/01/1987).

On the night of the 14th a camper parked his car on the river bank of the Ohikanui River, 3m above the river level. He was awoken at 5.30 a.m. the next morning by water lapping around the wheels of the car; unable to remove the car himself he sought help. In just over half an hour later when he returned the car was completely submerged. The Buller Gorge Road was closed because of a washout of the road near Te Kuha and slips between Cascade Point and the Ohikanui River. State Highway 67 between Westport and Karamea was severed because water 600m deep covered the road between the Little Wanganui River Bridge and Karamea township. Slips reduced the Coast Road between Greymouth and Westport to a single lane in many places (G.E.S. 16/01/1987). A major washout 16m deep closed the Buller Gorge railway for about a week (G.E.S. 19/01/1987).

On the night of the 15th a violent hail/thunder storm centred around Greymouth. Lightning and water damage to cables put many telephones in Greymouth out and links to Kokatahi-Kowhitirangi were cut (G.E.S. 16/01/1987). The bad weather continued throughout the next day and in the twenty-four hours to 9.00 a.m. on the 17th, Arthurs Pass had recorded 121mm of rain. Later that day State Highway 73 was closed because of slips at Rocky Creek (buried the bridge), Candy's Corner and Bluff Creek. Slips also cancelled all trains between Greymouth and Canterbury (G.E.S. 19/01/1987).

Note: The continuation of rain caused a major slip on the 20th, destroying half of the Windy Point tunnel in the Buller Gorge (G.E.S. 20/01/1987).

28 - 29 JANUARY 1987

Heavy overnight rain fell upon already wet catchments causing widespread damage. However, most of this was of minor nature.

State Highway 6, through the Buller Gorge was closed due to a washout and the abutment to the Island Creek Bridge on the Westport side was undermined. Elsewhere on the highway, much surface water covered parts of the lower Buller Gorge Road and the Coast Road between Westport and Charleston. To the south, the highway was closed at Havelock Creek Bridge near Fox Glacier due to flooding and deep surface flooding lay on many sections of the road between Harihari and Haast. Slips blocked the highway at Red Jacket Creek near Punankaiki. The Windy Point Rail tunnel between Westport and Inangahua was again closed by further slipping (G.E.S. 29/01/1987).

3 - 4 FEBRUARY 1987

A fast northerly moving front deposited torrential rain in South Westland and heavy falls elsewhere on the West Coast. In the twenty-four hours to 9.00 a.m. on the 4th the following rainfall recordings were made: Lake Mintara (Milford Track) 267mm, Haast Township 110mm, Lake Moeraki 127mm, Fox Glacier 98mm, Franz Josef 126mm and Okarito 78mm.

Flooding occurred in most Buller and Westland Rivers, being most severe in south Westland. At Havelock Creek, State Highway 6 to Haast was closed as floodwaters and debris covered the road bridge. Bridge approaches were washed out at Rocky Creek, 1km north of Fox Glacier, and deep surface flooding at Jacobs River, 40km south of Fox Glacier, also closed the Haast highway. A National Park warden narrowly escaped death when a huge landslide destroyed the hut in which he was sleeping and carried it into the flooded Copeland River. The slip was between 400m - 500m long (G.E.S. 04/02/1987). In the north, State Highway 6 was closed at Coal Creek, near Runanga as about 20m of road was completely submerged for five hours. Much farmland in the area was also flooded. Along the Blackball-Stillwater road flooding, slumping and a damaged culvert caused a short delay for traffic.

Rail routes were also affected. The Runanga line was closed when four lengths of track were washed out near the Camp Creek overbridge and the Midland Line was closed by a washout at Rocky Creek between Aickens and Jacksons. In Buller, another slip at the Windy Point Tunnel again closed the line between Inangahua and Westport (G.E.S. 05/02/1987).

19 MAY 1987

Overnight, the Buller Region received 35mm of rain, Greymouth 69mm, Hokitika 56mm, Otira 43mm, Fox Glacier 24mm and Haast 15mm. No flood damage was reported as most river levels were relatively normal. However Sawyers Creek was in fresh, indicating the rain was mainly coastal (G.E.S. 19/05/1987).

13 - 15 JUNE 1987

Heavy rain caused by two cold fronts moving up the coast affected much of Westland; the little damage caused was confined mainly to the south. Franz Josef recorded 238mm in the forty-eight hours between the 13th and 15th. Little Man Creek burst its banks and blocked State Highway 6 and scoured a county road. At Havelock Creek between Fox Glacier and Karangarua, flooding closed the highway, and the rain turned other South Westland creeks and rivers into muddied torrents although damage was minimal.

Hokitika recorded 114mm of rain and Greymouth 161mm in the same forty-eight hour period. The Grey was running a light flood and did not reach alarm levels (G.E.S. 15/06/1987).

6 OCTOBER 1987

Parts of South Westland were flooded by torrential rain, noticeably the Glacier area. Franz Josef recorded 235mm in the twenty-four hours to 9.00 a.m. In the same period Fox Glacier received 192mm, Pukekura 51mm and Hokitika only 3mm.

The heavy rain disrupted the water supply at Franz Josef when the supply was washed out, but it was quickly repaired. Floodwaters also scoured out part of the northern approach to the Whakapohai River. No other damage was reported (The Press 07/10/1987).

19 - 20 MAY 1988

Heavy rain fell between 8-19 May following the driest April on record, raising the Grey River at Dobson to 5.4m above its normal 1m level (Fauth 1988a). At its peak the river was flowing at 5180 cumecs (W.C.B. data) and at 7m/s. These were the highest levels ever recorded. Water levels in the Grey were elevated by the Big Grey River running at 2.7m and the Ahaura River at 7.6m.

Water rose to within a metre of the 2.3m high Cobden stopbank for much of its length, although at the Range Creek Lagoon it was only 15cm from the top. Most of Greymouth was flooded and a Civil Defence emergency was declared at the peak of the tide at 1.00 a.m. Water began to enter the town as the river overflowed the banks near the signal box. At the height of the flood between 2.00 a.m. and 3.00 a.m. water surged through Mackay and Guinness Streets and Mawhera Quay, lifting man-hole covers and exposing high voltage wires, and uplifting and twisting asphalt and rail lines. Water was over 1m deep in many places making it impossible to cross places like Albert Street.

Over 1m of water flowed through the Union Hotel, along with deep mud and silt for the first time. Other hotels also suffered badly. The Gilmer Hotel had almost half a metre of water and silt pass through it whilst the West Coast Lodge received about 45cm of the same. Also at the Lodge, the force of the water uplifted a large beer cooler containing 1,200 litres of beer and shifted it across the backyard. Over 1m of water flowed through the Golden Eagle Hotel and over 75cm passed through the Duke of Edinburgh Hotel. Further up the Quay, the Railway Hotel only received a few centimetres of water and the Royal Hotel completely escaped the flooding. Water levels were up to the windows of the Greymouth Library and the Aerodrome was under about 1m of water in many parts. Severe surface flooding occurred in low lying areas of Cobden and water entered businesses of Greymouth that had been raised to the Borough Council's flood specifications based on prior floods (G.E.S. 20/05/1988).

All rivers from the Karamea to the Wanganui (South Westland) rose to major flood levels, as already saturated catchments shed the excess water. Three Buller River tributaries recorded "one in 50 year floods" and the Inangahua River rose to a level greater than any on record. Personal observations indicated it was the largest flood known (Fauth 1988b). However, most damage occurred in the Grey Valley. The road at Coal Creek was totally cut off, as was the road between Stillwater and the Arnold River due to flood water. Heavy scouring cut the Lower and Upper Buller Gorge roads, State Highway 7 between Greymouth and Reefton and State Highway 73 at Rocky Creek between Jacksons and Aickens. The temporary bridge at Craigieburn Creek and its approaches were washed out as was the Granite Creek Bridge. Caledonian Creek overflowed and blocked the road in that area. The rail line between Greymouth and Reefton was washed out, being blocked at Ngahere and Totara Flat, and the Westport-Greymouth line was blocked by three slips and a bridge washout between Ngakawau and Westport.

In the Grey Valley at Omoto, racehorses were saved but about 30 sheep drowned and bulldozers were needed to secure timber packs for the new grandstand from floating away. All of Omoto was flooded but water drained away quickly when the river levels dropped (G.E.S. 20/05/1988). Further up the valley farms suffered particularly heavy losses, as many stock were washed away, fences were destroyed and heavy silting of pasture occurred over a wide area. (Fauth 1988a, Stapleton 1988). Much destruction was done to river protection works throughout the region, especially the Grey Valley and was estimated to cost \$1,352,250 to repair (Fauth 1988a).

In all, about 400 people from 102 houses had to be evacuated (Stapleton 1988) and total loss of property in insured and uninsured terms was estimated to be about \$4,000,000 (Works Department 1988).

Note: Lowe (1988) suggests that at Mai Mai Creek in the upper catchment, the return period of the rainfall and peak discharge of the creek (35.litres/second/hectare) was in the order of only five years.

25 JULY 1988

Torrential rain over the weekend caused surface flooding in Greymouth and closed State Highways 6 and 73. Since the 22nd, 131mm of rain fell in Greymouth. Surface flooding occurred in Palmerston, Shakespeare and Marlborough Streets and deep surface flooding occurred at the corner of Frickleton and Alexander Streets. Flooding was caused by the overloading of drains on the 25th.

Between Greymouth and Westport, State Highway 6 was closed when a bridge approach was washed out at Lawsons Creek 5km south of Punakaiki. A rock slip also closed the Otira Gorge. Flood damage in the area was generally light (G.E.S 25/07/1988).

23 AUGUST 1988

Surface flooding occurred in Westland as a result of heavy rain in the mountains. Flooding of the highway occurred between Greymouth and Runanga and between Kumara and Jacksons. The approaches to the Greenstone Creek Bridge at Cape Terrace were washed out and the surface at Mawhera Quay level crossing was broken by heavy rain (The Press 24/08/1988).

13 - 14 SEPTEMBER 1988

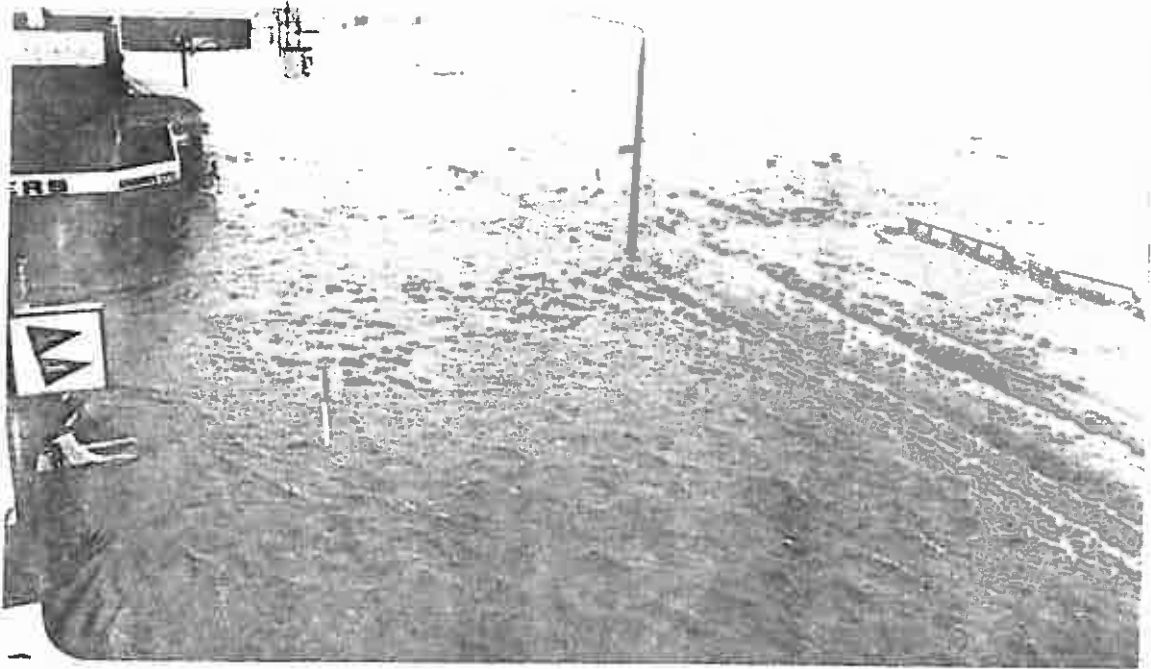
Steady rain fell between Saturday the 10th and Tuesday the 13th, thoroughly wetting already saturated catchments in Buller and Westland. Rivers in the Buller and Grey catchments were most affected. Total rainfall in the Grey Catchment during this period was 291mm in the Upper Grey and 169mm in Greymouth. The Haupiri-Rotomanu area received the greatest intensity of rainfall, recording 150mm from 9.00 a.m. on the 12th to 9.00 a.m. on the 13th. In this area much spring snow had melted also.

At Dobson the Grey River peaked at 5.8m above its normal 1m flow level (Fauth 1988b) and at 5,770 cumecs (W.C.B. data). This was 0.4m higher and 590 cumecs greater than the May 1988 flood - the previous biggest flood in Greymouth and the Grey Valley. Hence, the worst flooding in Greymouth's history occurred and the flow was considered to be 121+ years in magnitude. The Buller River at Westport peaked at approximately 6,100 cumecs, equating to just under a ten year return period. The Buller overflowed into the Orowaiti River between 9.00 a.m. on the 13th until early morning on the 14th. Other rivers rose rapidly. The Matakita River rose 40mm in 15 minutes and the Maruia River rose 4.6m in 2.5 hours. The Hokitika and Karamea Rivers also rose rapidly but caused little concern (Fauth 1988b).

Damage was widespread and severe. Much of Greymouth was inundated resulting in 183 homes and 356 people having to be evacuated (Kerr 1988). Many goods and supplies were damaged in shops and heavy silting occurred through much of the town. Many houses were flooded even before the river came over the wharf. The rising river flowed into Erua Moana Lagoon and into Lake Karoro. Sawyer's Creek, swollen from the rain also flowed into Lake Karoro. By early morning both the lake and lagoon broke free, flowed through Victoria Park and flooded Arney, Boundary and Swainson Streets with more than 1.6m of water. The rising floodwaters threatened the business district from behind and backed up along Preston Road. The lake behind Preston Road eventually overflowed, and silt laden water flowed through houses in the area. The river then came over the wharf at about 9.00 a.m. on the 13th and flooded the town from the river side. At the peak of the flood approximately 2m of water flowed through the business district in many parts (The Press 21/09/1988).



a) Albert Street, Looking Towards The River.
(W.C.B.).



b) Mawhera Quay, Looking Downstream From Kings Hotel.
(W.C.B.).

Approximately 50 farms were affected by the flood (G.E.S. 16/09/1988). Many of these suffered from silting, stock losses and fence and stopbank damage. Stock losses in the Upper Grey Valley were relatively light due to ample flood warning. However, in other areas stock losses were severe. The Crooked River-Rotomanu area, a traditional stock refuge, was overwhelmed with water and stock losses were very high (Kerr 1988). River protection works were either further damaged from the May 1988 flood, or repairs carried out after the May flood were destroyed, or damage not connected with the May flood resulted. Estimated of damage to protection works was put at \$1,196,500 (Fauth 1988b).

The intakes of the Greymouth and Runanga water supplies were threatened with damage as the Coal Creek stopbank which protected them was demolished (Kerr 1988), and Kumara lost its alternative water supply when the Taramakau River cut into the bore site and washed away the well casing (G.E.S. 17/09/1988). Total repair bill for the flood, including physical damage and "invisibles" such as lost profits etc. has been estimated at approximately \$40-\$45 million, by Mayor Dallas of Greymouth (New Zealand Herald 15/04/1989).

In general, damage to communication links was light. Numerous slips, scours, minor damage to bridge approaches and overtopped culverts were the main problems for the Westland County and were quickly repaired in most cases (G.E.S. 17/09/1988). Worst affected areas were State Highway 7 at Stillwater and Runanga, State Highway 6 at Lake Wahapo, the Upper Buller Gorge between Inangahua Junction and the township, and the Kaniere-Kokatahi Road which were all closed due to flooding. Slips closed the Otira Gorge (Christchurch Star 13/09/1988), and a slip at the Rewanui State Mine buried a hut, killing the caretaker. A large slip about 300m east of Cobden closed State Highway 7 as it completely blocked the road (G.E.S. 17/09/1988).

18 SEPTEMBER 1988

Continued rain brought surface flooding to many parts of Greymouth as drains were still blocked from the big flood on the 13th and pumps were having trouble moving the water (The Press 19/09/1988).

4 - 5 OCTOBER 1988

Heavy rain over much of the West Coast caused many rivers to rise. Franz Josef received the heaviest rainfall of 146mm during the night. Falls of over 100mm were recorded from the Westland and Buller Ranges and between 35mm and 50mm along the coastal area north of Ross. The rainfall was attributable to a moist north-westerly flow.

The tributaries of the Grey River rose to similar levels as the May 1988 flood. However the Grey was low at the time and was able to carry the extra volume. The Grey at Dobson peaked at 5.6m on the gauge. Low lying farmland at Kaiata, Coal Creek and Stillwater was flooded. At Kaimata a helicopter had to be used to rescue 75 heifers trapped by flood waters.

In Greymouth surface flooding occurred in the usual areas such as Boundary, Arney and Leonard Streets, and Nimmo Park playing fields were flooded by the Grey River (G.E.S. 06/10/1988). The Taramakau River was also in reasonable flood although damage was not reported. A slip closed the Greenstone-Mitchells road for a short period and a slip across the Waipuna Road occurred but the road remained open.

Further afield, low lying farmland was also flooded from the Lower Inangahua, Buller and Karamea Rivers. Flooding and a slip near Inangahua Junction closed roads in that area and a slip near Lyell bridge blocked State Highway 6 for three hours. Parts of State Highway 69 near the Junction were impassable because of the flooding. A small slip on the Coast Road between Punakaiki and Westport reduced traffic to one lane.

The Karamea River looked most dangerous as it rose 30cm per hour, peaking at 4.6m at the Karamea bend, 40km upstream from the township. The Umere Overflow near the township broke its banks and spilled onto the main road near Market Cross. Water also over-topped the stopbank at Arapito about 3km upstream from the town and covered farmland. Karamea School closed for the day because of the high river levels. The Mokihiui River level was also up but did not flood farmland. The Buller River at Berlins peaked at 11.4m (G.E.S. 05/10/1988).

17 - 18 OCTOBER 1988

A whitebaiter drowned in the swollen Paringa River and most other rivers in Westland were in a state of fresh after 25 days of consecutive rain. The Grey River was 1.2m above normal (G.E.S. 18/10/1988).

23 NOVEMBER 1988

Heavy rain in the Buller and Nelson ranges caused no problems for the West Coast. To the south falls of 45mm and 50mm were reported from the glaciers in a twenty-four period and up to 100mm in the South Westland ranges. Only minor surface flooding occurred in Greymouth (G.E.S. 24/11/1988).

7 DECEMBER 1988

Heavy rain in the Grey catchment caused creeks to flood, resulting in surface flooding in some areas. State Highway 6 between Greymouth and Runanga was covered with about 300mm of water when Coal Creek flooded. Surface flooding was also reported around Kamaka, Blackball, Haupiri, Rotomanu areas and Harihari.

The Iveagh Bay Road was closed when the Crooked River swelled, and the flooded Kokatahi River cut into the south bank by Lake Arthur. The Taramakau River and other South Westland rivers were also in flood. The heavy rain was mainly confined to the Paparoa Ranges where 240mm fell in the twenty-four hours to midnight on the 6th. About 50mm fell in the central Grey catchment in the same period (G.E.S. 08/12/1988).

13 DECEMBER 1988

Heavy rain in the Hokitika catchment caused minor freshes in creeks and streams flowing into the Hokitika River. No damage was reported (G.E.S. 13/12/1988).

23 - 24 MARCH 1989

Heavy overnight rain generated high flows in the Greenstone River which washed out the Greenstone bridge during the late night-early morning. Two American tourists nearly drowned while trying to cross the swollen Waiho River on the 24th (G.E.S. Star 28/03/1989). The Taramakau, Hokitika, Grey and Buller Rivers were running high and the Grey was reported to be only 1m from the top of the wharf (G.E.S. 25/03/1989). The lower river flats and Omoto area suffered minor flooding.

28 - 29 MARCH 1989

A heavy rainfall event concentrated in South Westland caused minor surface flooding and slips throughout Westland. In a twenty-four hour period Fox Glacier received 122mm, Franz Josef 110mm, Greymouth 27mm (G.E.S. 29/03/1989) and Okarito 39.9mm (G.E.S. 26/04/1989). The Grey River was running between normal and high flow but no damage was reported.

Slips closed the road at the Weheka Hills between the Glaciers and cut telephone communications in the area. A washout at Depot Creek closed the road between Haast Pass and Haast and surface flooding covered parts of the Otira Gorge road (G.E.S. 29/03/1989).

28 - 29 OCTOBER 1989

Most of the West Coast escaped heavy rain which had been forecast. Some heavy falls were recorded during the night of the 28th with 40mm falling in the Grey District and 43mm in Hokitika. More rain fell in the south with 68mm being recorded at Paringa on the 29th. No reports of heavy rain causing problems were received. "The rain brought rivers up in South Westland, but not even to a year's fresh" (G.E.S. 30/10/1989).

6 - 8 NOVEMBER 1989

A moist northerly flow brought heavy rain to Westland which raised river levels. On the 6th 110mm of rain was recorded at Franz Josef with 64mm at Pukekura, 54mm at Hokitika and 45mm at Greymouth. Some surface flooding occurred on farms in South Westland on the 7th and closed the access road to Franz Josef Glacier (The Press 08/11/1989). River levels dropped on the night of the 8th, but were still above normal the next day (G.E.S. 08/11/1989).

During the night of the 8th, 96mm of rain was recorded at Pukekura and 93mm at Franz Josef. The only damage reported was some minor slips on roads in South Westland and some culverts which had been blocked, causing minor surface flooding. A minor slip occurred on the Greymouth approach to Cobden Bridge. No significant changes in river levels were reported (G.E.S. 09/11/1989).

15 - 16 DECEMBER 1989

A northward moving front produced heavy rain over much of the West Coast, bringing many rivers into flood. Between midnight on the 14th and 9.00 a.m. on the 16th the following rainfall recordings were made: Haast 214mm, Cropp River 627mm, Upper Crooked River 378mm, Moana 150mm, Ahaura 137mm, Greymouth Airport 164mm and Greymouth Harbour 140mm. In the Greymouth area, 93mm fell in the twenty-four hours to 9.00 a.m. on the 16th.

Minor damage occurred on the night of the 14th and early morning hours of the 15th when the rain commenced and rivers began to rise. A washout closed the Lower Buller Gorge and several county roads were scoured. At the Fox River in South Westland some rock protection works had to be repaired (G.E.S. 18/12/1989). The rivers rose rapidly early on the 15th. In the Grey River catchment, the Crooked River attained levels equal to those of September 1988. The river cut the Iveagh Bay and Haupiri roads, as well as farm access routes between Te Kinga and Rotomanu School. Haupiri School was closed for the day due to the flooding (G.E.S. 15/12/1989). The Grey River at Dobson peaked at 9.15 a.m., reaching 4.96m. Although precautions were taken in the Greymouth business district such as lifting carpets and filling gaps in the nearly completed flood wall, the river remained well below the old wharf level (G.E.S. 16/12/1989).

At 7.00 a.m. the Haast River reached a twenty year flood level, being only 66cm below the highway embankment at Haast Hotel. The Whataroa and Hokitika Rivers attained a two year and a one year level respectively (G.E.S. 15/12/1989). The causeway to the new Hokitika Bridge under construction was washed away (A. Husband pers. comm. 1990). The Waiho River reached near record levels. The Fletcher Bridge in the Waiho Valley was washed away by ice and gravel being brought down by the flooded river. The State Highway 6 road bridge across the Waiho was threatened as large logs being brought down by the Callery and Waiho Rivers were hitting the girders of the bridge. The northern stopbank downstream of the bridge, protecting the new Mercer Airfield was almost overtopped. At its peak the river was reported to have been only 30cm from overflowing the bank. Between 6.00 a.m. and 2.00 p.m., a 5m section of the land slumped and between 7.00 p.m. and 10.00 p.m., 250 tonnes of rock had to be put in place at the subsided area.

Despite heavy early morning rain on the 16th, river levels in the Grey catchment actually dropped, although high altitude rivers elsewhere rose slightly. Later in the morning the upper reaches of the Grey and Ahaura Rivers began rising again for a short period as did the Buller and Inangahua Rivers (G.E.S. 16/12/1989). The Waiho River, although still high, began falling quite rapidly (G.E.S. 19/12/1989). Some surface flooding occurred in Greymouth (G.E.S. 16/12/1989).

Many roads were affected throughout the period although damage was usually minor. State Highway 6 was blocked in numerous places, by the washout in the Lower Buller Gorge on the 14th, a slip at Ten Mile, and flooding on the Runanga side of the Camp Overbridge cut the road to light traffic (G.E.S. 16/12/1989). Flooding also closed the road at Jacob River and Boulder and Havelock Creeks between Fox and Haast, and slips at the Gates of Haast. State Highway 73 was affected by surface flooding at Jackson's and minor slips on the Otira Gorge. Small rockfalls occurred on State Highway 7 at Kamaka and the Greymouth side of the Cobden Bridge, but both this and the Otira route remained open (G.E.S. 15/12/1989).

28 - 29 DECEMBER 1989

A slow moving front travelling northwards produced heavy rain over much of the West Coast and brought most rivers into flood. The front arrived over South Westland at 3.00 a.m. on the 27th and reached Hokitika by 6.00 a.m. In the twenty-four hours to 9.00 a.m. on the 27th, Haast received 215mm of rain, Franz Josef 84mm and Pukekura 48mm.

Widespread surface flooding occurred on roads in South Westland although all remained open. The main problem area was at Boulder Creek and some small slips occurred at Kamaka (G.E.S. 27/12/1989). Serious damage resulted in the early morning of the 28th after another night of heavy rain. State Highway 6 between Otira and Arthurs Pass was blocked by a number of slips on the Otira Gorge road and Lake Misery flooded the road to a depth of 60cm. Other trouble spots for roadways were slips at Nine Mile and Kamaka, and flooding at Boulder and Havelock Creek. To the north the Buller River at Te Kuha registered 5.88m on the gauge at 8.00 a.m., although it probably rose higher than this as the telemetry system malfunctioned. The Karamea River attained high levels and the Inangahua River peaked at 10.30 a.m. but caused no damage. The high level of the Hokitika River damaged the causeway of the new bridge under construction (A. Husband pers. comm. 1990).

The most serious damage to occur was when the Waiho River changed course and broke through the stopbank protecting the new Mercer Airport at Franz Josef. When the river peaked at 6.00 a.m., about three quarters of it was flowing across the airfield. One plane was written off, a fuel tanker was submerged and tourist huts were washed away. The airfield itself was completely obliterated and the river was flowing across the lawn of the T.H.C. Hotel.

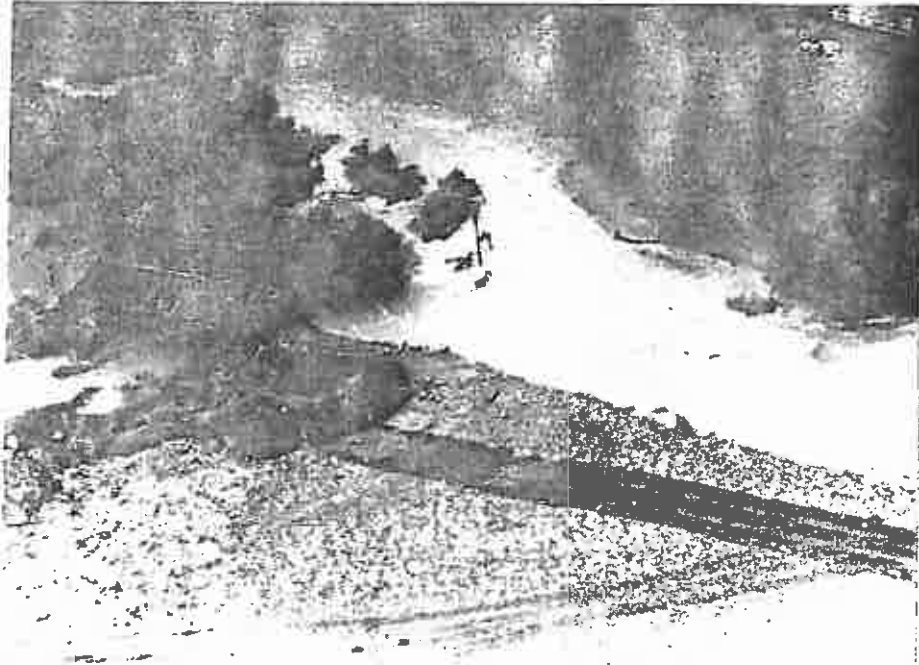


PLATE 16. WAIHO RIVER AT FRANZ JOSEF AIRPORT, 28/12/1989.
(West Coast Regional Council).

Between 9.00 a.m. on the 27th and 9.00 a.m. on the 28th, 133mm of rain fell at Franz Josef. "This is not a great quantity of rain, but the problem of the Waiho River has been compounded by the massive build up of river gravels and the subsequent dramatic raising of the river level over the last few years". It was thought the stopbank was breached at about 4.30 a.m. At 10.00 a.m. the Waiho road bridge was still under threat as the northern stopbank upstream of the bridge was eroding rapidly at its upstream end (G.E.S. 28/12/1989).

Only limited power supplies could be maintained in the area from the Fox power station. The new substation just north of the Fox River was washed out and considerable damage was sustained to the stations switchgear. Over a mile of powerlines were washed away (G.E.S. 29/12/1989). A generator had to be trucked to Franz Josef to provide a temporary electricity supply (G.E.S. 28/12/1989).

The Waiho was still high on the 29th and flowing down its new course across the airfield but had dropped considerably (G.E.S. 29/12/1989).

4 JANUARY 1990

A front moving rapidly up the West Coast produced heavy rain in South Westland. Between midday on the 4th and 9.00 a.m. on the 5th, 180mm of rain was recorded behind Hokitika and in the twenty-four hours to 9.00 a.m. on the 5th, 135mm fell at Franz Josef.

Widespread surface flooding occurred on State Highway 6 between Hokitika and Haast, particularly south of Fox Glacier. The Hokitika and Whataroa Rivers reached annual flood levels, but the Grey River only reached major fresh levels. Heavy surface flooding also occurred on State Highway 73 between Jackson's and Otira. All roads remained open (G.E.S. 05/01/1990).

14 - 16 JANUARY 1990

On the 14th heavy rain began falling in the coastal region north of Hokitika, affecting creek levels more than the major rivers. Coal Creek burst it's banks at the Camp Overbridge, closing the Coast Road for several hours; about 60cm of water covered the road. Surface flooding occurred at Atarau and Ngahere when Slatey Creek and Redjacks Creek overflowed. In Greymouth some surface water lay in the low lying areas. Minor slips fell on the Coast Road, on State Highway 7 at Kamaka and on the Greymouth side of the Cobden Bridge (G.E.S. 15/01/1990).

The Grey River peaked at 1.00 a.m. on the 16th, reaching 4.5m on the Dobson gauge, but dropped rapidly during the day as did other rivers and creeks. The causeway of the new Hokitika bridge under construction was again damaged by the Hokitika river (A. Husband pers. comm. 1990).

10 MARCH 1990

A heavy fresh in the Hokitika River again washed away the access way to the new bridge site. The water scoured out the earth embankment between the temporary wooden bridge and the Bailey Bridge spanning the north channel. Boats had to be used to gain access to the island while the access route was scoured out.

The river also carried away half a dozen spans of the causeway which bridge workers had been using to work from in between the piers (G.E.S. 12/03/1990).

Appendices

APPENDIX A. FLOOD PEAK DISCHARGES

BULLER RIVER AT TE KUHA (Site 93203)

DATE	TIME	PEAK DISCHARGE (CUMecs)
08/11/63	6.00 p.m.	4392
26/04/66	9.00 a.m.	3953
11/03/67	12.10 p.m.	4299
26/04/67	Midnight	3709
16/11/67	9.45 a.m.	4826
09/02/68	2.41 p.m.	4442
30/10/68	8.50 a.m.	5611
08/09/69	4.30 a.m.	4552
31/08/70	3.03 p.m.	8498
17/09/70	3.00 a.m.	6231
24/09/70	Midday	4038
03/10/71	3.31 p.m.	4065
03/10/71	11.10 p.m.	4568
07/10/72	10.00 p.m.	5848
21/11/73	5.41 p.m.	3715
14/04/74	9.00 p.m.	3936
02/04/75	7.00 a.m.	5250
27/01/76	11.50 a.m.	3847
15/07/76	4.23 p.m.	3969
19/01/77	6.00 a.m.	4344
28/03/78	3.10 p.m.	4173
07/05/79	2.45 a.m.	6793
03/12/79	8.00 a.m.	4656
24/01/80	9.32 p.m.	4875
21/05/80	6.49 p.m.	3748
16/08/80	6.34 p.m.	3817
29/04/81	7.00 p.m.	4335
06/10/81	12.26 p.m.	4296
15/04/83	Midday	5170
10/05/83	2.15 p.m.	3960
10/07/83	2.50 a.m.	6541
21/10/83	10.00 p.m.	6838
05/11/83	3.45 p.m.	4139
18/10/84	8.15 a.m.	5866
23/11/84	2.45 p.m.	5755
24/11/84	4.00 p.m.	3920
20/05/88	2.15 a.m.	7778
05/10/88	2.00 p.m.	5428

APPENDIX A. CONTINUED - GREY RIVER AT DOBSON (Site 91401)

DATE	TIME	PEAK DISCHARGE (CUMECs)
30/10/68	5.08 a.m.	3639
13/04/69	3.55 p.m.	4159
31/08/70	1.19 p.m.	4825
17/09/70	12.18 p.m.	4127
08/10/72	11.00 p.m.	4081
21/11/73	8.28 p.m.	3978
14/04/74	9.00 p.m.	3713
02/04/75	7.55 a.m.	4074
19/01/77	3.30 a.m.	4772
06/05/79	9.15 p.m.	3866
03/12/79	11.43 p.m.	3958
24/01/80	9.45 p.m.	3996
23/01/82	6.45 a.m.	3932
10/07/83	3.15 p.m.	4184
18/10/84	6.00 a.m.	3721
23/11/84	9.00 p.m.	4748
20/12/84	2.00 p.m.	3709
20/05/88	0.15 a.m.	5180
13/09/88	1.45 p.m.	5768
05/10/88	10.15 p.m.	3956

APPENDIX A. CONTINUED - HOKITIKA RIVER AT COLLIERS CREEK (Site 90604)

DATE	TIME	PEAK DISCHARGE (CUMECs)
01/04/75	6.22 p.m.	1820
12/05/78	11.15 a.m.	1835
02/12/79	9.08 p.m.	2048
25/12/82	7.00 a.m.	1911
19/12/84	11.30 p.m.	1802
04/02/87	10.45 a.m.	1845
19/05/88	12.30 p.m.	1923
15/12/89	5.45 a.m.	1857

APPENDIX A. CONTINUED - POERUA RIVER AT LOWER GORGE (Site 89601)

DATE	TIME	PEAK DISCHARGE (CUMECs)
22/01/82	11.32 a.m.	905
26/01/82	3.48 p.m.	810
27/01/82	0.35 a.m.	987
12/03/82	4.46 p.m.	858
25/12/82	7.00 a.m.	919
10/03/83	1.00 p.m.	1028
19/12/84	7.45 p.m.	936
28/01/87	6.15 p.m.	880
12/09/88	7.00 p.m.	837

APPENDIX A. CONTINUED - HAAST RIVER AT ROARING BILLY (Site 86802)

DATE	TIME	PEAK DISCHARGE (CUMECs)
03/11/73	8.52 a.m.	3751
15/03/74	5.38 a.m.	4615
05/12/76	1.00 p.m.	3651
27/03/78	9.38 a.m.	4792
12/05/78	9.38 a.m.	6442
14/10/78	5.20 a.m.	4340
06/03/79	11.36 p.m.	3522
22/01/82	10.15 a.m.	3821
20/05/82	10.15 a.m.	4019
25/12/82	3.48 a.m.	4275
27/01/84	1.45 p.m.	5302
20/12/84	9.00 p.m.	3669
21/12/84	9.30 a.m.	5109
04/02/87	6.15 a.m.	5125

NOTE: Data is from Westland Catchment Board/West Coast Regional Council Records. Recording Site Numbers are from Walter (1987).

APPENDIX B. CALCULATED FLOOD DISCHARGES AND RETURN PERIODS

Return Period (Years)	Buller (Te Kuha)	Buller (Rotoroa)	Grey (Dobson)	Hokitika (Colliers Ck)	Haast (Roaring Billy)
	Discharge (cumeccs)				
1	4000	78	3100	1500	3000
2	4600	87	3600	1700	3500
5	5500	103	4300	1850	4200
10	6200	114	4800	1930	4700
20	6800	125	5300	2100	5200
50	7700	139	6000	2120	5900
100	8300	150	6500	3200	6400

(Stocker 1990).

APPENDIX C. MAGNITUDE AND RETURN PERIOD OF MAY 1988 EVENT

River	Typical Level (m)	Rise Above Typical Level (m)	Peak Flow (cumecs)	Return Period (years)
Karamea	0.9	4.3	2300	7
Mangles	1.6	3.5	290	50
Matakitaki	-	-	1200	50
Maruia (at Falls)	0.8	4.3	1300	50
Buller (at Wolfs above Inangahua Junc)	1.4	7.0	5000	25 + (1)
Inangahua (at Landing)	0.9	5.8	3000	25 + (1)
Buller (at Te Kuha)	2.0	9.2	6700	18
Grey (at Waipuna)	1.3	4.1	1300	20
Ahaura (at Gorge)	2.2	5.7	2000	23 + (2)
Grey (at Dobson)	1.0	5.4	5100	25 + (2)
Hokitika	2.4	4.1	2000	4

(1) Highest since records began in 1963

(2) Highest since records began in 1968

(Fauth, 1988a)

APPENDIX C. CONTINUED - MAGNITUDE AND RETURN PERIOD OF SEPTEMBER 1988 EVENT

River	Typical Level (m)	Rise above Typical Level (m)	Peak Flow (cumecs)	Return Period (years)
Buller (at Woolfs above Inangahua Junc.)	1.4	5.4	No record	7
Inangahua (at Landing)	0.9	5.1	2200	10
Buller (at Te Kuha)	2.0	8.1		9
Grey (at Waipuna)	1.3	3.5	991	3
Ahaura (at Gorge)	2.2	4.6	1980	23 +
Grey (at Dobson)	1.0	5.8	5500	121 +
Hokitika	2.4	3.2	1400	1

(Fauth 1988b)

APPENDIX D. FLOOD WARNING LEVELSKaramea River

Levels refer to the gauge at the Gorge.

4.2 metres - Issue general warnings.4.6 metres - Overflow starts.Buller River

Levels refer to the gauge at Te Kuha.

7.0 metres - General warning, first stage.7.5 metres - Meadows and O'Connor floods.7.8 metres - Issue general warnings, second stage.8.5 metres - Orowaiti overflow starts.11.0 metres - (approx) - Road level at Hawkes Crag.Note: Road level at Hawkes Crag is about 15.2m (50ft) above normal river level.

APPENDIX D. CONTINUEDUpper Buller

Levels refer to gauge at Longford.

3.5 metres - General warning.

Grey River

Levels refer to the new metric staff gauge at Dobson.

3.1 metres - Omotumotu sports field floods.

3.4 metres - General warning.

4.0 metres - Grey River Gold floods.

4.6 metres - Stables at Omotumotu Racecourse flood.

5.3 metres - S.H.7 at Stillwater floods.

5.5 metres - Stormwater back-up in Greymouth.

5.8 metres - Grey River overtops wharf at Greymouth (pre flood wall level).

6.8 metres - (approx) - Grey River overtops Floodwall at Greymouth.

Hokitika River

Gauge levels refer to the staff gauge at Kaniere Bridge.

6.0 metres - General warning.

APPENDIX E. SPECIFIC DISCHARGES FOR MAJOR FLOOD EVENTS.

Site	Catchment Area (Km ²)	Peak Discharge (cumecs)	Date Recorded	Specific Discharge (cumecs/Km ²)
Te Kuha	6061	7645	4-5 Nov. 1926	1.26
Tutaki	65	141	4-5 Nov. 1926	2.16
Tiraumea	114	375	4-5 Nov. 1926	3.28
Karamea (Arapito)	1606	1897	10-12 Oct. 1936	1.18
" " (Mouth)	1632	3143	(?) 1914	1.92 (estimated)
Lake Rotoroa (Outfall)	383	109	10-12 Oct. 1936	0.28
" "	" "	88	21 Mar. 1938	0.23
" "	" "	133	26-27 Feb. 1940	0.34
Hokitika (Kaniere Bridge)	2696	4530	" "	1.68
Arahura (Road/Rail Bridge)	310	1252	" "	4.03
Ahaura (Road Bridge)	880	2517	" "	2.86
Taramakau (Kumara Bridge)	958	2526	" "	2.63
Grey (Brunner Gorge)	3807	5287	" "	1.38
Lake Rotoroa (Outfall)	383	328	4-8 Apr. 1942	0.85
" "	" "	77	17-19 Sep. 1943	0.20
" "	" "	73	15 Dec. 1944	0.19
" "	" "	119	9-10 Dec. 1946	0.31
Berlins	5910	12459	25-26 May. 1950	2.10
Inangahua (Landing)	1005	3540	" "	3.52

APPENDIX E. - CONTINUED

Site	Catchment Area (km ²)	Peak Discharge (cumecs)	Date Recorded	Specific Discharge (cumecs/km ²)
Maruia (Falls)	1020	1909	25-26 May. 1950	1.87
Lake Rotoroa (Outfall)	383	110	" "	0.28
Haast	1321	7362	25-26 May. 1950	5.57
Karangarua (Suspension Bridge)	368	2546	" "	6.91
Berlins	5910	3624	13 May. 1953	0.61
Lake Rotoroa (at outfall)	383	96	28 Nov. 1953	0.25

Note: The above information is derived from Cowie (1957). Catchment areas differ slightly from those below, obtained from Walter (1987). Site, discharge and date information below is from Fauth (1988 a,b).

Karamea (Arapito)	1200	2300	19 May. 1988	1.91
Maruia (Falls)	980	1300	" "	1.32
Te Kuha	6350	6700	" "	1.05
Waipuna	642	1300	" "	2.02
Dobson	3830	5100	" "	1.33
Hokitika (Colliers Creek)	352	2000	" "	5.68
Inangahua (Landing)	1000	2200	13 Sep. 1988	2.20
Waipuna	642	991	" "	1.54
Ahaura (Gorge)	790	1980	" "	2.50
Hokitika (Colliers Creek)	352	1400	" "	3.97

APPENDIX F. SYNOPTIC WEATHER CONDITION SUMMARIES AND RAINFALL DATA (WHERE GIVEN) LEADING TO MAJOR FLOODS.

8 - 9 FEBRUARY 1872

Notes for February 1872.

Hokitika. Showery generally, although some pleasant weather occurred; heavy rain fell on the 8th; winds moderate, prevailed from S.W; strong S.W. breeze on 9th, with rain. (N.Z.G. 24/04/1872).

24 - 25 JUNE 1905

In the South Island rainfall was very heavy about the 22nd and 23rd, and floods occurred in parts - on the West Coast and in Canterbury. The rain in Canterbury was preceded by a strong, dry, and warm nor-wester (a "fohn" wind) which ended in rain ... It was noted that when the heavy rains occurred at Greymouth the wind changed round from the west to the east by the north, with a very heavy bank of clouds, which ultimately disappeared away to the east... It would appear as if the rain had circled round Canterbury along the ridges and to the westward of the Southern Alps.

Station	Date of Heaviest Fall	Rainfall(mm)
Reefton	24	121
Greymouth	24	121
Denniston	23	63
Westport	24	65

(N.Z.G. 20/07/1905).

28 MARCH - 1 APRIL 1913

The atmospheric disturbances were of the westerly low-pressure type passing to the southward of New Zealand. Of these, the most notable one was that which influenced weather conditions between the 26th and 30th. During this period extremely heavy rains occurred in the high level of the South Island and in Otago, causing floods in many of the larger rivers.

Station	Date of Heaviest Fall	Rainfall(mm)
Reefton	29	42
Greymouth	29	44
Otira	28	224
Karamea	28	12

Note: On four days the Mt Cook Hermitage recorded 557mm and of this 485mm fell in two days.

(N.Z.G. 01/05/1913).

Note: Rainfall data between September 1925 and February 1935 is not given as N.Z.G. tables do not present maximum rainfall data during this period. October 1936 data is not given as heaviest rainfall occurred much later in the month.

22 SEPTEMBER 1925

The weather during September was, on the whole, unsettled, bleak and squally. Westerly disturbances predominated, and were usually of considerable extent and intensity. Rainfall was therefore above average in districts having a westerly aspect...Conditions were severe from the 19th to the 27th, very heavy rains accounting for flooded Westland rivers about this time. (N.Z.G. 05/11/1925).

4 - 5 AND 10 - 11 DECEMBER 1925

Warm, dry, and windy weather was experienced during December in most parts of the Dominion and except in Westland and the high country of the South Island, the aggregated month's rainfall was everywhere below the mean. The latter districts had more than their average precipitation chiefly owing to two severe storms, one which ruled on the 3rd and 4th, and another between the 9th and 11th. The heavy rains during these two periods caused floods in the West Coast rivers...(N.Z.G. 11/02/1926).

30 - 31 OCTOBER 1926

An extensive westerly disturbance during the last week was complicated by a well defined cyclonic system which invaded the larger area of low pressure. The centre of the latter storm passed through Cook Strait during the night of the 28th. There were some heavy rainfalls accompanying thunderstorms in the south at the close of the month. (N.Z.G. 09/12/1926).

4 - 5 NOVEMBER 1926

The outstanding feature of the month was the severe floods in Westland in the beginning of the month. Through an exceptional rise in the Buller River, Westport experienced one of the worst floods in the history of that town. The heavy rains at the end of the previous month had soaked the land and swollen the streams, while much snow had also fallen in the mountains. On the 3rd November an extensive westerly disturbance brought further heavy rain, and this, combined with the melting of the snow, accounted for record floods. (N.Z.G. 23/12/1926). See text for rainfall figures.

5 JUNE 1929

June began with good weather, in continuance of the fine and dry conditions which had been the rule during May. General rains were recorded between the 7th and 12th, with many heavy falls in districts with a westerly aspect... (N.Z.G. 15/08/1929).

2 AND 22 FEBRUARY 1931

From the 1st to the 3rd a series of westerly depressions passed. Northerly gales blew in places on the 2nd. Heavy rain fell on the West Coast, Harihari experiencing a very heavy flood. After the 19th a further series of westerly depressions was responsible for a period of very stormy weather. On the 22nd northerly gales were widespread and heavy rain was almost general. A cyclonic system developed west of Greymouth, and exceptionally heavy rain occurred as it moved eastward; 317mm fell at Greymouth in about twelve hours, constituting the heaviest fall ever recorded there. Arthurs Pass had 286mm (N.Z.G. 07/05/1931).

3 APRIL 1931

A series of storms occurred during April. The first occurred on the 2nd and 3rd. A deep and complicated depression moved from the Tasman Sea on to New Zealand. The variation in pressure in front of it was very rapid, and consequently conditions favoured strong northerly winds. Actually, these reached gale force over a wide area, extending from the extreme north to beyond Christchurch. Rain was practically general; some of the total registrations for the 2nd and 3rd were over 222mm at Collingwood, over 611mm at Bainham, 428mm at Karamea, 259mm at Millerton, 385mm at Tiroroa and 284mm at Otira. (N.Z.G. 25/06/1931).

31 JANUARY 1933

The outstanding feature of the month, as in the previous was the general low pressure and disturbed conditions prevailing in the tropics...

On the 17th, a deep westerly depression moved on to the South Island. This was successively rejuvenated, so that it was not until the 22nd that it finally moved away. Muggy weather, with rains of irregular character, continued throughout this period.

An equally slow moving anticyclone then took place of the depression, and fine, cool weather prevailed at most places until the 28th, when a fresh and complex depression commenced to affect our weather in a series of waves. Warm and humid conditions set in again. As a result of heavy rains on the 30th and 31st, there was severe flooding in northern Nelson and Marlborough, and in Westland. (N.Z.G. 23/03/1933).

19-20 FEBRUARY 1935

From the Meteorologists point of view the breaking of the drought was a rather tame affair. As regards pressure and wind there was no storm of note during the month. There is no doubt, however, that in the continued hot weather great quantities of moisture had been taken up into the atmosphere and it required only a slight disturbance to cause heavy precipitation. In the early part of the month the unstable conditions were shown by the frequency of thunderstorms and heavy local downpours. These continued until the last week, but in the later stages were associated with more general rains. Severe local flooding resulted in a number of places.

The wettest period of the month commenced after a series of shallow depressions on the 19th and continued until the 24th. On the 19th Hokitika had the worst flood it had ever recorded. The same fate was experienced by Taranaki and parts of North Auckland on the 22nd. The heavy rains during this period were associated with a strong invasion of cold air from the south which forced up the warm and damp air over the Dominion, causing it to drop a large part of its moisture. (N.Z.G. 28/03/1935).

10 - 12 OCTOBER 1936

During the first eleven days a series of vigorous westerly depressions crossed the Dominion, and north-westerly or westerly gales were blowing in some part or other throughout. The gale on the night of the 8th to morning of the 9th was particularly severe, and some damage was done, especially in the Wellington, Westland and Canterbury Provinces. The gale was accompanied by general rains, which were very heavy on the West Coast and in the high country of the South Island. Floods occurred on the West Coast, that at Greymouth being reported as the highest in twenty two years. The Waimakariri River (Canterbury), also, was in high flood, the highest level exceeding anything during the preceding sixty years. Many severe thunderstorms were experienced during the 8th and 9th.

On the 11th and 12th the weather changed, the winds turned to southerlies... some snow fell in the ranges and the high levels of the South Island. South - westerly weather predominated until the 16th. (N.Z.G. 26/11/1936).

13 - 14 APRIL 1938

In the beginning of the month there was an almost stationary cyclone located over the North Tasman Sea. It finally moved eastwards and passed north of New Zealand on the 4th to 5th. This storm, combined with a shallow depression from the west, caused very heavy rain in the Auckland Province and parts of Taranaki and the Manawatu. In the two areas last mentioned it resulted in the breaking of a long spell of dry weather.

On the 13th one of the low-pressure centres referred to formed west of Nelson. It was rather deep and crossed the South Island during the next day. This storm, occurring just before Easter, caused general rain with many heavy falls and considerable flooding, especially in the South Island, where road traffic was disorganized on Good Friday. The weather remained unsettled throughout a large part of Easter at many places.

Station	Date of Heaviest Fall	Rainfall (mm)
Westport	13	46
Hokitika	13	81

(N.Z.G. 02/06/1938).

26 - 27 FEBRUARY 1940

Apart from rain in the south-west, fair conditions prevailed until the 23rd when rain commenced in Taranaki. One of the centres of the approaching disturbance developed into a small but active cyclone, which produced general rain over the North Island as well as Nelson and Marlborough. Heavy falls in the King-Country and Taranaki were followed by severe floods and slips, while the dry spell was broken in Poverty Bay. The weather improved following the rapid passage of the cyclone, but by the 26th the situation had reverted to the westerly type with vigorous depressions crossing New Zealand, the rain being confined mainly to Otago and Westland. Strong northerly to westerly winds prevailed and many gales were experienced on the 27th and 28th. Showery weather continued south of Taranaki and heavy falls occurred in the Southern Alps.

Station	Date of Heaviest Fall	Rainfall (mm)
Westport	23	72
Hokitika	28	66

(N.Z.G. 20/03/1942).

4 - 8 APRIL 1942

On the West Coast the persistent rain during the first week caused local flooding, as well numerous slips and washouts.

Pressure continued high to the north-east of New Zealand but low to the south of the Tasman Sea, so that west to north-west winds prevailed. Conditions were very mild and humid with thick weather in western districts, more especially in the South Island. On an almost stationary trough a depression developed during the 6th and as this moved from the central Tasman across southern New Zealand there were north-westerly gales and some moderate rain in the central provinces, steady falls continuing in Westland. A secondary disturbance followed, bringing strong westerlies which gradually turned south-westerly, so that by the 9th cold, changeable and showery weather became almost general.

Station	Date of Heaviest Fall	Rainfall (mm)
Westport	4	38

(N.Z.G. 21/05/1942).

23 FEBRUARY 1949

On the 21st an anticyclone crossed over to the east of the Dominion. Skies became overcast and northerlies increased next day in advance of a deep depression whose centre passed over Southland on the 23rd. It produced general rain, except in Hawkes Bay, and some heavy falls about the Southern Alps.

Station	Date of Heaviest Fall	Rainfall (mm)
Westport	22	49
Greymouth	22	50
Hokitika	22	61

(N.Z.G. 17/03/1949).

25 - 26 MAY 1950

The southern anticyclone passed across to the east of New Zealand on the 23rd, where it became stationary and intensified further. Rain fell for a time in Westland and Southland during the passage of deep depression in the far south on the 24th. The following wedge gave a very brief clearance during the night.

A severe storm which was deepening rapidly off New South Wales on the 24th, then crossed the Tasman Sea, later passing close to Southland on the morning of the 26th. With its approach, northerly winds prevailed and gradually increased to gale strength in the South Island. Rain became general except in coastal districts east of the main ranges where only a few scattered showers managed to penetrate. As a result of exceptionally heavy rains in and west of the Southern Alps, rivers in Westland and Canterbury were in high flood by the 27th.

Even though the storm centre moved away steadily to the south, northerly winds and unsettled weather continued.

Station	Date of Heaviest Fall	Rainfall (mm)
Westport	26	48
Greymouth	26	72
Hokitika Airfield	26	110

(N.Z.G. 22/06/1950).

4, 14, 26 - 27 DECEMBER 1957

On the 2nd conditions were fair, under the influence of a weak ridge of high pressure. However, for the next three days the passage of another depression to the south caused general rain, except in eastern districts north of Christchurch. Heavy falls were reported in the Alps, with serious interruptions in road and rail transport. From the 6th to the 8th a south westerly airstream covered the country, with showers in some areas; but the 9th was mainly fair.

For the next three days western and northern areas of both Islands received rain as a depression from the central Tasman Sea passed to the south west of Southland. A trough of low pressure became stationary over the North Island on the 13th and secondary depressions developed on it, resulting in six days of unsettled weather, with flooding in western districts of both Islands. On the 20th a ridge of high pressure extended over New Zealand from an anticyclone centred far to the north. The weather was fair apart from rain on the West Coast associated with the approach of a depression across the South Tasman Sea. Rain became general over the South Island on the next two days as the depression passed to the south west. From the 23rd to the 25th an anticyclone was centred west of Auckland, but the passage of a weak trough over the South Island caused conditions to remain unsettled on the West Coast. On the following day a depression formed over Westland and deepened rapidly moving southward. Strong westerly gales were reported in Cook Strait; rain affecting mainly western districts as far north as Taranaki. There were particularly heavy falls in the Alps, with floods in several Canterbury (and Westland) rivers.

Station	Date of Heaviest Fall	Rainfall (mm)
Franz Josef	26	244
Haast	26	75
Mt Cook Hermitage	26	491

Note: In the Alps, December 1957 was the wettest of any month in over 50 years of records. Arthur's Pass received 1194mm; and the Hermitage, Mt Cook received 1295, of which 491mm fell on the 26th (N.Z.G. 23/01/1958).

10 MARCH 1958

Widespread flooding occurred in South Westland after a period of incessant rain. In twenty four hours to 9.00 a.m. on the 10th, 152mm of rain was recorded at Paringa (G.E.S. 10/03/1958). Between 10.00 a.m. and 10.30 p.m. on the 10th a further 205mm was recorded in South Westland, raising many rivers to record levels.

State Highway 6 was closed for a number of days because of washouts and slips damaging roads and bridges. At Whataroa Bluff and an 80m stretch of road south of the Whataroa Bridge were washed out and a mechanical digger near the bridge was swept away and written off. A bridge approach in Whataroa township was destroyed by floodwaters and substantial slips occurred on the road in the Mt Hercules area (G.E.S. 11/03/1958). At Mt Bonar 300m of road were badly scoured and the Evans Creek Bridge was closed to heavy traffic as two piers were coured out over 18m of the bridge approaches to the Little Waitaha River were washed away (G.E.S. 12/03/1958).

Most farming land in the Kokatahi and Kowhitirangi Valleys was flooded to levels higher than those of the Boxing Day 1957 or January 24 1958 flood. Paddocks were severley sitted and debris was strewn high in fences. In this area stretches of highway channelled torrents of water down them and many bridge approaches were damaged. From the bottom of the hill at the junction of State Highway 6 and the road to Lake Kaniere, a solid sheet of water extended almost to the Longford Hotel. The Greymouth to Hokitika section of State Highway 6 was also badly flooded between Arahura and Awatuna and the bridge approaches to Serpentine Creek were partially scoured (G.E.S. 11/03/1958).

27 - 28 MARCH 1963

The period from the 13th to the 26th was one of dry weather for the greater part of the country. For the first week of this period pressure remained high over the Tasman Sea and the North Island, while depressions passed far to the south and south east. Winds were mainly south westerly, strong at times in the far south. In Southland and Fiordland the weather was unsettled, and the West Coast also received rain on several days.

On the 21st unusually strong westerlies caused damage in Southland. During the 25th and 26th pressures remained high to the east of the North Island while a very deep depression over the Tasman Sea moved southward and the associated trough of low pressure approached the South Island. In the strong north westerly airstream heavy rain came to West Coast on the 26th and 28th.

Station	Date of Heaviest Fall	Rainfall (mm)
Totara Flat	27	35
Greymouth	26	67
Hokitika	26	95
Franz Josef	26	298
Haast	26	117

(N.Z.G. 24/04/1963).

10 - 12 MARCH 1967

By the 4th an anticyclone was centred to the east of the Chatham Islands. Pressures were low over, and to the south of, the Tasman Sea and warm northerlies developed over most of the country. On the 4th and 5th a trough of low pressure brought rain to the greater part of the South Island with some heavy falls in South Westland. By the 8th the anticyclone was centred far to the east of the Chatham Islands. As pressures fell once again over the Tasman Sea winds became more northerly over the greater part of the country. A depression from the north Tasman Sea moved towards Cook Strait and a trough of low pressure progressed slowly north-eastward over the South Island. Copious rain fell on the West Coast and in the Alps, with flooding at Greymouth. On the 11th the trough reached the North Island and started to move more rapidly, while the weather cleared over the southern half of the South Island.

Station	Date of Heaviest Fall	Rainfall (mm)
Westport Aero	10	57
Lake Rotoiti	11	27
Hokitika Aero	10	166
Reefton	10	61
Totara Flat	10	94
Greymouth	10	141
Harihari	10	174
Haast	10	156
Milford Sound	10	345

(N.Z.G. 04/05/1967).

17 NOVEMBER 1967

From the 5th to the 7th a deep depression crossed the south Tasman Sea and moved past Campbell Island, while two associated troughs crossed the country. Winds were mainly between north-west and south-west, reaching well beyond gale forces in some areas, especially about Cook Strait. Excessive rain was reported in the Alps and on parts of the West Coast...A brief temporary improvement occurred in most areas on the 8th, with a small ridge of high pressure over the North Island. However, some light rain was still reported in the Alps and on parts of the West Coast.

Six days of strong westerlies followed. During the 9th and 10th a depression crossed the North Island and moved to the east of the South Island; a cold front moved over the country behind the depression. Rain was fairly general. The westerly to south westerly airstream behind the front continued for two more days, with rain on the West Coast and in the Alps. Somewhat similar conditions persisted during the 13th and 14th. The rain on the West Coast and in the Alps became much heavier.

The cold front was stationary over the northern half of the South Island on the 15th and 16th, owing to the formation of a wave depression on it over the Tasman Sea. Heavy rain persisted in Westland.

Station	Date of Heaviest Fall	Rainfall (mm)
Lake Rotoiti	15	39
Reefton	15	62
Totara Flat	15	67
Harihari	16	187
Franz Josef	16	174
Haast	13	115
Milford Sound	13	131

(N.Z.G. 11/01/1968).

9 - 10 APRIL 1968

On the 7th an anticyclone was centred to the south east of the Chatham Islands and a tropical storm over New Caladonia was moving southward. Temperatures remained warm and it was still raining in Northland. On the following day warm moist north easterly rain spread to the West Coast and Bay of Plenty. By the 9th, the tropical storm had reached Northland, while a cold front moved onto the South Island. Rain spread over the whole country, with many heavy falls on this and the following day; flooding being reported especially in Northland, Auckland, Bay of Plenty, Nelson and Buller. The tropical storm moved rapidly southward and by early morning on the 10th it was centred near Napier, while the cold front had reached Cook Strait. Strong gales buffeted many districts, with exceptionally violent and destructive southerlies around Wellington. As the centre of the storm moved southward along the coast towards Dunedin the weather cleared except in Canterbury, Otago and Southland, where the rain became heavier. Flooding was soon reported in parts of Canterbury and snow fell on the high country there.

Station	Date of Heaviest Fall	Rainfall (mm)
Westport Aero	8	71
Cobb Dam	8	74
Lake Rotoiti	9	90
Hokitika Aero	8	69
Reefton	8	95
Totara Flat	8	39
Greymouth	8	120
Harihari	8	124
Franz Josef	8	76

(N.Z.G. 30/05/1968).

31 AUGUST 1970

An anticyclone to the south-west of Southland moved eastward and as the depression also moved in this direction, cold southerlies covered the country from the 22nd to the 24th. The rain cleared first in the west of the South Island and later in the remainder of the South Island and in most western and northern districts of the North Island. On the following day an anticyclone covered New Zealand and the weather was fair.

As the anticyclone moved away to the east and pressures became very low to the south of Tasmania, strong northerlies set in, with rain commencing on the West Coast on the 26th and spreading over most of the country with the advance of a trough of low pressure during the following two days. By the 29th the trough had become stationary through Cook Strait, causing excessive rain about and east of Nelson City with a major flood. On the following day the trough moved southward with excessive rain in the Alps, causing serious flooding in the Grey and Buller Rivers. Rain continued on the West Coast and in the Alps, and spread also into Otago and Southland. On the last day of the month a small depression formed over Westland and the trough moved northward again, affecting the same parts of the South Island but also western districts of the North Island from Wellington to Taranaki, with considerable falls occurring there.

Station	Date of Heaviest Fall	Rainfall (mm)
Westport Aero	30	80
Murchison	30	96
Lake Rotoiti	30	31
Hokitika Aero	30	84
Reefton	30	166
Totara Flat	30	66
Greymouth	30	138
Harihari	30	208
Franz Josef	30	268
Haast	30	67
Milford Sound	30	178

(N.Z.G. 01/10/1968).

17 SEPTEMBER 1970

From the 5th to the 17th there was a marked predominance of northerly to westerly winds. During the 5th and 6th a deep depression to the south of Tasmania moved eastward while two associated troughs crossed New Zealand. In Westerly rain affected western districts of both islands. Further troughs crossed the country during the next two days as the depression passed far to the south of New Zealand, with rain still affecting mainly the West Coast. During the 9th and 10th a depression from the Mid Tasman Sea moved south eastward over Southland while a second centre formed to the north west and the trough associated with the two depressions moved onto the country. Winds were predominantly strong northerlies, rain persisted on the West Coast and spread to Nelson, Bay of Plenty, Taupo and Southland. On the 11th there was a change to westerly to south westerly winds and general rain. During the next two days a ridge of high pressure extended onto the country from an anticyclone passing to the north. Showers at first extended to western districts of both islands and Southland, but by the 13th had cleared over the North Island.

During the 14th to the 17th pressures remained high to the east and low to the south, and two active troughs in succession crossed the country. These were four rather wet days, especially in western and northern districts, while in the east the rain was lighter. Floods were reported on the West Coast, in Nelson and in North Otago.

Station	Date of Heaviest Fall	Rainfall (mm)
Westport Aero	16	66
Cobb Dam	16	73
Murchison	16	67
Hokitika Aero	16	69
Reefton	16	117
Totara Flat	16	63
Greymouth	16	79
Harihari	16	169
Franz Josef	16	252

(N.Z.G. 05/11/1970).

18 - 19 JANUARY 1977

On the 17th a cold front passed over the South Island. Pressures were high to the north of New Zealand with a depression centred near Tasmania.

By the 18th the depression near Tasmania had moved east onto the South Island and heavy rainfalls of between 50 and 200mm were recorded in Westland, Canterbury and Marlborough. Heavy falls in the Greymouth area resulted in major flooding.

Station	Date of Heaviest Fall	Rainfall (mm)
Westport Aero	18	79
Lake Rotoiti	18	75
Hokitika Aero	18	46
Reefton	18	46
Totara Flat	18	91
Greymouth	18	60
Springs Junct	18	78

(N.Z.G. 03/03/1977).

24 JANUARY 1980

By the morning of the 18th a depression had moved to the east and was lying near the Chatham Islands. Later on the same day a depression with associated cold front moved towards the South Island from the Tasman Sea, and by the morning of the 19th the cold front had moved onto Fiordland. As this front crossed the country heavy rain was reported on the West Coast, Wellington, Manawatu and Taranaki.

On the 21st a wave depression formed on a front in the Tasman Sea and this moved across the North Island early on the 22nd...bringing moderate rain throughout North Island districts and in the northern half of the South Island.

A depression in the Tasman Sea moved east and crossed the South Island on the 23rd, and this was followed by a trough of low pressure on the 24th. On the West Coast twenty-four hour falls of more than 50mm were reported, with light to moderate falls throughout the South Island (N.Z.G 13/03/1980).

Date	23	24	Total Fall (mm)
Station	Rainfall (mm)		(mm)
Inchbonnie	84	52	136
Kowhitirangi No 2	40	23	73
Lake Kaniere	56	26	82
Springs Junction	34	32	66
Ngakawau	27	82	109
Westport Aero	27	68	95
Inangahua	17	79	96
Arapito	20	25	45
Wangapeka	3	34	37
Lake Rotoroa	10	53	63
Lake Rotoiti	5	43	48
Hokitika Aero	41	19	60
Kowhitirangi Fairhave	36	18	54
Ross	55	8	63
Mai Mai 4	9	61	70
Barrytown	26	73	99
Totara Flat	19	83	102
Greymouth Aero	36	95	131
Dobson	33	64	97
Paroa	29	39	68
Reefton	22	69	91
Blackball	35	76	111
Atarau	30	91	121
Otira	67	84	151

(N.Z.M.S. Monthly Summary for January 1980).

22 - 24 NOVEMBER 1984

A cold front moved onto the country during the 15th and rain became widespread, apart from eastern areas of both Islands. Temperatures remained mild. Rain continued in most areas on the 16th, but by the 17th had cleared apart from the south and west of the South Island, and some very light falls in western areas of the North Island. A strong south-westerly flow developed over the country on the 18th.

Temperatures were cool and there were showers in many areas on the 18th and 19th as a front within the flow crossed the country. By the 20th an anticyclone extended over the north of the country, with a south-westerly flow remaining to the south. Apart from continuing showers in South Westland and Fiordland the weather was fine. During the 21st a cold front moved onto the south of the South Island, bringing rain to southern and western areas.

A strong north-westerly flow associated with a deep depression near MacQuarie Island covered the South Island on the 22nd. A front within this flow brought rain to much of the South Island on the 22nd, with very heavy falls in Westland and Fiordland. Temperatures were very mild especially in eastern areas. Rain spread to the south of the North Island on the 23rd as the front began to cross the country.

Among the heavier seventy-two hour falls recorded between the 21st and 23rd were: Inchbonnei 415mm, Lake Kaniere 296mm, Kowhitirangi 237mm.

Station	Date of Heaviest Fall	Rainfall (mm)
Cobb Dam	22	30
Arapito	21	85
Lake Rotoroa	22	44
Lake Rotoiti	22	50
Hokitika Airport	22	71
Punakaiki	23	68
Reefton	22	62
Barrytown	23	70
Totara Flat	22	54
Otira Substation	22	201
Springs Junction	22	85
Pukekura	21	60
Okarito	21	42

(N.Z.G. 23/01/1985)

19 - 20 MAY 1988

For the first few days of May, mostly fine, settled weather predominated, as an anticyclone moved across New Zealand. This was followed by a period of disturbed west to south-westerly conditions, which affected the South Island. At the beginning of the second week a depression situated in the North Tasman Sea moved south-east. This brought a moist northerly airstream onto the north of the North Island. By the 11th the depression lay to the south-east and disturbed westerlies prevailed as a trough covered the country. Cold south to south westerlies then prevailed for the next week, due to a series of deep depressions which passed to the south of New Zealand.

Surface flooding occurred in Invercargill on the 14th and 15th. This was reported to be the worst in ten years, excepting that of 1984. A civil emergency was declared in Greymouth due to flooding on the 19th. At least a metre of water was reported to have been flowing through most of the central business area. Damage costs were estimated to be around \$2 million, with 102 families affected.

Date	Rainfall (mm)												Total Fall (mm)	
	8	9	19	11	12	13	14	15	16	17	18	19		20
Arnold Power Station	19	50	15	22	23	2	25	28	2	75	33	27		321
Mitchells	17	44	25	40	23	5	19	17	1	73	45	24	1	334
Inchbonnie	16	44	34	57	22	1	58	18	1	99	54	69	1	474
Kumara Reservoir	11	41	38	40	6	-	-	13	15	14	43	21	2	244
Kowhitirangi No 2	4	23	15	19	12	2	20	6	0	13	26	8	0	148
Kokatahi	7	34	12	29	12	3	25	8	0	30	26	8	-	194
Lake Kaniere	9	28	25	52	2	4	28	9		11	15	37	22	242
Springs Junction	21	29	6	19	23	1	33	27	3	33	40	112	-	347
Pukekura	4	18	17	22	12	2	27	6	-	66	12	14	-	200
Ngakawau	55	67	13	23	22	-	9	16	1	50	51	42	-	349
Cape Foulwind Ed 1	40	63	6	11	10	2	1	28	5	51	29	10	0	256
Westport Aero	44	54	7	16	15	2	4	27	5	58	31	9	0	272
Westport Marine	42	53	8	11	18	2	2	23	4	45	27	4	0	239
Inangahua	45	59	4	26	25	5	12	3	33	66	70	30	0	378
Arapito	28	5	9	25	27	-	8	18	3	54	40	27		244
Wangapeka	25	15	2	14	20	-	3	11	-	37	30	76		233
Seddonville	32	54	7	27	18	-	11	12	8	38	61	34		302
Lake Rotoroa	-	-	52	24	30	10	-	25	-	28	28	70		267
Lake Rotoiti	26	12	8	20	21	0	11	12	0	17	23	43		193
Matakitaki	22	40	4	22	24	0	9	12	1	37	33	56		260
Hokitika Aero	10	32	15	20	8	3	18	13	1	68	23	10		221
Kowhitirangi Fairhave	4	27	13	22	8	3	24	8	-	133	27	9		278
Ross	4	33	-	35	10	2	20	6	-	85	17	12		224
Punakaiki Rocks	28	71	23	22	17	1	1	16	6	35	31	14	1	266
Mai Mai 4	-	-	-	-	116	-	8	21	26	-	75	52		298
Barrytown	23	52	20	27	16	2	13	20	8	38	33	21		273
Totara Flat	22	32	5	24	13	2	20	24	8	19	49	63		281
Greymouth Harbour	29	68	18	10	10	-	-	30	5	51	30	-		251
Greymouth Aero	26	46	14	16	9	1	7	15	5	46	25	4		214
Runanga	34	79	23	10	12	2	16	23	7	37	32	7		282
Dobson	29	69	22	-	36	3	1	23	6	48	40	15		292
Paroa	26	52	14	24	13	3	4	15	6	49	30	5		241
Kokiri, Maori Gully Road	15	58	17	24	30	1	34	35	4	68	15	47	0	348

- = No record (N.Z.M.S. Monthly Summary for May 1988).

13 SEPTEMBER 1988

Disturbed westerly conditions predominated from the 5th, as a series of troughs of low pressure travelled east across New Zealand. A substantial amount of rain was recorded in Greymouth, in moist northwesterly conditions, as a particularly active trough affected the area on the 12th and 13th.

Heavy rain, totalling 111mm at Greymouth and as much as 200mm in the high-country, was recorded in the twenty-four hours to 9am on the 13th. This caused the Grey River to burst its banks and severe flooding occurred in Greymouth. About 200 houses were flooded and the flood was noted as being the worst ever recorded there.

Daily Rainfall Recordings for 10-13th September 1988

Date	10	11	12	13	Total Fall (mm)
Station	Rainfall(mm)				
Arnold Power Station	60	44	67	34	205
Haupiri Coates	73	29	120	42	264
Mitchells	69	61	106	54	290
Inchbonnie	139	53	203	67	462
Kowhitirangi No 2	60	32	130	15	237
Kokatahi	58	38	104	29	229
Lake Kaniere	-	-	-	-	-
Springs Junction	13	34	89	52	188
Pukekura	85	22	93	10	210
Ngakawau	29	7	51	15	102
Westport Aero	19	4	65	9	97
Inangahua	15	21	93	40	169
Wangapeka	3	4	11	32	50
Seddonville	32	22	47	18	119
Lake Rotoroa	-	21	31	47	99
Lake Rotoiti	6	5	17	28	56
Matakitaki	22	11	52	42	127
Hokitika Aero	36	45	110	13	204
Kowhitirangi fairhave	58	35	142	15	250
Ross	70	32	94	19	215
Punakaiki Rocks	28	12	99	10	149
Barrytown	34	17	103	16	170
Totara Flat	23	17	58	13	281
Greymouth Harbour	-	56	111	-	167
Greymouth Aero	27	11	90	-	128
Runanga	38	26	125	11	200
Dobson	49	26	117	38	203
Paroa	34	26	115	11	186
Kokiri, Maori Gully Road	69	52	78	48	247

- = no record
(N.Z.M.S. Monthly Summary).