

RAINFALL & RIVER FLOW MONTHLY REPORT OTAGO REGIONAL COUNCIL

December 2005

In Brief

River flows and soil moisture levels were very low at the start of December, after seven months of below average rainfall across most of the region. The first two weeks of the month remained relatively dry, with water restrictions looming, and minimum flows being breached at several rivers. This all changed over the latter part of the month however, as weather patterns more typical of December began to develop. Heavy rain spread up the east coast in the week leading up to Christmas, and Regional Council staff were closely monitoring a number of flood events over the Christmas / New Year period. The Kakanui, Pomahaka and Taieri in particular had reasonably significant flood events over this period. By the end of the month, most rivers were dropping back towards normal levels however.

The Shag and Manuherikia rivers also increased after some heavy rainfall towards the end of the month, but remained well below normal. This is more than likely due to the cumulative effects of the previous long dry period, with soils able to soak up large amounts of moisture, and less water contributing to runoff.

By comparison, the Queenstown Lakes district remained relatively dry throughout the month, with below average rainfall, and river flows approximately half of the historical December average.

Summary text and graphs are provided for the following districts.

- North Otago
- Dunedin
- Lower Taieri and Strath Taieri
- South Otago
- Central Otago
- Queenstown Lakes

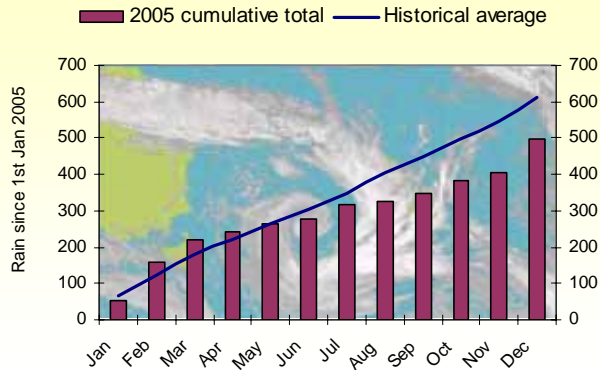
A summary table of flow and rainfall is attached to this report, which gives more detail on sites in each of these areas.

Rainfall & river flows around the region

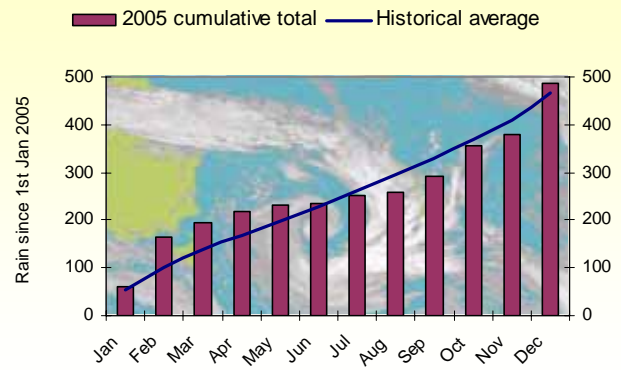
North Otago

December rainfall was generally well above normal in North Otago. The wettest area was the headwaters of the Maerewhenua, where **201mm** was recorded at Dome Hills, **twice** the normal December rainfall total. The headwaters of the Kakanui and Kauru catchments were also very wet, with **107mm** at Clifton Falls, and **150mm** at the Dasher. Coastal North Otago received slightly less rain, with **61mm** recorded at Oamaru, **27% above** normal. In the Shag catchment, **93mm** was collected at Stoneburn this month, **43% above** normal.

Accumulated rainfall totals for Shag Valley

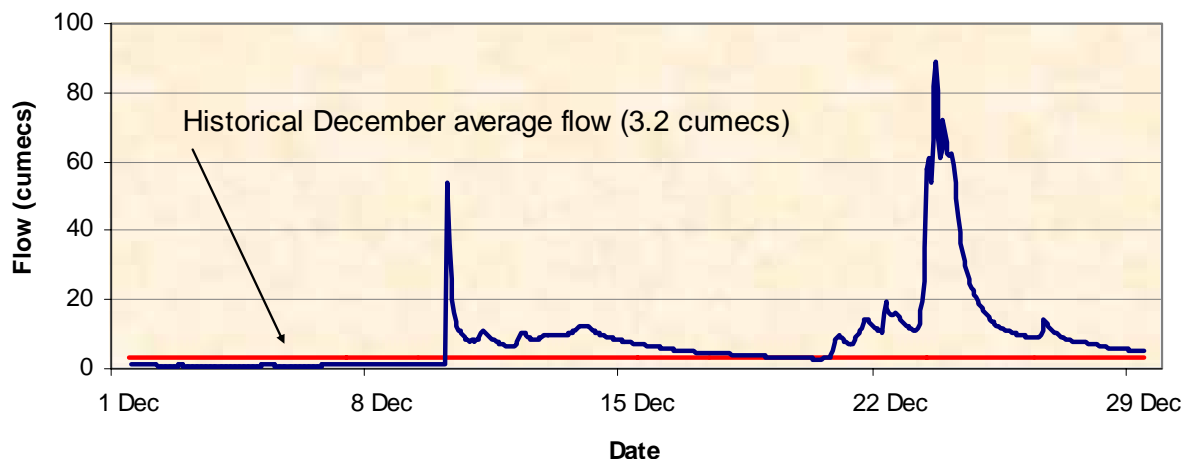


Accumulated rainfall totals for Kakanui



The accumulated rainfall total for the Shag at Stoneburn up to the end of December was **115mm** less than the historical average, after a series of dry months between May and November. In the Kakanui, heavy rainfall in December lifted the 2005 total above the historical average. More rain fell in the Kakanui in December than for the months of April to August, and November combined.

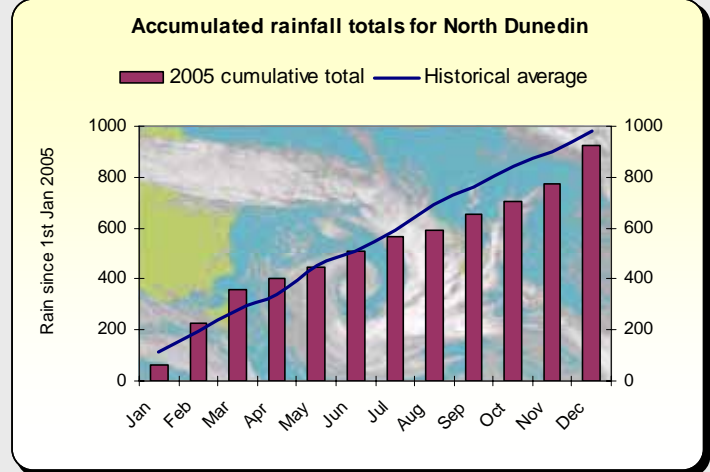
River Flow: Kakanui at Clifton Falls



River flow in the Kakanui at Clifton Falls was well below average at the start of the month, with restrictions on consumptive water use looking likely. A change to more north-easterly weather conditions in the second week resulted in several medium sized flood events in the Kakanui however. The largest event peaked at 90 cumecs on the 23rd of December. The Shag River at the Grange peaked at 5.5 cumecs on two occasions, but remained well below the historical average December flow of 1.7 cumecs for most of the month.

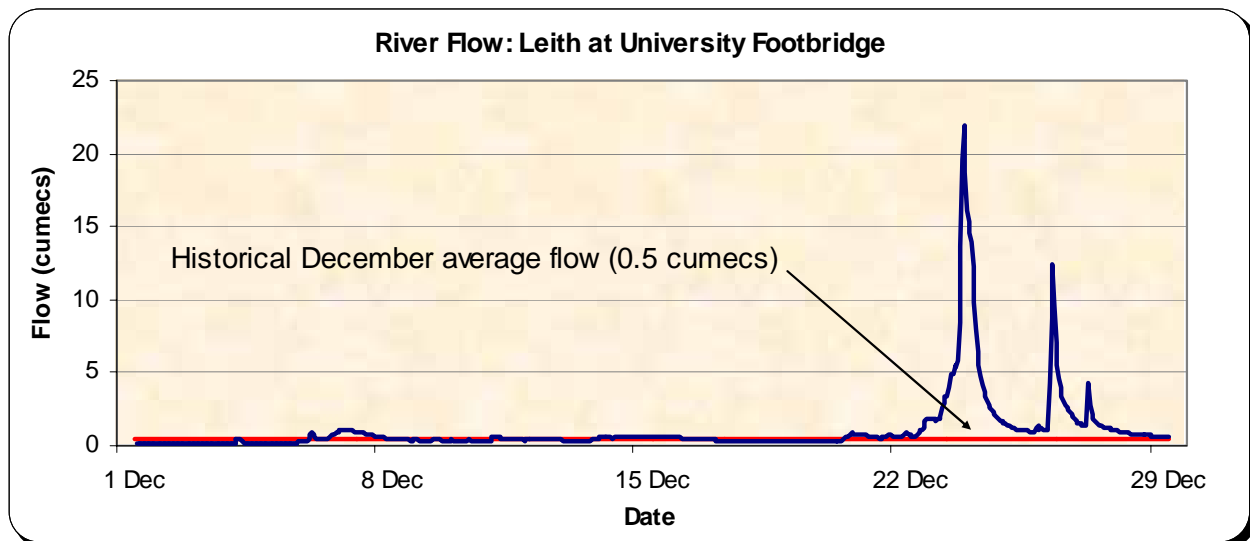
Dunedin

Rainfall totals in the North Dunedin area were also well **above normal** this month. Pine Hill recorded **156mm**, which is **135% above** the average December rainfall of 66mm. Sullivans Dam had twice its average rainfall, with **228mm**. Across town, Musselburgh was also wetter than normal, with **115mm** recorded, **75% above** average.



A wetter than normal December at Pine Hill pushed the cumulative total for the year to **927mm**, slightly below the average annual rainfall of 981mm for this site

River flows remained low in the Water of Leith for the first three weeks of December. The river then rose rapidly to peak at 22 cumecs on the 23rd, with another smaller peak on Christmas Day. These were the first significant flood events since March 2005, although still well below the first flood warning level of 66 cumecs. The average flow for the month was **1 cumec**, **twice** the historical December average.

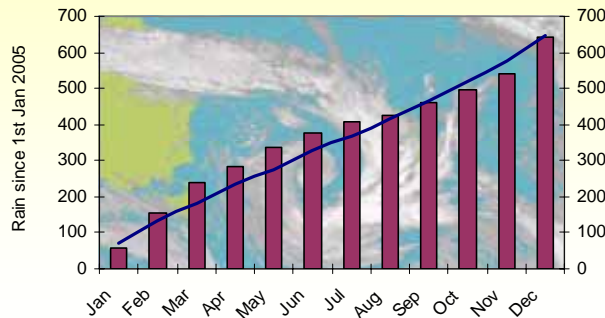


Lower and Strath Taieri

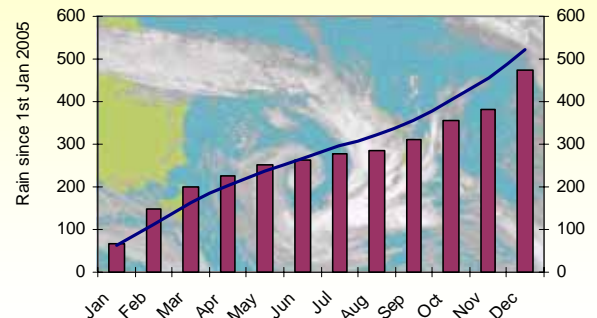
On the Lower Taieri, rainfall was **50% above** normal at the Riccarton Road site with **102mm** recorded. Further south, the Dunedin Airport gauge collected **90mm**, **27% above** the normal December total of 71mm.

In the Strath Taieri, rainfall totals were also well above normal. **105mm** was the total for Nenthorn at Mt Stoker, **67% above** normal. Middelmarsh received **98mm**, **53% above** normal, and Deep Stream at SH87 received **130mm**, **109% above** normal.

Accumulated rainfall totals for Taieri Plains
■ 2005 cumulative total — Historical average



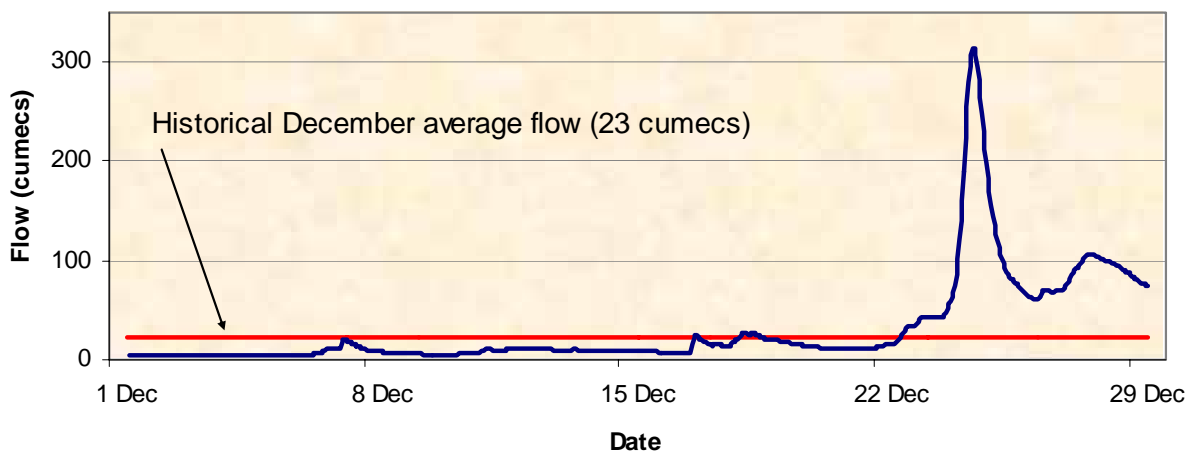
Accumulated rainfall totals for Middelmarsh
■ 2005 cumulative total — Historical average



The accumulated rainfall total for the Taieri Plains at Riccarton Road finished at the same level as an average year, after a wetter than normal December. At Middelmarsh, December was also wetter than normal with **92mm** recorded, although the accumulated rainfall for the year remained below average.

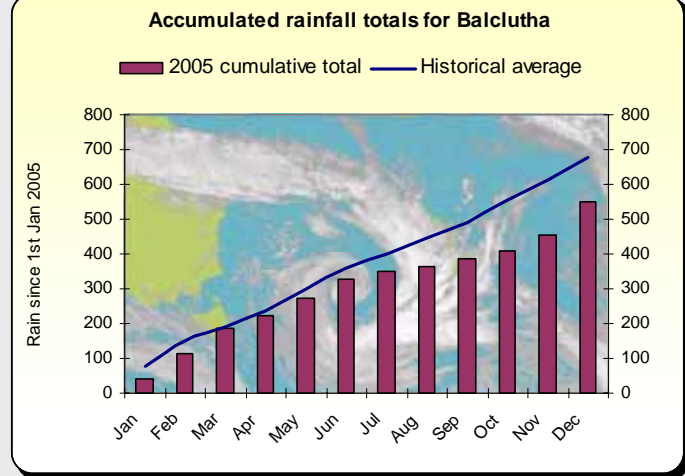
The Taieri River began the month at a very low level, with just 5 cumecs at Outram at the beginning of December. Some small events during the middle of the month raised the level to a normal level for this time of year. This was followed by heavy rain in the Deep Stream, Maniototo and Strath Taieri areas, resulting in a flood peak of 314 cumecs on Christmas Eve. The moderating effect of the Taieri Scroll Plain on flood peaks from the upper catchment was seen clearly in this event. The Canadian Flat site recorded 200 cumecs on the 23rd December, the highest flow recorded at this site. However it took 3 days for this flood peak to reach Waipiata, and the peak had been moderated to just 60 cumecs.

River Flow: Taieri at Outram



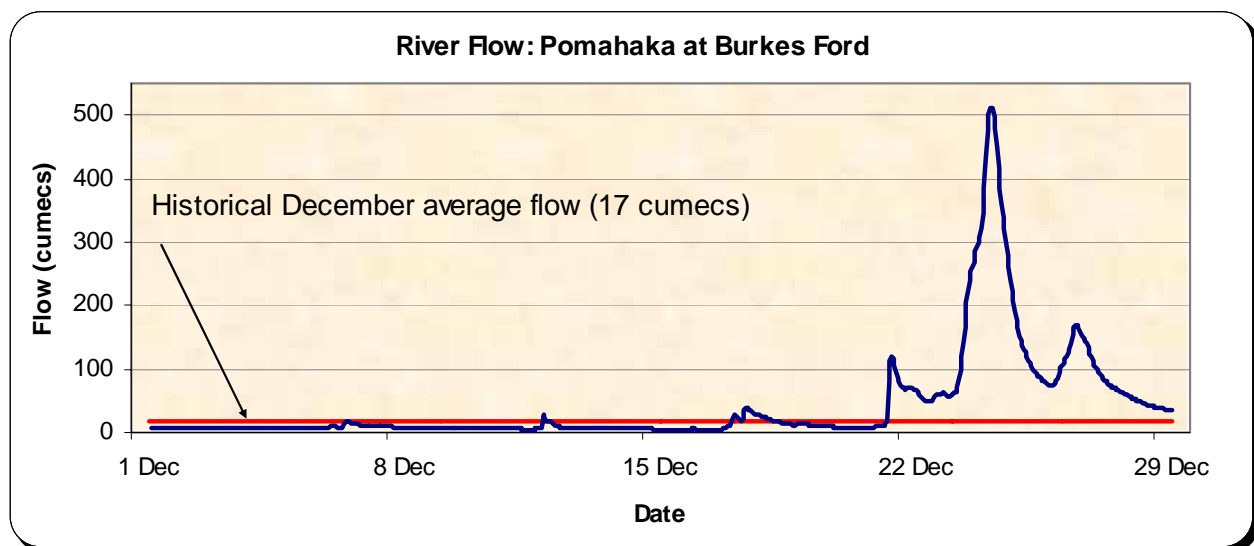
Southwest Otago

Rainfall totals in southwest Otago were also generally **above normal** this month. The Waitahuna at Clarks Flat was the wettest site in the district with **163mm, more than twice** the historical December average. Balclutha received **94mm, 42% above** normal. In the Pomahaka catchment, Moa Flat collected **140mm, 60% above** the December average.



The cumulative rainfall total for 2005 at Balclutha finished well below the historical average, despite a wetter than normal December. The Balclutha area was particularly dry from July through to November this year.

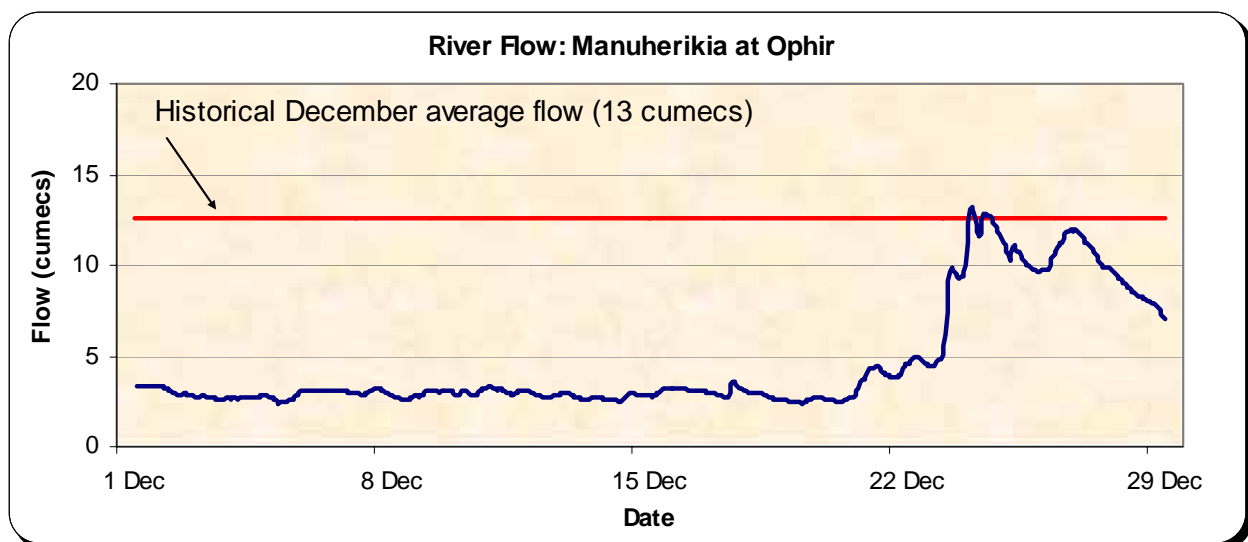
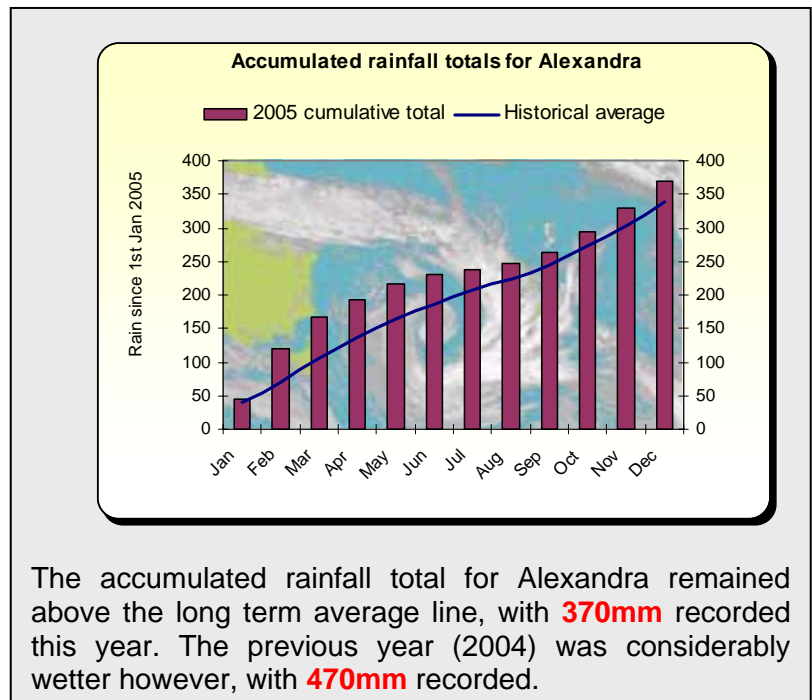
Several small rainfall events during the first three weeks did little to elevate flow in the Pomahaka above the historical December average, and the river had dropped to less than 5 cumecs at Burkes Ford. Heavy rain in the upper catchment fell on the 22nd, and again on the 23rd, resulting in a flood peak of over 500 cumecs (a level of 5.2 metres) at Burkes Ford on Christmas Eve. An event of this size has a return period of 5 years (20% chance of occurring in any year). However, the previous 7 months have seen three similar sized events (not to mention some extreme low flows as well!).



Central Otago

The Maniototo and Idaburn received some heavy rainfall this month, and were considerably wetter than normal. Ranfurly and Pat-Paerau recorded **116mm** and **110mm** respectively, **more than twice** the usual December total. Hills Creek in the Idaburn recorded **99mm**, **60% above** average.

The remainder of Central Otago had average rainfalls, with Alexandra and Clyde both recording approximately **40mm**. Ettrick collected **78mm**, while in the Manuherikia, Lauder received **68mm**.



Despite good rainfall in the headwaters of the Manuherikia, flows remained well below normal for most of month. The heaviest rain fell during the third week of December, briefly raising the Manuherikia River at Ophir to 13 cumeecs. Average monthly flow at Ophir was **4.7 cumeecs**, **64% below normal**.

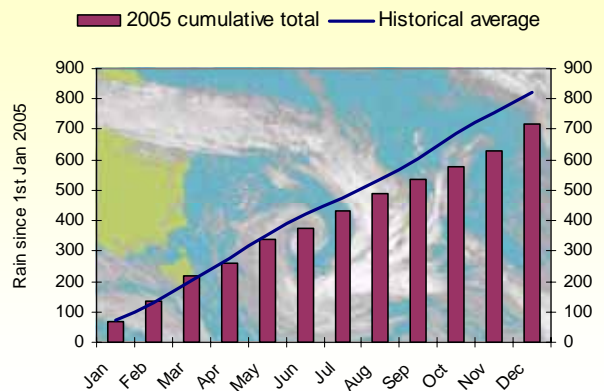
Further upstream, the Dunstan Creek at Beatties Road recorder measured an average flow of **1 cumecc** this month. Previous December average flows range from 0.4 cumeecs in 2003, to 5.5 cumeecs in 2004.

Queenstown Lakes

In the Queenstown Lakes district, rainfall was once again below normal. Totals were almost all in the range of **30 to 55% below average**. Wanaka airport received just **37mm**, while Glenorchy at the Hillocks collected **95mm**, which is **46% below** the historical December average. Closer to the Main Divide, Makarora recorded **78mm**, **56% below normal**.

Queenstown was the only site wetter than usual, with **88mm**, **33% above** normal.

Accumulated rainfall totals for Queenstown

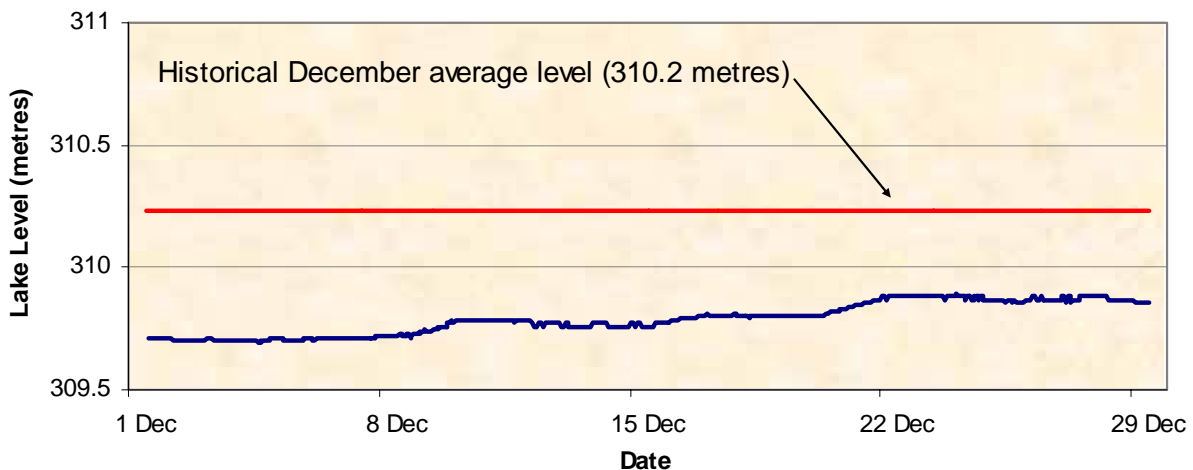


Queenstown rainfall was higher than normal this month, but the cumulative rainfall total for the year remained below the historic average.

Average monthly river flows in the Queenstown Lakes district were once again approximately half of normal this month. The Shotover River at Peat's Hut was flowing at an average of **19 cumecs**, (**55% below** normal) while the Dart River at the Hillocks averaged **102 cumecs** (**20% below** normal). In the Kawarau at Chards Road, average flow for the month was **164 cumecs** (**44% below** normal).

Lake levels remained low. Lake Wakatipu began the month **half a metre** below the historical December average, with a peak of 309.9 metres late in the month. Lake Wanaka was also low, approximately **0.7 metres** below the long term average for most of the month.

Lake Level: Wakatipu at Willow Place



Further information

See the Otago Regional Council website for regular rainfall and river flow updates:
<http://www.orc.govt.nz/waterinfo>

For more information phone Chris Arbuckle, Manager Resource Science, on 03 474 0827 or e-mail:
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Mailing list

This report is available by email

To update your contact details on our mailing lists, please contact: environmentalinfo@orc.govt.nz; tel:
0800 474 082.

Acknowledgement

The information produced in this report was derived from rainfall, flow, lake level and lake outflow data collected from stations throughout the region operated by private individuals and corporate bodies, the National Institute of Water & Atmospheric Research Limited, Dunedin City Council and Contact Energy who are gratefully acknowledged.

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RAINFALL TABLE (December 2005)

Station	Area	Total Rainfall for this Month (mm)			Total Rainfall this Year Up to the End of this Month (mm)		
		Recorded	Historic	% Change	Recorded	Historic	% Change
Oamaru AWS	North Otago	61.000	48.0	27.08	417.00	488.00	-14.55
Glenrowan	North Otago	128.050	46.0	178.37	589.15	598.00	-1.48
Waikoura	North Otago	98.500	55.0	79.09		537.00	
Clifton Falls	North Otago	107.000	53.0	101.89	484.50	459.00	5.56
The Dasher	North Otago	150.000	90.0	66.67	741.00	817.00	-9.30
Stoneburn telemetry	North Otago	93.000	65.0	43.08	497.00	616.00	-19.32
Dome Hills	North Otago	201.000	99.0	103.03	807.00	713.00	13.18
Leith at Sullivan's Dam	L/S Taieri, Dun	227.500	107.0	112.62	1135.00	1217.00	-6.74
Leith at Pine Hill	L/S Taieri, Dun	155.500	66.0	135.61	923.50	963.00	-4.10
Musselburgh	L/S Taieri, Dun	115.400	75.0	53.87	646.70	779.00	-16.98
Taieri Depot	L/S Taieri, Dun	102.000	67.0	52.24	643.50	647.00	-0.54
Dunedin Airport	L/S Taieri, Dun	90.400	71.0	27.32	473.70	667.00	-28.98
Mt Stoker	L/S Taieri, Dun	105.000	63.0	66.67	455.00	479.00	-5.01
Glengarry	L/S Taieri, Dun	129.500	62.0	108.87	576.50	593.00	-2.78
Middlemarch-Garthmyl	L/S Taieri, Dun	97.700	64.0	52.66	482.40	517.00	-6.69
Balclutha	Southwest Otago	93.500	66.0	41.67	548.50	697.00	-21.31
Glenbrook	Southwest Otago	148.000	80.0	85.00		995.00	
Clarks Flat	Southwest Otago	163.000	76.0	114.47	744.00	789.00	-5.70
Cairn	Southwest Otago	79.847	112.0	-28.71	1066.85	1350.00	-20.97
Moa Flat	Southwest Otago	139.500	88.0	58.52	948.00	820.00	15.61
Ranfurly	Central Otago	116.000	48.0	141.67	410.00	444.00	-7.66
Pat-Paerau	Central Otago	110.000	46.0	139.13	511.00	374.00	36.63
Tima	Central Otago	95.000	78.0	21.79	678.00	671.00	1.04
Ettrick No2	Central Otago	78.100	64.0	22.03	598.70	594.00	0.79
Hills Creek	Central Otago	98.500	62.0	58.87	487.00	516.00	-5.62
Lauder EWS	Central Otago	67.600	56.0	20.71	404.60	454.00	-10.88
Alexandra	Central Otago	39.800	35.0	13.71	369.40	335.00	10.27
Clyde EWS	Central Otago	37.600	39.0	-3.59	347.60	385.00	-9.71
Makarora telemetry	Lakes district	77.500	178.0	-56.46	1725.00	2147.00	-19.66
West Wanaka	Lakes district	58.000	87.0	-33.33	711.50	1027.00	-30.72
Wanaka Aero AWS	Lakes district	37.200	69.0	-46.09	436.50	659.00	-33.76
Peat's Hut	Lakes district	67.000	97.0	-30.93	696.00	875.00	-20.46
Glenorchy telemetry, Hillocks	Lakes district	95.500	178.0	-46.35	1289.74	1769.00	-27.09
Queenstown	Lakes district	87.500	66.0	32.58	705.40	826.00	-14.60
Queenstown AWS	Lakes district	33.400	71.0	-52.96	518.80	741.00	-29.99

RIVER FLOW TABLE (December 2005)

Station	Area	Minimum flow recorded (m ³ /s)	Maximum flow recorded (m ³ /s)	Mean flow for the month (m ³ /s)	Historic mean for the month (m ³ /s)	% Change of Historic Mean
Kakanui River at Mill Dam	North Otago	0.893	213.484	20.311	4.694	332.72
Kakanui River at Clifton Falls	North Otago	0.856	90.116	7.994	3.173	151.98
Shag River at The Grange	North Otago	0.194	5.553	0.959	1.717	-44.17
Leith at University Foot Br	L/S Taieri, Dun	0.184	22.253	1.000	0.509	96.62
Silverstream at Taieri Depot	L/S Taieri, Dun	0.070	22.653	1.492	0.563	164.86
Taieri River at Outram	L/S Taieri, Dun	4.484	314.295	33.204	23.443	41.64
Taieri River at Sutton	L/S Taieri, Dun	3.043	101.991	20.261	13.324	52.06
Taieri River at Tiroiti	L/S Taieri, Dun	2.510	88.092	14.539	10.763	35.09
Taieri River at Waipiata	Central Otago	1.598	63.259	10.952	8.437	29.81
Nenthorn Stream at Mt Stoker Rd	L/S Taieri, Dun	0.034	16.186	1.481	0.835	77.48
Deep Stream at SH 87	L/S Taieri, Dun	0.692	303.856	7.279	2.856	154.89
Waipori River at Berwick	Southwest Otago	0.593	41.084	7.526	3.567	110.98
Clutha River at Balclutha	Southwest Otago	199.031	950.664	386.351	693.422	-44.28
Waitahuna River at Tweeds Br	Southwest Otago	0.469	47.176	2.549	2.195	16.13
Pomahaka River at Burkes Ford	Southwest Otago	4.628	514.435	40.263	17.440	130.86
Pomahaka River at Glenken	Southwest Otago	2.224	406.424	21.914	11.383	92.51
Waipahi River at Waipahi	Southwest Otago	0.768	45.252	6.217	3.517	76.77
Manuherikia River at Ophir	Central Otago	2.389	13.298	4.776	12.645	-62.23
Clutha at Clyde	Central Otago	108.813	560.546	337.750	626.670	-46.10
Clutha River at Cardrona Confluence	Lakes District	140.445	183.512	161.117	359.262	-55.15
Kawarau River at Chards Rd	Lakes District	145.876	204.372	164.461	292.123	-43.70
Shotover River at Bowens Peak	Lakes District	20.730	52.286	25.717	57.615	-55.36
Shotover River at Peat's Hut	Lakes District	11.739	55.887	18.550	41.051	-54.81
Dart River at The Hillocks	Lakes District	37.352	338.770	102.370	128.461	-20.31

LAKE LEVEL AND OUTFLOW TABLE

Lake	Lake level for the month (m above mean sea level)					Historic mean lake level (m above mean sea level)
	First Day	Last Day	Min.	Max.	Mean	
Lake Hawea	341.798	342.414	341.787	342.423	342.107	342.948
Lake Wakatipu	309.706	309.855	309.670	309.908	309.795	310.235
Lake Wanaka	276.900	276.968	276.868	277.087	276.984	277.692

Lake	Lake outflow for the month (m ³ /s)					Historic mean outflow (m ³ /s)
	First Day	Last Day	Min.	Max.	Mean	
Lake Hawea	11.2	11.6	11.2	12.3	11.4	40.97
Lake Wakatipu	118.4	151.7	110.9	164.8	138.1	262.88
Lake Wanaka	134.0	144.2	129.4	162.6	146.6	271.97

Notes:

L/S Taieri, Dun = Lower Taieri, Strath Taieri and Dunedin.

** = Controlled Outflows.*