

**BUREAU OF METEOROLOGY
QUEENSLAND REGIONAL OFFICE**

**FLOODING IN NORTH QUEENSLAND COASTAL RIVERS
JANUARY - FEBRUARY 1991**

SUMMARY

In the two months following the coastal crossing of Tropical Cyclone Joy near Ayr on the 26th December 1991, residents along Queensland's North Tropical Coast experienced one of their wettest seasons on record. Flooding in many coastal streams between Cairns and Mackay was virtually continuous during this period as various parts of the coast came under the influence of the active monsoon trough located across northern Australia.

Severe major flooding occurred in the Tully River near Euramo, the Herbert River at Ingham and Halifax, the Haughton River at Giru and the Burdekin River in and around the Ayr and Home Hill areas. Significant flooding also developed in the numerous small coastal streams in the area.

Flood peaks at the major towns were generally the second or third highest on record but in many parts of the catchments record flood levels were recorded.

Damage estimated at many millions of dollars was caused to road and rail infrastructure, losses to livestock and crops (especially sugar cane) were high and significant damage was caused to residential and commercial properties. Several lives were lost as a result of the flooding, and many more were placed in great danger. The State Emergency Service, police and local councils were involved in many flood operation tasks aimed at minimising loss of life and damages.

METEOROLOGICAL CONDITIONS

The synoptic situation during January and February was dominated by the monsoon trough located across northern Australia. At the start of January the trough extended from a low pressure area located off the coast near Ingham. Scattered showers and storms occurred in areas north of the trough. South of the trough a deep moist easterly airflow produced widespread moderate to heavy rain in coastal areas. A surface low developed along the monsoonal trough in the Southern Gulf of Carpentaria. Widespread rain continued with local heavy falls on the North Coast due to a converging easterly airflow in the area.

During February several low pressure areas developed within the trough, causing isolated areas of very heavy rain in coastal areas.

FLOODING

TULLY RIVER

The Tully River caused three periods of flooding during January and February 1991. The first period commenced on the 10th January when heavy rainfall fell over the lower parts of the catchment in the Tully area. The river at Euramo rose rapidly during Thursday 10th January and reached about eight metres late that night. Further heavy rain maintained river levels around the eight metre mark for the following five days. River levels commenced falling on the 17th January after heavy rain had cleared from the area. During this period, Tully experienced close to eight consecutive days with rainfalls of greater than 100 millimetres. The heaviest daily total was 241 millimetres, recorded in the twenty-four hour period to 9AM Friday 11th January.

The second period of flooding occurred during the weekend of the 2nd and 3rd of February following heavy rainfalls of 98 millimetres and 167 millimetres on Friday 1st and Saturday 2nd February respectively. The rain fell on an already wet catchment and caused immediate river rises at Euramo. The river peaked at about 8.15 metres on Saturday 2nd. Heavy rain cleared from the area during the Sunday and river levels commenced falling soon after.

The third period of flooding commenced around the 17th February after 316 millimetres was recorded at Tully overnight. Again the catchment was saturated and river rises were rapid. The river at Euramo rose to a peak of 8.64 metres around midnight on Sunday 17th. Further rain of 209 millimetres on Wednesday 20th caused slight renewed rises to around 8.4 metres. No further heavy rain was reported and river levels commenced to fall below flood height.

On each occasion the river caused moderate flooding in the Euramo flats area and cut the Bruce Highway at the Euramo crossing. The river did not reach major flood classification and there were no reports of residential or commercial flood damage.

Flood warnings were issued by the Bureau for each of the three floods. The warnings gave predicted times of the commencement of minor and/or moderate flooding in the Euramo area and also the approximate time of inundation of the Bruce Highway at Euramo. Forecasts were based on observed rainfalls from the catchment. Telemetry equipment at the Tully rainfall station and at the Euramo river gage (operated by Water Resources Commission) enabled up to date information to be disseminated to the public and relevant authorities through warnings and routine river height bulletins during flood periods. Table 1 gives a summary of the flood warnings issued for the Tully River.

Figure 1 shows a diagram of river heights and rainfalls for the Tully river for the period January to February 1991.

HERBERT RIVER

The Herbert River experienced flooding during the same three periods, but with far more severe consequences.

During the 10th to 15th January heavy rain, mainly over the lower reaches of the Herbert River catchment downstream of Abergowrie Bridge caused river rises and flooding in Ingham and downstream areas. The river rose quickly on Thursday 10th January and reached about eleven metres. Further rain over the following few days maintained high flows in the river and it subsequently peaked again at 11.32 metres on the 13th and again at 10.6 metres on the 15th. Heavy rain cleared from the area after the 15th and river levels fell quickly to about four metres on the Gairloch gauge.

Some areas of moderate flooding occurred with these peaks in the Ingham area with water entering the main street. Several commercial properties were threatened, and owners were forced to take precautions such as lifting valuable stock and equipment to higher levels. Significant flooding occurred in the Lower Herbert River areas around Halifax where major traffic disruptions occurred and water entered some low lying properties. Widespread traffic hazards occurred in the Ingham and Gairloch areas, and both Gairloch and Ingham were isolated for several days with the Bruce Highway cut to the north and south.

During the first few days of February, heavy rain over the middle and lower reaches caused river rises which generated minor to moderate flooding in the Lower Herbert areas. Traffic disruptions occurred in the Halifax area with many low lying roads inundated with floodwaters. However there was no significant flooding in the Ingham area.

During the first half of February, areas of rain continued over the catchment with some moderate falls being recorded in the upper reaches of the river above Gleneagle. The level in the river remained around the five to seven metre mark on the Gairloch gauge and the catchment remained wet and primed for high runoff should heavy rains have recommenced.

This scenario eventuated during the 15th to 21st February. With river levels already quite high due to rainfall in the upper parts of the catchment in the few days beforehand, very high rainfalls were recorded over the lower parts of the Herbert River during the 16th and 17th February. River levels commenced rising on the 17th February and peaked at 12.22 metres at Gairloch on Monday 18th February. This was the third highest flood on record and caused major flooding at Ingham and in downstream areas around Halifax.

Further heavy rain overnight on the 19th maintained river levels at around 11.5 metres until they commenced to fall on the 21st.

Two thirds of the township of Ingham was inundated, with water up to five metres deep in low lying areas. The main street of Ingham had water up to two metres deep. More than one hundred and fifty people were evacuated from their homes.

Extensive damage was caused to road and rail infrastructure in the area, with the damage bill likely to be several million dollars.

FLOOD WARNING SERVICES

Floodwarnings were issued for each of the three Herbert River flood periods. The floodwarnings generally gave twelve to twenty-four hours warning of the commencement of minor, moderate or major flooding in the main areas of Ingham and Halifax. Lead times of six to twelve hours were given for quantitative rising limb and peak height forecasts for the Gairloch gauge. The warnings provided were considered to be timely and effective. During the major flood event of 17th to 21st February, Bureau warnings gave early indications of the impending flood. The warning at 10 AM on Sunday 17th February stated that "THE RIVER AT GAIRLOCH IS EXPECTED TO REACH ABOUT 11.5 METRES AROUND 3 PM TODAY AND FURTHER RISES. . . . MAJOR FLOODING IS LIKELY AT INGHAM LATER TODAY AND TONIGHT." At that stage Gairloch was 9.85 metres with minor flooding. This warning provided about nine hours warning time for the onset of major flooding in the Ingham area. The 7.15 PM warning of later that Sunday gave the first peak height prediction for Gairloch. "BASED UPON UPSTREAM RIVER RISES, GAIRLOCH IS PREDICTED TO REACH ABOUT 12.2 METRES AT ABOUT 3AM MONDAY MORNING. - WITH SIMILAR FLOODING TO THE FEBRUARY 1986 FLOOD."

This warning provided a further nine hours lead time for the expected peak. The river eventually peaked at 12.22 metres at around 6 AM Monday 18th.

The Bureau's Flood Warning Centre maintained close contact with Hinchinbrook Shire Council during the flood events. Numerous briefings were held with the Shire Engineer and other council officers during the flood warning periods. The Hinchinbrook Shire Council operated their own Flood Information Centre, which handled local enquiries during the floods. Bureau flood warnings were used by the Shire Council in their local warnings as well as more detailed local information.

This constant contact with Council Officers throughout the warning phase ensured that Warnings issued by the Bureau were consistent with local advices and that flood warnings were received and acted upon locally.

Bureau and Council warnings were broadcast by the local radio stations and no criticism or failures were reported. Table 2 gives a summary of the flood warnings issued for the Herbert River.

HAUGHTON RIVER

The Haughton River caused flooding in the small township of Giru up the eight times between Christmas and the end of February. Periods of very heavy rainfall over the upper parts of the catchment of the Haughton and Reid Rivers and in the township of Giru itself caused flooding of properties and roads within the town. Figure 3 shows the main flood peaks recorded at Giru during the period. It should be noted that moderate flood height for Giru is two metres. Above this height the river breaks its banks and commences to enter low lying areas of the town. Warnings for the town of Giru are based on river levels recorded upstream at Huston's farm and at Flora Valley on the Reid River. Because of the rapid rates of rise of the river levels at these upstream stations, the low threshold of flooding in Giru and the absence of heavy rain reporting stations in the catchment, some early warnings did not anticipate major flooding in the Giru area. During the periods of flooding, warnings were issued at approximately three to six hourly intervals. The Bureau also issued routine river height bulletins throughout the flood periods which contained the most recent river height information.

BURDEKIN RIVER

Minor flooding first developed in the Lower Burdekin River during early January, following heavy rainfalls associated with the coastal crossing of Cyclone Joy. Rainfalls over the upper tributaries of the Burdekin River upstream of the Burdekin Falls Dam were sufficient to fill the Dam and spilling commenced in early January.

Rainfall over the Lower Burdekin River downstream of the Dam and its tributaries, the Bowen and Bogie Rivers, during the 3rd and 4th January, caused minor flooding in the Strathbogie and Myuna areas on Friday 4th. The floodwaters moved downstream subsequently causing minor to moderate flooding in the lower Burdekin River. Inkerman Bridge peaked at 10.35 metres overnight on Friday 4th causing minor flooding in downstream areas.

During the next week or so, rain over the catchments of the Burdekin and Belyando Rivers caused further inflows to the Dam. Outflows from the Dam gradually increased to reach a height of five metres above the spillway on 14th January with accompanying minor flooding in the low lying areas downstream. Outflows from the Dam then gradually decreased until the start of February when the level had dropped to one metre above the spillway.

During Saturday 2nd February very heavy rainfalls were recorded over the catchments of the Bowen and Bogie Rivers and the Lower Burdekin River downstream of the Dam. In the twenty-four hours up until 7 AM Sunday 3rd February, Collinsville received 315 millimetres and Ridgeland, to the west of Mackay, received 450 millimetres.

Rainfall totals of 100 to 150 millimetres were also reported over the Lower Burdekin River. Extremely rapid river rises commenced about midnight on Saturday 2nd February and continued throughout Sunday 3rd. Major flooding developed along the Lower Burdekin River during Sunday 3rd. The river peaked at Inkerman Bridge at about 1 AM on Monday 4th at 12.53 metres, which was the second highest flood on record, just below the record 1958 flood level of 12.62 metres.

Extensive flooding of the Home Hill and Ayr districts accompanied the peak. The township of Home Hill was flooded with depths of up to 0.6 metres in the main street. Residents were evacuated from the low lying areas of Home Hill and the small township of Clare to the west of Home Hill. Widespread damage was caused to sugar cane crops in the area. River levels remained fairly high throughout February with Inkerman Bridge remaining above seven metres.

Heavy rain was recorded in the area again during 18th to 20th February, with twenty-four hour rainfall totals of around 200 millimetres being reported over the headwaters of the Burdekin River upstream of the Dam. Rapid river rises and record flooding subsequently developed in the upper reaches of the river in the Mount Fullstop area. The river at Sellheim rose rapidly during the 18th and 19th and finally peaked on Wednesday 20th February at 19.60 metres, the second highest on record. The Burdekin Dam which was already 3.5 metres above the spillway before these new inflows, commenced rising and peaked at 6.85 metres above the spillway on Thursday 21st. River levels downstream of the Dam rose to moderate flood height with Inkerman Bridge peaking at 11.5 metres on Thursday 21st. Table 4 shows Burdekin catchment rainfalls for the February 20th flood.

FLOOD WARNING SERVICES

The Bureau issued flood warnings for the Burdekin River and its tributaries throughout the period January to February 1991. The first warnings were issued on Friday 4th January warning of river rises and minor to moderate flooding in the Lower Burdekin River later that day. Warnings ceased after river levels peaked and had commenced falling. Warnings were also current for the Lower Burdekin River during the 12th to 16th January as flows over the Burdekin Dam caused minor flooding downstream. Flooding was confined to the residents of low lying areas downstream of Inkerman Bridge.

Warnings for the major flood event of 2nd to 5th February commenced at midnight on Saturday 2nd February. This warned of major flooding in the Bowen and Bogie rivers extending to the Lower Burdekin River later on Sunday. Warnings were issued approximately three-hourly during Sunday 3rd and provided at least six to twelve hours lead time for the rising limb at Inkerman Bridge. The 12.30 PM warning of Sunday 3rd indicated that "THE RIVER AT INKERMAN BRIDGE IS EXPECTED TO RISE TO AT LEAST 12.2 METRES LATER TODAY. AT THIS LEVEL THE RIVER CAUSES MAJOR FLOODING IN THE AYR AND HOME HILL AREAS."

Subsequent warnings issued at 6 PM and 8 PM revised the expected flood peak at Inkerman Bridge to a level similar to the April 1958 flood. The river finally peaked at around midnight on Sunday 3rd at 12.53 metres (about 0.1 metres less than the 1958 flood), the second highest flood on record. A minor floodwarning remained current for the Burdekin River throughout February.

The warning was again upgraded to MAJOR flooding on Sunday 17th February as record flood levels were exceeded in the Upper Burdekin River about the Dam. The 11.30 AM warning of Monday 18th February warned of major flooding developing in the Lower Burdekin River during Tuesday and Wednesday. Warnings were updated approximately every six hours during Monday and Tuesday. The 11.30 AM warning of Tuesday 19th provided the first quantitative forecast for Inkerman Bridge. These forecasts were subsequently revised as flows over the Dam increased.

As this was the first major flood in the Burdekin River since the construction of the Burdekin Dam, the effect of the Dam on the peak flood heights down the river were not accurately known. Because the flood was significantly different to the quickly rising floods that are normally experienced in the Lower Burdekin, the warnings issued by the Bureau and The Burdekin Shire Council carried the qualification that "THE DAM STORAGE WILL REDUCE THE FLOOD PEAK AS IT MOVES DOWNSTREAM AND RESULT IN GRADUAL RIVER RISES IN THE RIVER BELOW THE DAM".

The warning issued at 12.00 noon Wednesday 20th February forecast Inkerman Bridge to rise to at least 11.4 metres by Thursday morning with further rises during Thursday. At that stage the river at Inkerman Bridge was already 10.35 metres and rising slowly. The warning of 4 PM that day reported a peak at Dalbeg and forecast an overnight peak of around 11.5 metres. The river peaked overnight at 11.5 metres, about one metre less than the peak of Sunday 3rd February 1991. No significant flooding of properties was reported and major flood level was not exceeded at Inkerman Bridge.

The Burdekin Shire Council provided a local Flood Reporting Centre which operated throughout each of the flood periods. The Bureau worked closely with the Shire to ensure that warnings were consistent between the two organisations. The Council's Flood Reporting Centre provided valuable detailed local flood effects around Inkerman Bridge and for residents in low lying areas downstream of Inkerman Bridge. Both the official Bureau Warnings and the local Council warnings were widely disseminated to the local media. No complaints or failures of the Bureau's warning system were reported.

The Burdekin Shire Council recently installed an ALERT flood data system as a joint venture with the Bureau. The system worked well throughout the floods, though minor faults occurred at some stations. The floods proved how valuable such systems can be by providing up-to-date rainfall and river height information. The data generated by the Burdekin ALERT system was of immense use to both the Bureau and Burdekin Shire Council in providing timely and effective flood warning services.

Table 1. SUMMARY OF TULLY RIVER FLOOD WARNINGS

Date	Time	Warning Summary and Forecast	Observed
Thu 10/1	11AM	Initial Warning for Tully River. Reported heavy rains, & minor flooding at Euramo this afternoon.	6.3 m rising @ NOON
10/1	10PM	Euramo to continue rising + reach 7.5 to 8.0 metres by 6AM tomorrow.	7.57 m @ 6AM
Fri 11/1	7AM	Euramo to rise to 8 metres by 3PM close to level of Bruce Highway	7.9 m @ 3PM
Sun 13/1	10AM	River near its peak, minor flooding cont	
Mon 14/1	10AM	Further rain o'night to maintain flooding	7.95m
14/1	5PM	Moderate flooding continuing. Water at level of Bruce Highway.	8.1 m rising
14/1	10PM	Renewed rises at Euramo after heavy rain	8.2 m
Tue 15/1	7AM	Moderate flooding at Euramo	8.2 m
15/1	3PM	Further rain to maintain moderate flooding.	
Thu 17/1	10AM	Minor flooding easing slowly	7.0 m
17/1	4PM	Final Warning. Minor levels falling	

Fri 1/2	5PM	Initial Warning for Coastal streams between Cairns and Townsville.	
Sat 2/2	6AM	Euramo to rise to 8 metres by 9AM.	8.0 m @9AM
2/2	10AM	Further slight rises at Euramo.	
2/2	10PM	Euramo to peak at about 8.4 metres next 6 to 9 hours.	
Sun 3/2	1PM	Moderate flooding at Euramo easing.	
3/2	6PM	Minor flooding easing slowly.	
Mon 4/2	10PM	Final Warning all levels below minor.	

Sat 16/2	10PM	Initial Flood Warning for the Tully River.	
Sun			

16/2	8AM	Moderate flooding at Euramo. Bruce Highway innundated later today or tonight.	
17/2	10AM	Euramo predicted to reach 8.1 m (Bruce Highway level) by about 3PM today.	8.0m @ 3PM
17/2	1PM	Euramo to exceed 9 metres overnight with major flooding in Euramo flats area.	
17/2	4PM	Euramo predicted to be close to 9 metres by midnight.	
17/1	10PM	Euramo to be 9 metres between midnight and 6AM.	
17/2	1 AM	Euramo to peak around 8.7 metres by 3AM.	
Mon			
18/2	6AM	Euramo close to peak	
18/2	10AM	Moderate flood levels easing slowly. Water to remain over Highway most of today.	
Wed			
20/2	8AM	Heavy rain overnight. Renewed rises to 8.1 metres by 6PM.	
20/2	11AM	Euramo to reach 8.5 metres by 9PM. 0.4 metres above Bruce Highway.	
20/2	4PM	Euramo to reach 8.4 metres by 9PM	:8.44m @9PM
20/2	9PM	Euramo to peak at 8.5 to 8.6 metres by 3AM.	
Thu			
21/2	7AM	Flood levels now falling slowly. Bruce Highway remains closed.	
Fri			
22/2	4PM	Final Warning issued.	

A total of 64 flood warnings were issued for the Tully River during January and February 1991.

Table 2. SUMMARY OF HERBERT RIVER FLOOD WARNINGS

Date	Time	Warning Summary and Forecast	Observed
Thu 10/1	11AM	Initial Warning for Herbert River. Reported heavy rains, & minor flooding at Halifax today, moderate overnight. Minor flooding at Ingham	6.0 m @ 9 AM
10/1	5PM	Gairloch to reach 9.5 m by midnight.	9.50 m @ midnight
10/1	10PM	Gairloch to reach about 9.5 to 10 m by 6AM tomorrow.	10.40m @ 6AM
Fri 11/1	7AM	Slow river rises today to 11m by midday to 3PM. Major flooding at Halifax and moderate flooding at Ingham	10.83m @ 3PM
Sat 12/1	10AM	Gairloch expected to reach 11.0 m by about 3PM - 6PM today.	11.05 m @ 6PM
12/1	5PM	Gairloch to reach 11.2 m later this evening between 8PM and midnight.	11.25 m @11PM
12/1	10PM	Gairloch continuing to rise, will reach 11.4 m between 3AM and 5AM tomorrow.	11.32m @ 4AM
12/1	12PM	Gairloch to peak at 11.4 m between 3AM and 5AM.	11.32m @ 5AM
Sun 13/1	4PM	Bruce Highway not expected to re-open until Monday (tomorrow) morning.	
Mon 14/1	10AM	Bruce Highway open, minor traffic problems.	
14/1	5PM	Gairloch to rise slowly and peak around 9.9m between 9PM and midnight.	9.98 m @ 11PM
14/1	10PM	Gairloch to continue rising next few hours and peak at about 10.1 m.	10.43m @ 3AM
Tue 15/1	7AM	Heavy rain overnight, Gairloch to rise to 11.3 m by midday. Moderate flooding Ingham and Major flooding Halifax.	11.2 m peak @ 1PM
15/1	10AM	Gairloch to peak at 11.3 metres between NOON and 3PM.	11.2 m peak @ 1PM
Thu 17/1	4PM	Final Warning. Minor levels falling	

Fri 1/2	5PM	Initial Warning for Coastal streams between Cairns and Townsville.	
Sat 2/2	6AM	Heavy falls reported. Rises in Lower Herbert	

River above Ingham.

2/2	10AM	Gairloch expected to reach 9 metres by 3PM today.	8.25m @ 3PM
2/2	4PM	Gairloch peak of between 9.0 to 9.5 metres later this afternoon.	8.87m @ 10PM
2/2	10PM	Gairloch to peak below 9 metres before midnight. Moderate Halifax flooding.	8.87m @ 10PM
Sun			
3/2	7AM	River levels peaked. Moderate flooding in Lower Herbert River areas today.	
Mon			
4/2	10PM	Final Warning all levels below minor.	

Sat			
16/2	10AM	Initial Flood Warning for Herbert River. Minor flooding in Ingham today and moderate flooding around Halifax overnight.	
Sun			
17/2	8AM	Heavy rain overnight. Moderate flooding at Ingham and major flooding at halifax today.	
17/2	10AM	Gairloch expected to reach 11.5 metres at 3PM. Further rises and major flooding likely today.	
17/2	1PM	Gairloch predicted to reach 12 metres between 9PM and midnight. Similar flooding to March 1990. Further rises are likely tonight.	
17/2	4PM	Gairloch to reach 12 metres around midnight.	12.13 @ midnigh
17/2	7PM	".. GAIRLOCH IS PREDICTED TO REACH ABOUT 12.2 METRES AT ABOUT 3AM MONDAY MORNING" "WITH SIMILAR FLOODING TO FEBRUARY 1986"	
Mon			
18/2	6AM	Major flooding in Ingham and Lower Herbert River areas.	
Wed			
20/2	8AM	Heavy rain overnight. Renewed rises to levels similar to Monday	
20/2	11AM	Gairloch to reach 12.2 metres by 6PM to 9PM.	
20/2	4PM	Gairloch to reach 12 metres between 9PM and midnight.	
20/2	9PM	Gairloch peak 11.9 metres and now falling.	
Fri			
22/2	4PM	Final Warning issued.	

A total of 68 flood warnings were issued for the Herbert River during January and February 1991.

Table 3. SUMMARY OF BURDEKIN RIVER WARNINGS

Date	Time	Warning Summary and Forecast	Observed
Wed 9/1	11AM	Initial Warning for Burdekim River	
Thu 10/1	11AM	Final warning issued	

Sat 12/1	11AM	Initial warning, minor at Inkerman	7.9 m @9AM
Sun 13/1	11AM	Major flooding u/s of Dam	
Mon 14/1	11AM	Further rise d/s of Dam next 1 - 2 days	
14/1	5PM	Inkerman Br to reach 9.3m by Tuesday morn	9.25 @ 9AM
14/1	10PM	Inkerman to reach 9.7 by Tuesday afternoon	9.25 @10AM
Wed 16/1	10AM	Final warning, Inkerman bridge falling.	

Sun 3/2	00AM	Initial warning, heavy rain river rises moderate flooding Lower Burdekin today.	
3/2	3AM	Moderate flooding at Dalbeg this morning.	
3/2	7AM	Inkerman to reach 10 metres this afternoon	10.1 @11AM
3/2	12AM	Inkerman to reach at least 12.2 m later today.	
3/2	6PM	Inkerman to reach 12.5 metres tonight. Major flooding similar to 1958 levels.	
3/2	8PM	Inkerman could reach 12.7 metres tonight. Water to enter Home Hill and Ayr townships.	
3/2	11PM	Inkerman 12.4 metres close to peak. Peak 12.53m	@ Midnight
Mon 4/2	7AM	Inkerman peak 12.53m overnight, now falling.	
Wed 6/2	5PM	Final flood warning.	

Mon 18/2	11AM	Priority warning. Record major flooding in Upper Burdekin. major flooding likely in Lower reaches Tuesday and Wednesday.	

18/2 5PM "Dam Storage will reduce flood peak"
Tues
19/2 11AM Major flooding u/s dam. Inkerman to be at
least 8.5 m by this afternoon. 8.4m @ 6PM

19/2 5PM Inkerman to be at least 10 m by Wed morning 10.1
@ 9AM
19/2 9PM Inkerman to rise to at least 10.9m by Wed arvo.
Wed
20/2 12PM Inkerman to rise to at least 11.4m by Thur morn.

20/2 4PM Inkerman to reach 11.7m by Thursday afternoon.
Thu
21/2 11AM Inkerman to peak at around 11.5m overnight.
Fri
22/2 9AM Inkerman peaked overnight at 11.5 metres.

22/2 4PM Moderate flood levels falling slowly.

25/2 10AM Final warning, minor flooding easing.

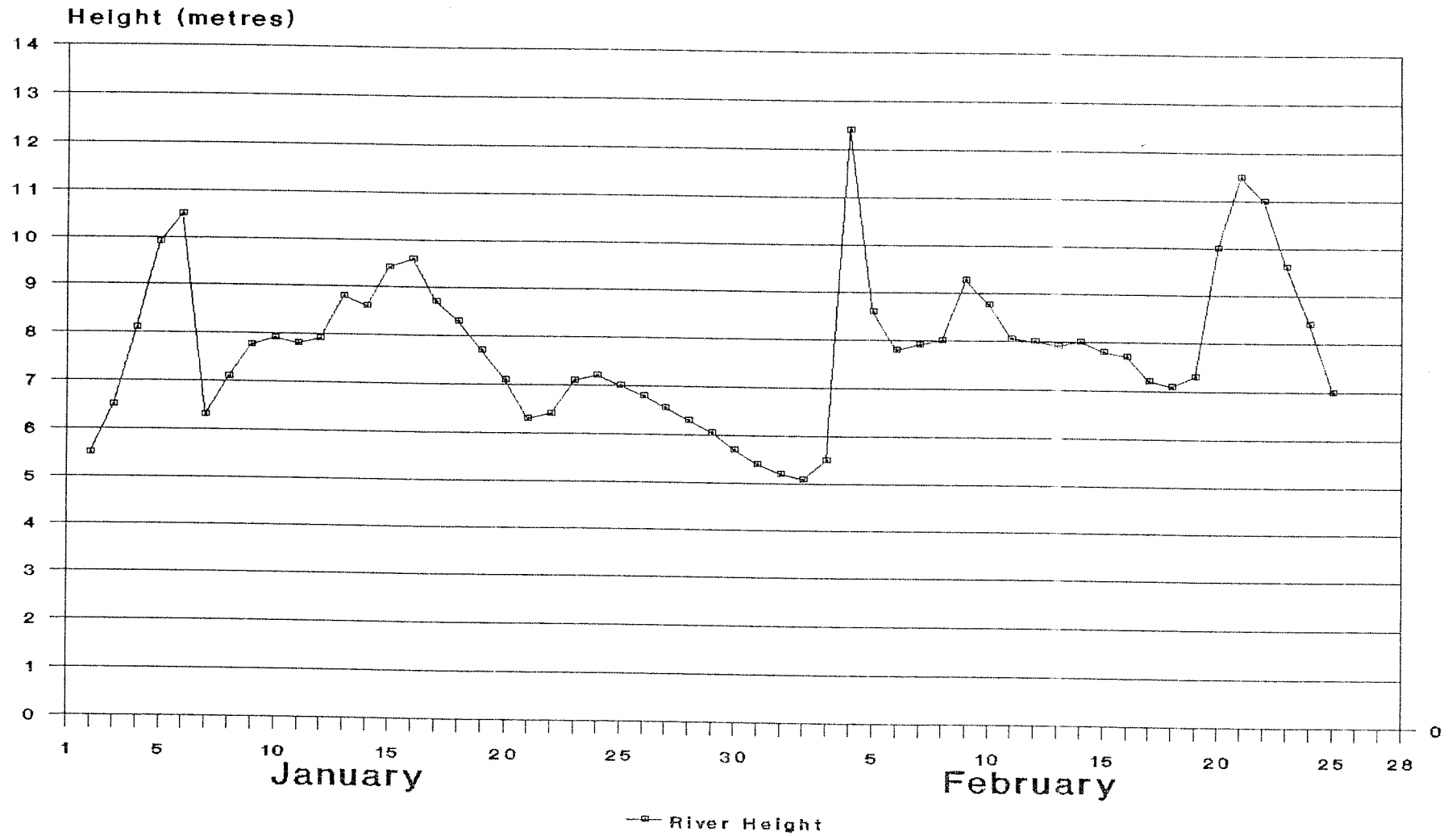
A total of 62 flood warnings were issued for the Burdekin River during January and February 1991.

Table 4 BURDEKIN CATCHMENT RAINFALLS 17TH - 19TH FEBRUARY

Station	17th	February 18th	19th	20th
Greenvale	28	155	8	20
Blue Range	40	89	9	14
Gregory Springs	14	45	112	19
Hillgrove	8	125	44	18
Sellheim	8	105	69	7
Mingela	17	159	121	12
Pentland	-	76	-	21
Ayr	-	90	80	26
Home Hill	-	-	95	5
Giru	-	197	50	10

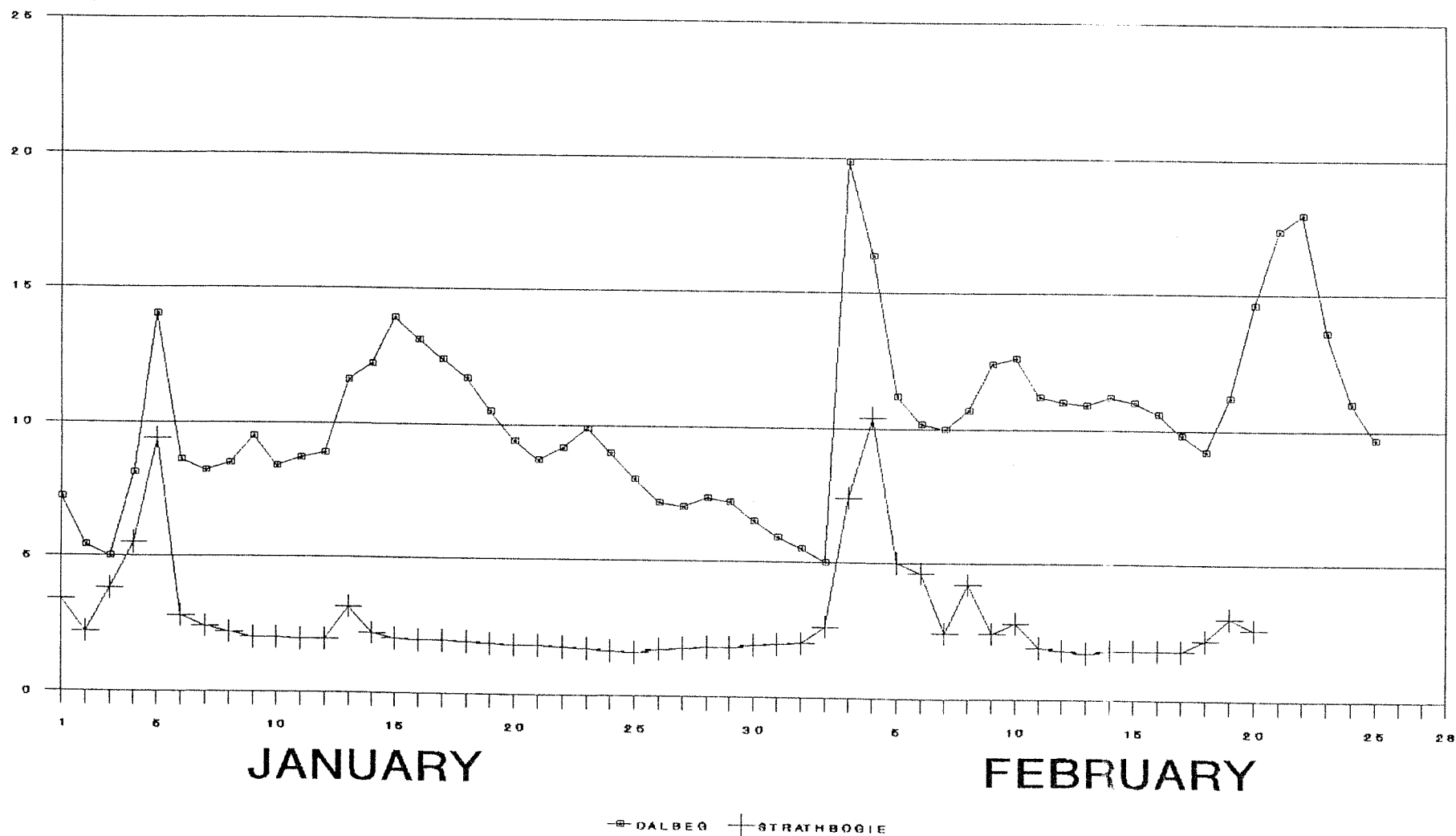
INKERMAN BRIDGE

January - February 1991 Floods



DALBEG AND STRATHBOGIE

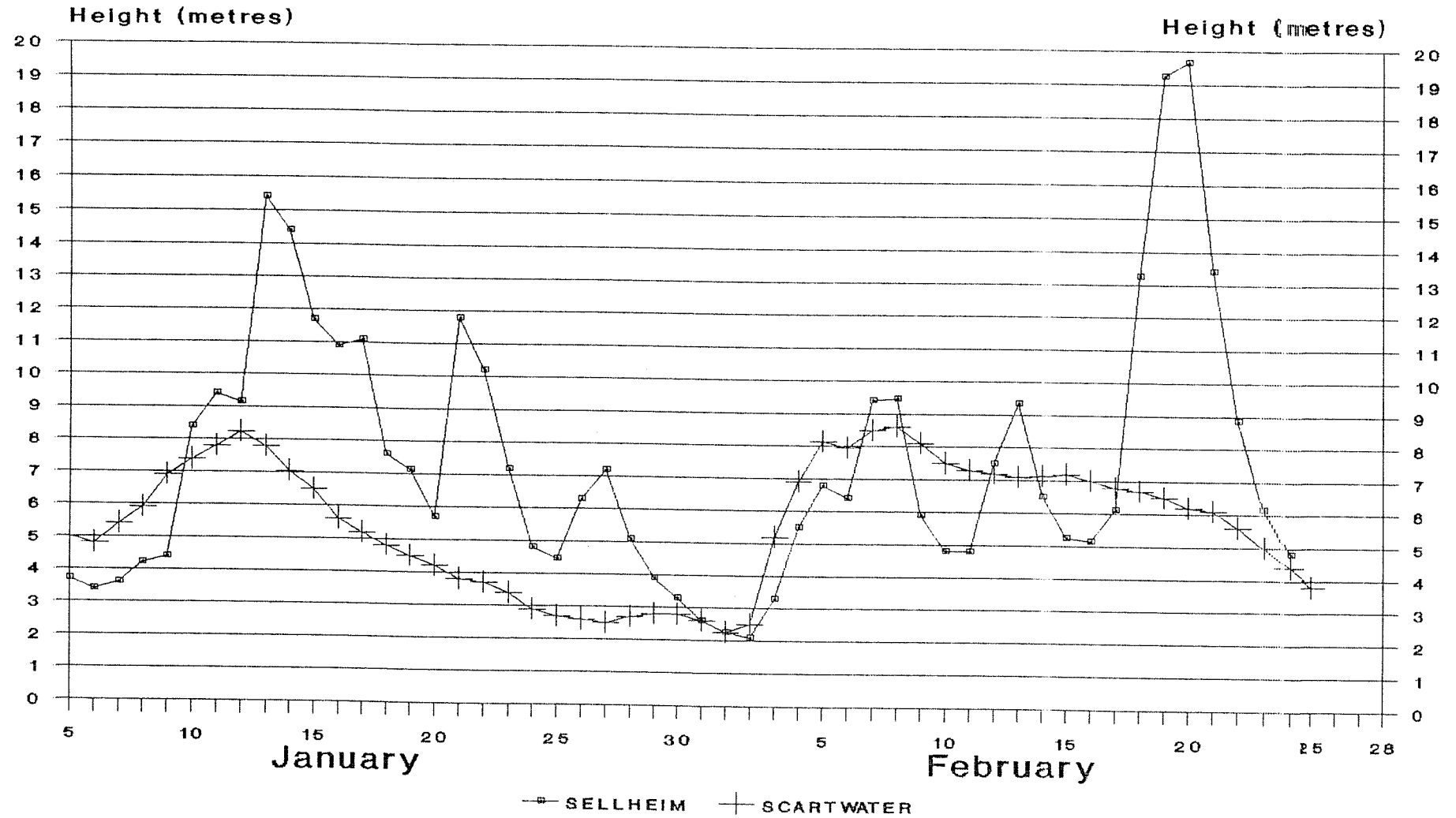
January - February 1991 Floods



Data from Telemark

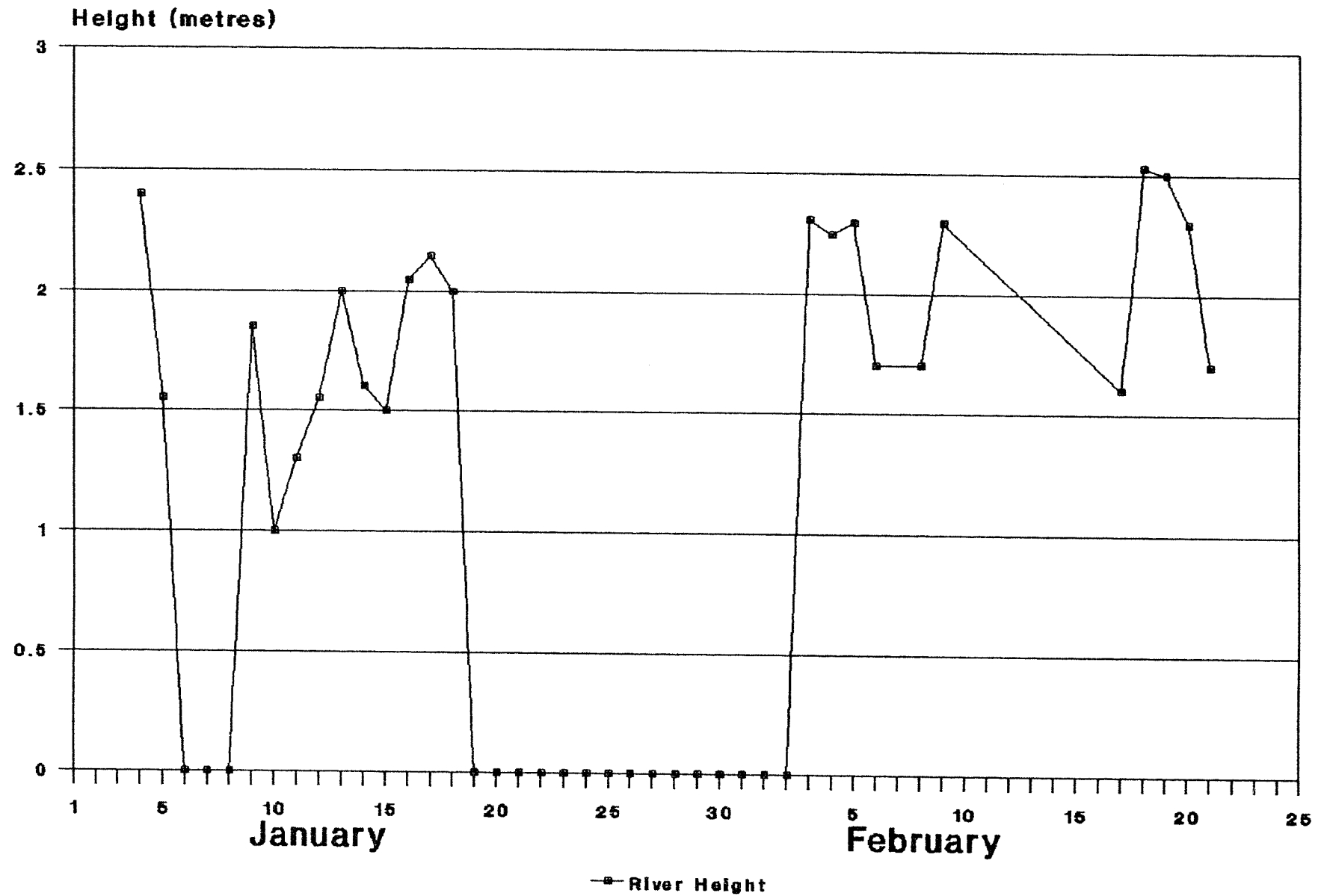
SELLHEIM AND SCARTWATER

January - February 1991 Floods



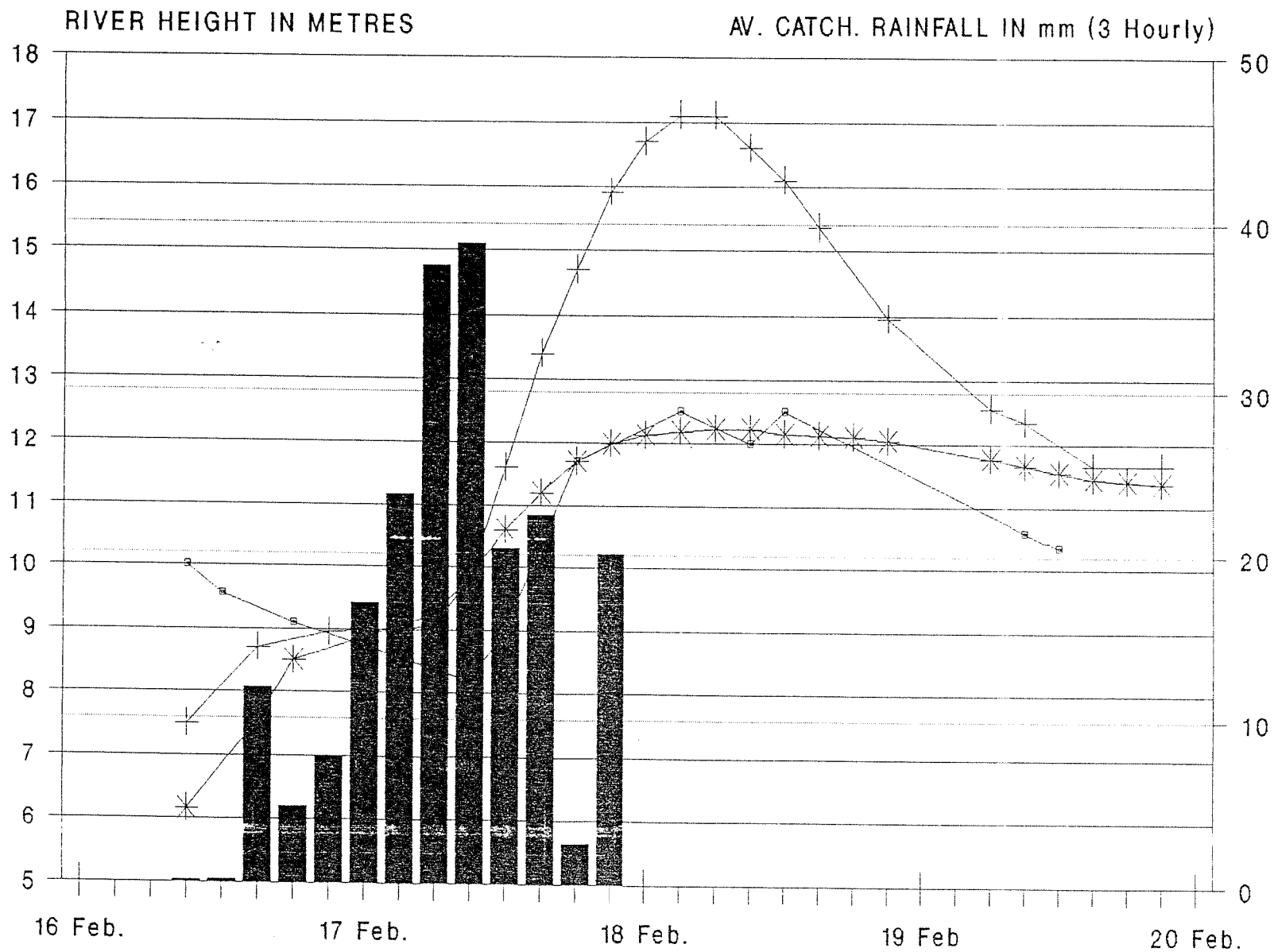
HAUGHTON RIVER AT GIRU

January - February 1991 Floods



HERBERT RIVER

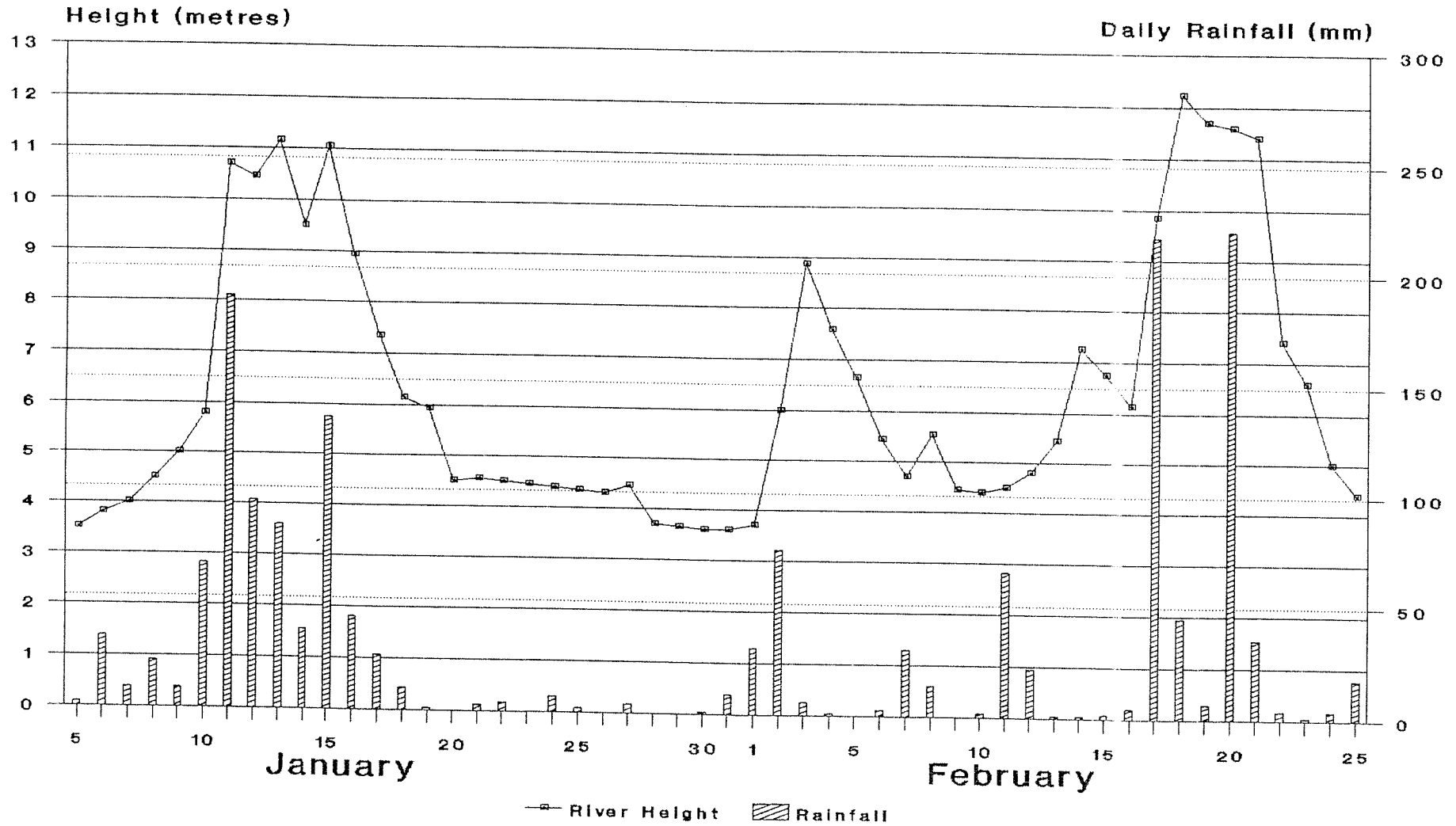
Flood of 16th. to 20th. February 1991



— GLEN EAGLE + ABERGOWRIE BR. * GAIRLOCH ■ AV. CATCH. RAINFALL

HERBERT RIVER AT GAIRLOCH

January - February 1991 Floods



TULLY RIVER AT EURAMO

January - February 1991 Floods

