RAINFALL & RIVER FLOW MONTHLY REPORT

OTAGO REGIONAL COUNCIL

August 2005

In Brief

Parts of Otago were experiencing drought-like conditions by the end of August, with very little rainfall in coastal East Otago from Balclutha through to Oamaru. Soil moisture levels were approaching mid-summer levels, with irrigation already underway in many areas.

Less than 10mm of rain was recorded at most North Otago rain gauge sites this month, and this has intensified the already dry conditions the area has experienced since May. River levels in the upper Kakanui dropped to one cumec by months end, less than a quarter of the normal level for August. Groundwater levels have also continued to drop, with 50% restrictions on irrigation takes likely to be enforced in the Deborah aquifer, if it falls below 128.3 metres as expected later this month.

Further south, the Dunedin, Lower and Strath Taieri areas have also had rainfall totals considerably lower than normal. Dunedin rain gauges recorded just one quarter of normal August rainfalls, with only 10mm recorded at Musselburgh. Dunedin Airport also collected just 10mm this month. The Taieri River had dropped to less than 50% of normal by the end of the month, with no significant flow events recorded during August.

Rainfall totals were higher in traditionally wetter Southwest Otago, although several sites still had less than half of their average August rainfall. River flows dropped correspondingly, and the Pomahaka at Burkes Ford was flowing at approximately half the August average by the end of the month.

Further inland, rainfall in Central Otago was close to normal at several sites, including the Idaburn at Hills Creek and Clyde. The majority of this district was much drier than normal however, with just 10mm recorded at Pat-Paerau, and Alexandra, half the average total. The Manuherikia River at Ophir remained below 10 cumecs all month, considerably lower than the average August flow of 19 cumecs.

In the west, moderate rainfall totals were experienced in the Queenstown Lakes district, although river flows were still generally below normal. Average lake levels for the month were approximately normal for Lakes Wakatipu and Wanaka.

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.

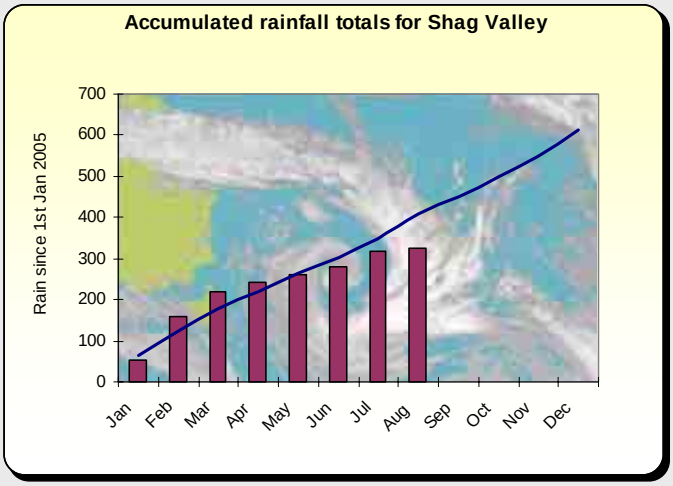
An in-depth analysis of rainfall totals during the previous winter is given at the end of this report, as well as a brief summary of groundwater levels across the region

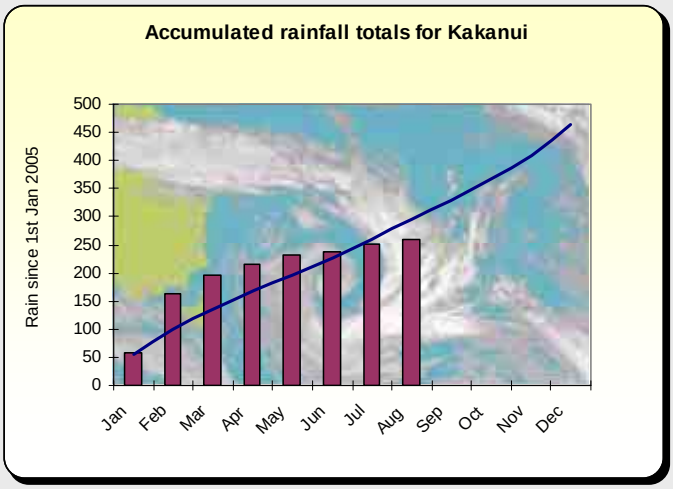
Rainfall & river flows around the region

North Otago

August rainfall was **far below normal** in North Otago. Most sites received **only 20% of normal** rainfall this month. The driest areas were Oamaru, and Clifton Falls in the Kakanui, which received only **7mm**. The wettest area was Glenrowan, near Maheno, which collected just **12mm**.

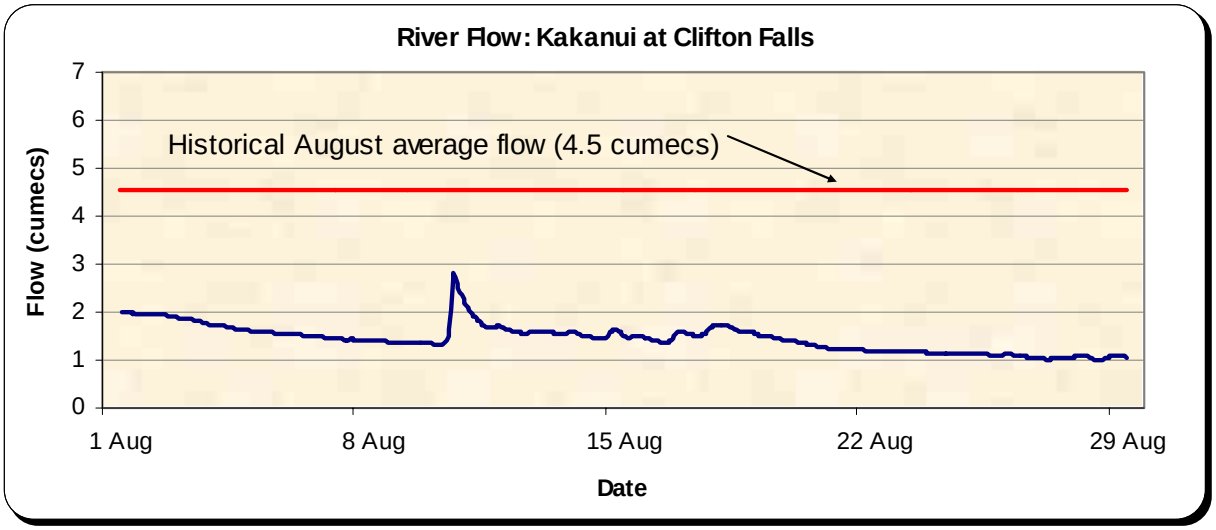
There were no major storm events, and very little wind. Most of the rainfall that did fall was in the form of very light showers. Irrigation has already begun in many parts of North Otago, as soil moisture levels continue to drop.





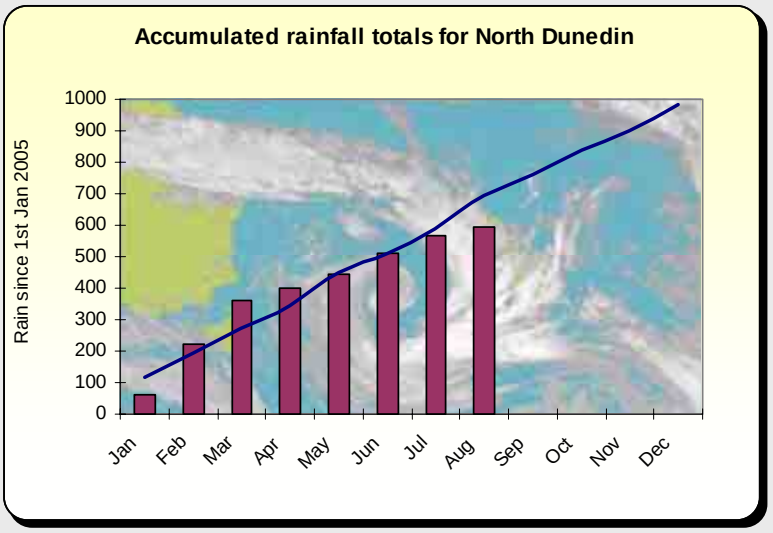
Accumulated rainfall totals at the Shag and Kakanui rain gauge sites are now well below the long term average, after a very dry winter. This is a dramatic turnaround from the situation at the start of the year, when rainfall was well above average, after a series of wet months.

River flow in the Kakanui at Clifton Falls was less than half of the historical August average for almost the entire month. The river peaked at 2.8 cumecs after a rainfall event in the second week, but even that was well below the average August flow of 4.5 cumecs. In the Shag River, mean flow for August was just **0.6 cumecs** at The Grange. This is only **15%** of the normal August flow of 3.6 cumecs.



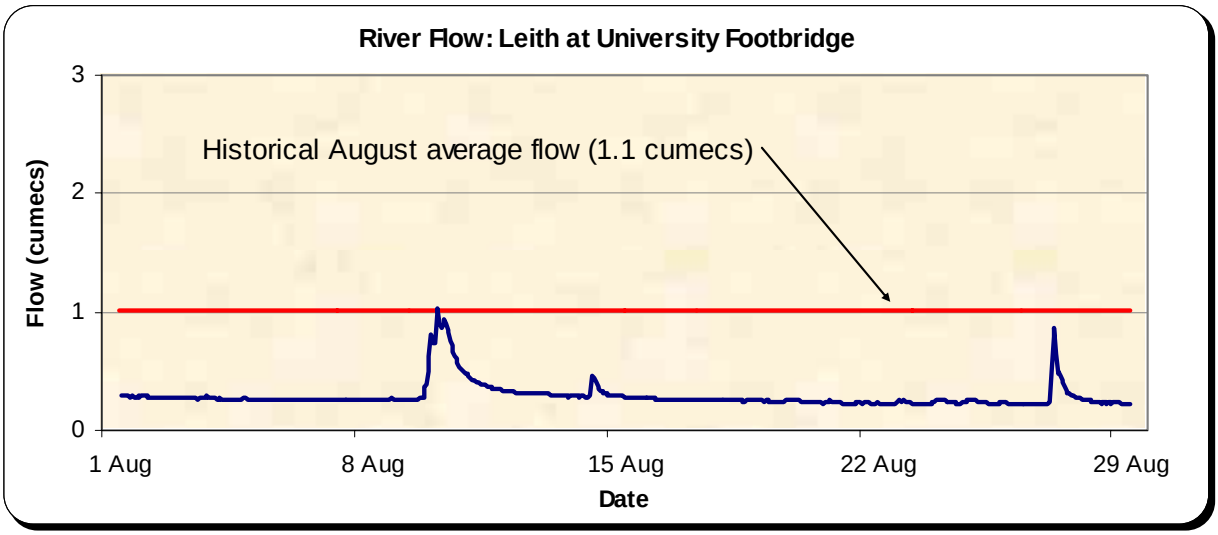
Dunedin

Rainfall totals in the Dunedin area were also well below normal. Pine Hill in North Dunedin recorded **25mm,** considerably lower than the long term average of 92mm. At North East Valley, and also at Long Beach, **22mm** was recorded. Across the city at Musselburgh, just **10mm** was recorded, which is **less than 20% of normal**.



Accumulated rainfall up to the end of August in North Dunedin has slipped further below the long term average. 593mm has been collected so far this year, compared to the long term average of 692mm for the first 8 months of the year.

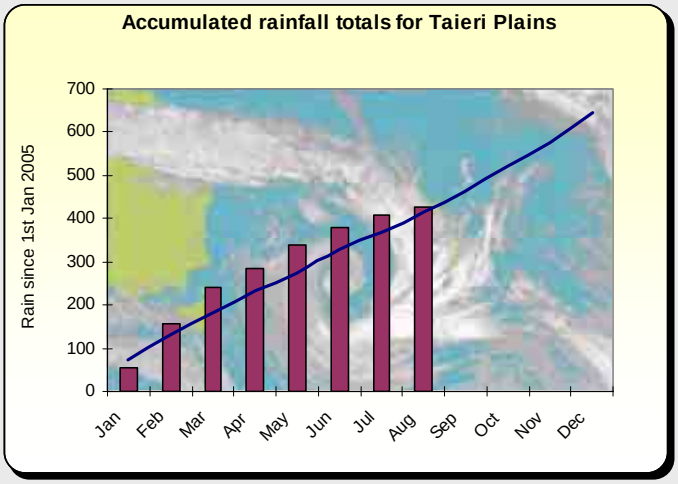
The lower than normal rainfall totals have led to reduced flows in local Dunedin streams. At the Leith at University footbridge, flow was **below average** for the entire month. Average flow at this site was **0.3 cumecs**, approximately **one quarter** of the historical August average flow.

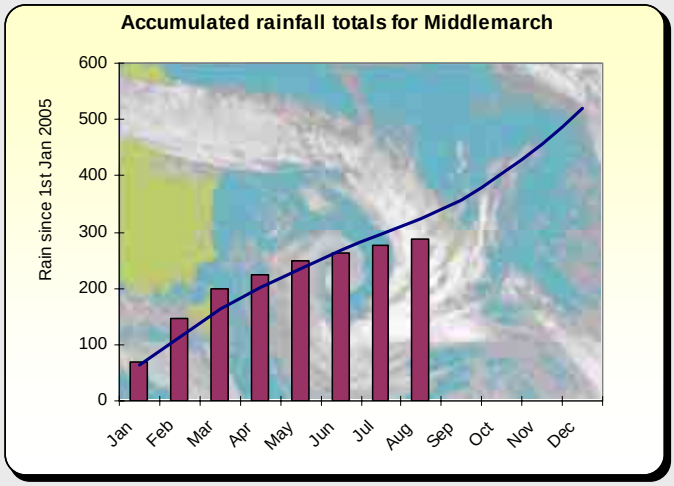


Lower and Strath Taieri

On the Lower Taieri, rainfall was approximately **one quarter** of the normal August total. Riccarton Road, and Dunedin Airport received just **16** and **10mm** respectively.

In the Strath Taieri, rainfall was approximately **half** the long term average for August. Just **10mm** was recorded at Middlemarch, and Mt Stoker, while Deep Stream collected **16mm**.

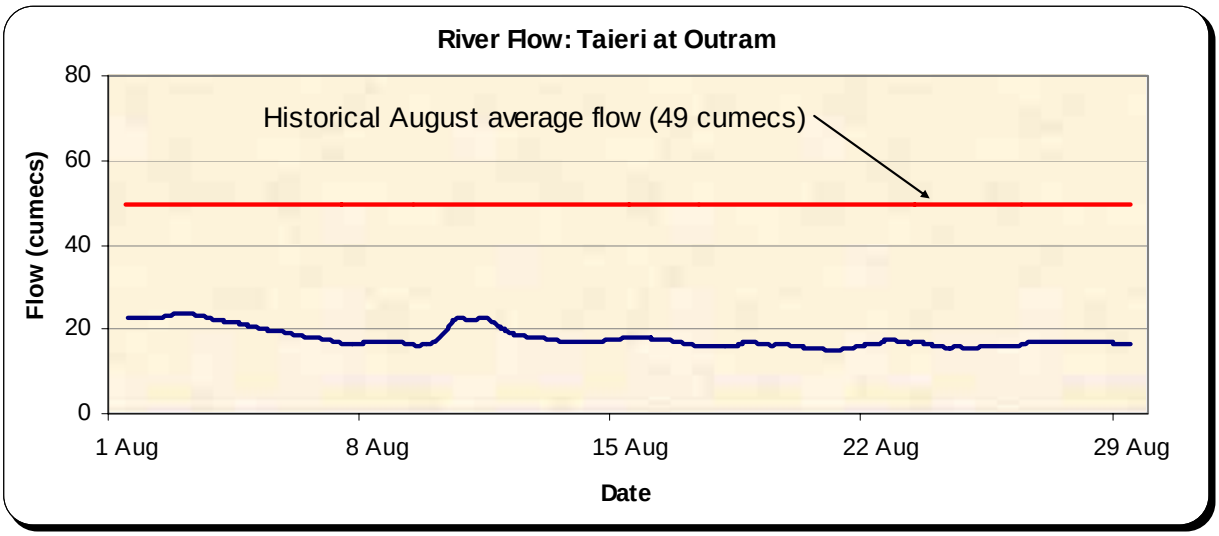




The accumulated rainfall total for the Taieri Plains at Riccarton Road is still slightly above the long term average, although there has been a series of drier than usual months since June. In the Strath Taieri, accumulated rainfall at Middlemarch has continued to drop further below the long term average, with very little rain since May.

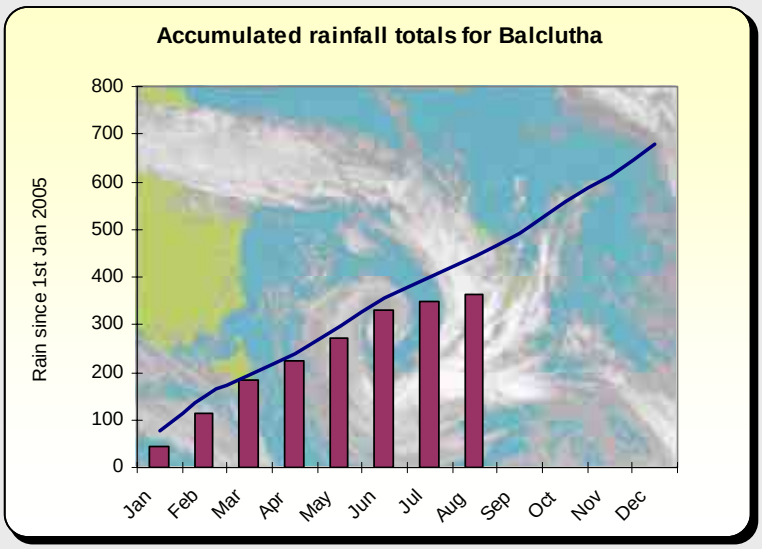
Average monthly flow in the Silverstream at Riccarton Road was **0.3 cumecs**, which is just **20%** of the long term average for August of 1.6 cumecs.

The Taieri River at Outram was flowing at **less than half of normal** for much of August. There were no significant flood events during the month, and river level gradually declined to be less than 20 cumecs by the end of August. Further upstream, Taieri River flows at Waipiata and Tiroiti were also less than average, although somewhat closer to normal than at Outram.

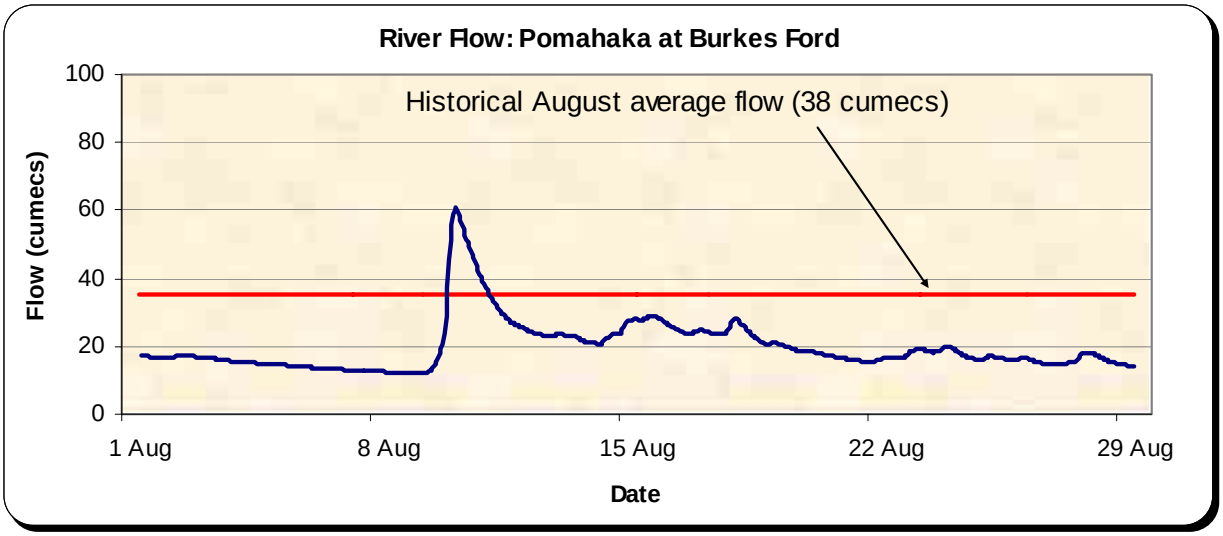


South Otago

Southern Otago was also drier than usual, with all rain sites recording totals that were less than normal. Waipahi at Cairn in the Catlins area was once again the wettest area in South Otago, with **50mm**, although this is **less than half of normal** for August. Balclutha was the driest area, recording just **15mm**, well below the long term average of 42mm. Further north, Clarks Flat in the Waitahuna, and Moa Flat in the Pomahaka recorded **33 and 40mm** respectively.



Accumulated rainfall totals for 2005 at Balclutha continued to drop further below the long term average line. **363mm** has fallen at Balclutha this year, compared to the historic average of **445mm**, for the period up to the end of August.



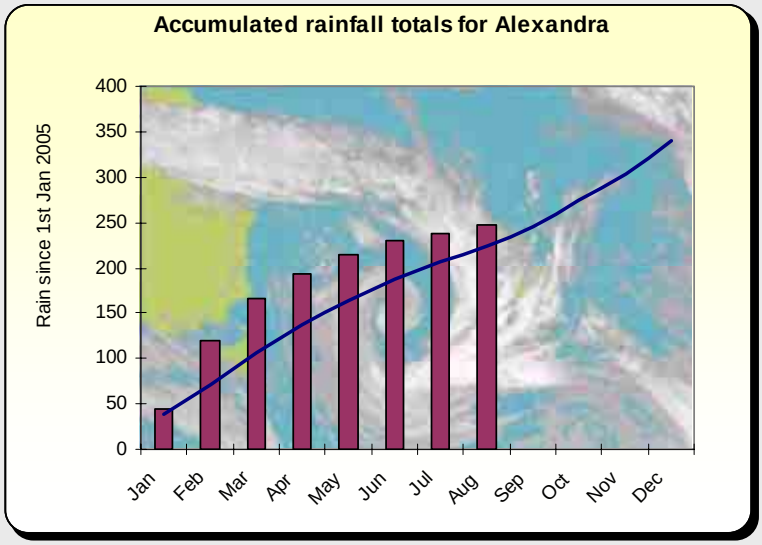
Flows in the Pomahaka River were generally **below normal** this month. At Burkes Ford, a small event during the second week peaked at 60 cumecs. There was a steady decline from this point on however, and by the end of the month, flow had dropped to less than half the long term August average.

Elsewhere in the district, the Waipahi River was also flowing at less than half the long term August average, while the Waitahuna was 40% below average for the month.

Central Otago

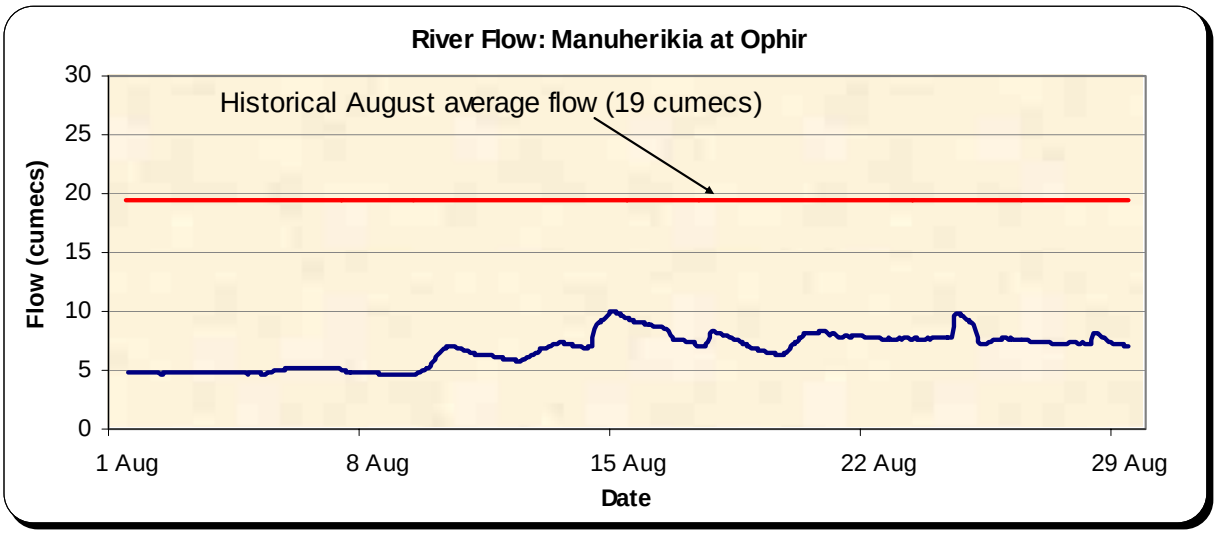
The Central Otago area had another reasonably dry month, and rainfall was below normal all sites except Hills Creek in the Idaburn, and at Clyde. Hills Creek received **27mm** (**normal** for August), while Clyde recorded 20mm (slightly **above normal**). The lowest totals were collected at Pat-Paerau (**10mm**, **50% below normal**), and Alexandra (**11mm**, **40% below normal**).

The area around Ettrick and Roxburgh was somewhat wetter, although still less than average. Millers Flat recorded **28mm**, **36% below normal**.



The accumulated rainfall total for Alexandra is still above the long term average line, despite monthly totals being below average since June. An extremely wet period in late summer is responsible the accumulated total still being above average for 2005.

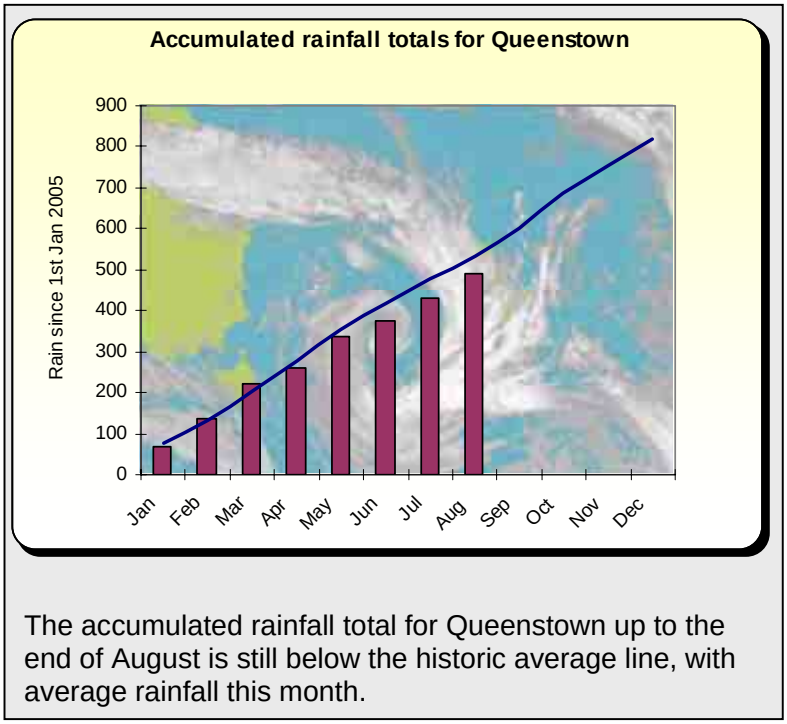
Flow in the Manuherikia was **less than half** of the historical August average this month. There were no significant events recorded at the Ophir site, although the overall trend was for a slight increase in flow from the middle of the month onwards.



Queenstown Lakes

The Queenstown Lakes district was the only area to have predominantly average to above average rainfall. Most sites in the Wakatipu Basin, including Queenstown, Glenorchy, Routeburn Station, and the Shotover recorded average rainfalls. Queenstown had **62mm** this month, while the Routeburn Station site received **181mm**.

At Makarora, **217m**m was collected, **14% above** average. Rain gauges around Wanaka were all close to normal, with the DOC Headquarters site receiving **68mm**, and West Wanaka recording **96mm**.



The accumulated rainfall total for Queenstown up to the end of August is still below the historic average line, with average rainfall this month.

Despite good rainfall in the Queenstown Lakes district, average monthly river flows were still generally below normal. The Shotover River at Peat's Hut was flowing at an average of **24 cumecs**, **30% below** the long term average for August. The Dart River at the Hillocks averaged **30 cumecs**, which is **40% below normal**. Outflow from Lake Wakatipu was closer to normal, with a maximum flow of **182 cumecs** in the Kawarau at Chards Road. Average flow for the month at this site was **144 cumecs**, compared to the normal August flow of **149 cumecs**.

Lake levels on the last day of August were slightly **above normal** for Wakatipu and Wanaka. Average lake level for the entire month was slightly **below normal** for Lake Wakatipu, and slightly **above normal** for Lake Wanaka.

Dry winter for much of Otago

Parts of Otago have experienced very dry conditions this winter. The drought that affected the east coast of the South Island during the summer of 2003-2004 is still fresh in most people's minds, and it is timely to compare the conditions that preceded that drought with the winter of 2005.

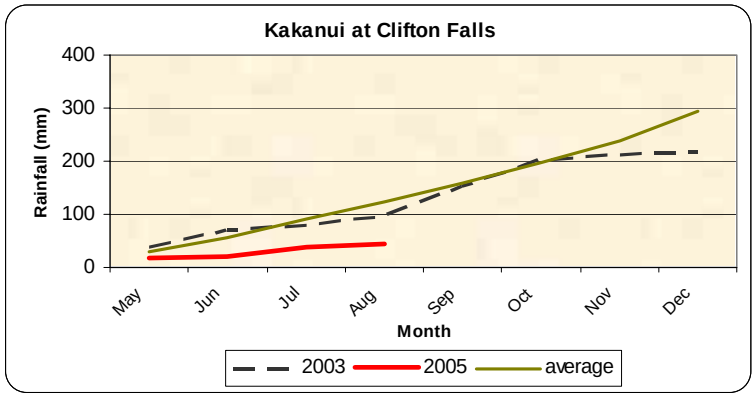
The graphs on the right show cumulative rainfall totals from May through to December for

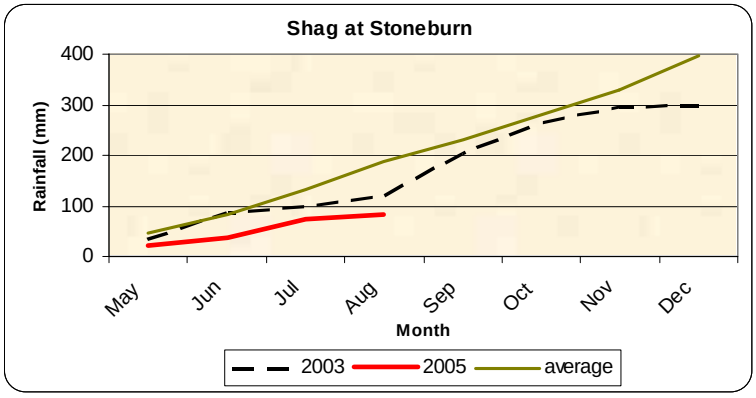
- An 'average' year
- 2003
- 2005, up to August.

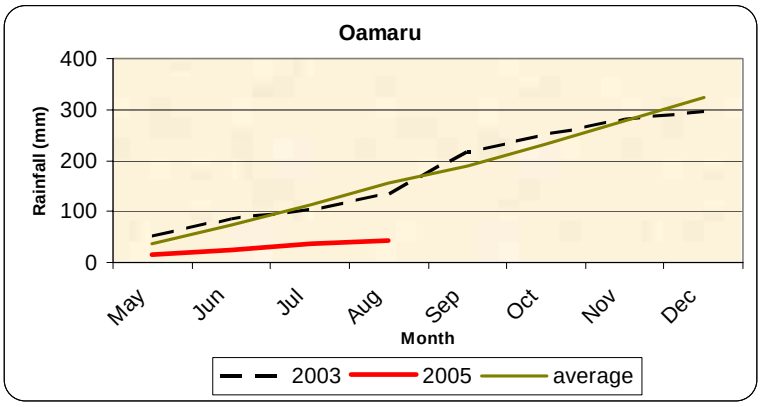
North Otago

In North Otago, there has been very little rain since May 2005. In the Kakanui catchment, Clifton Falls has received 44mm, Shag at Stoneburn 83mm, and Oamaru has recorded 44mm. These totals are well below average, and considerably less than those experienced in the year leading up to the 2003-2004 drought. This means that rivers, soil moisture and groundwater levels will also be dropping at present, with significant rain needed to recharge them.

These graphs show that at least 100mm of rain is needed for cumulative rain totals to approach average levels.







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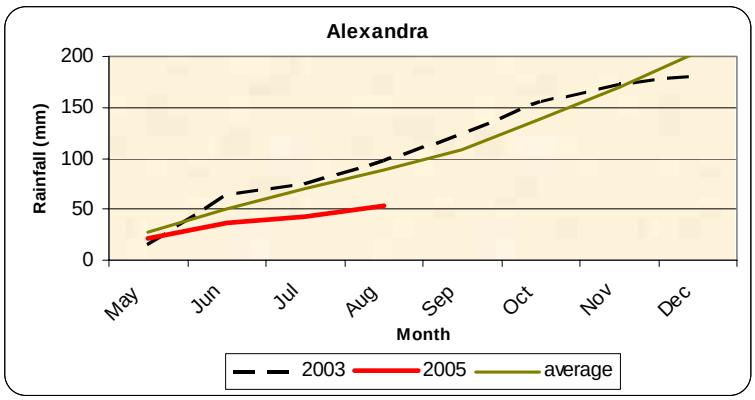
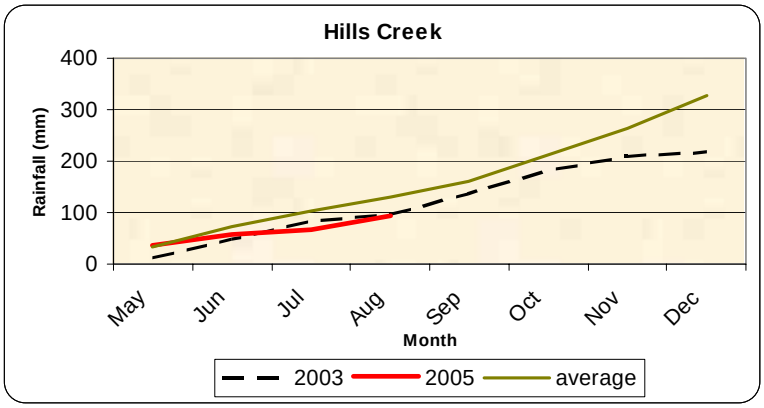


Central Otago

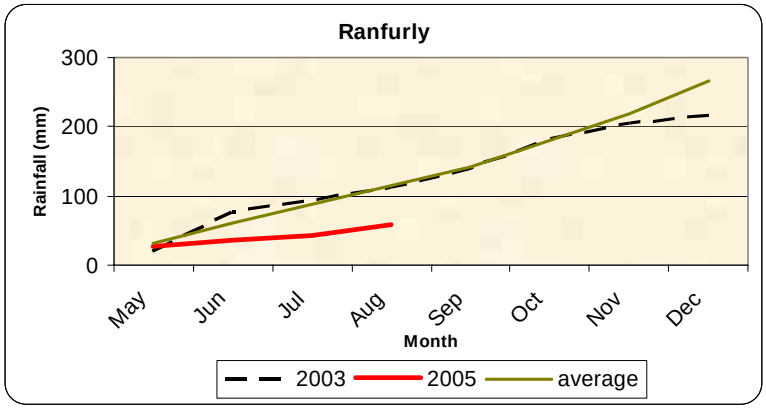
As in North Otago, rainfall totals from May to August 2005 are below average. Spring and early summer is normally the wettest time of year in this district, and significant rainfall will be needed during this period to restore river flows and maintain groundwater levels at normal.

In Alexandra, the cumulative total is 100mm below the long term average for this period.



At Hills Creek in the Idaburn catchment, the cumulative total to the end of August is the same as that in the 2003 year, preceding the severe drought conditions that occurred that summer.

In the Maniototo Basin, the cumulative rainfall total for winter 2005 at Ranfurly is well below the average line, with only 30mm recorded during the last three months.



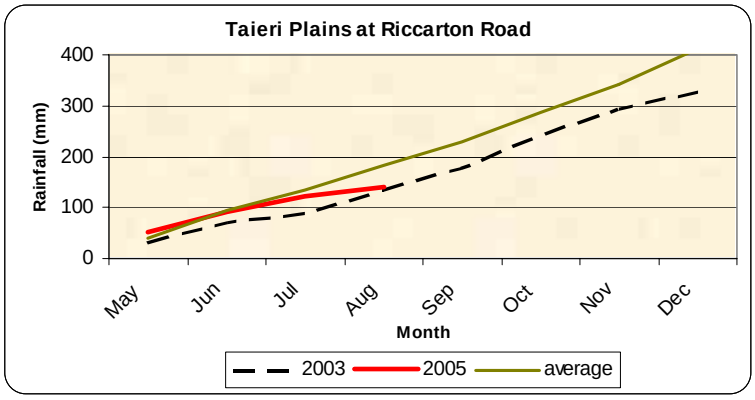
The graphs on the right show cumulative rainfall totals from May through to December for

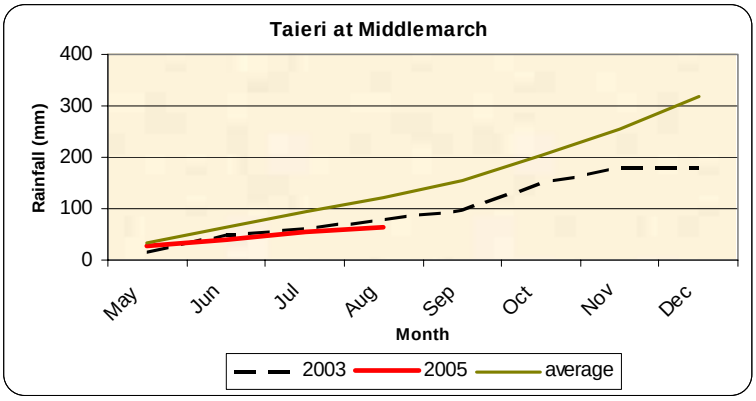
- An ‘average’ year
- 2003
- 2005, up to August.

Taieri

Rainfall at the lower Taieri at Riccarton Road was approximately average for May and June. Lower than normal July and August totals however have seen the cumulative total drop below average.

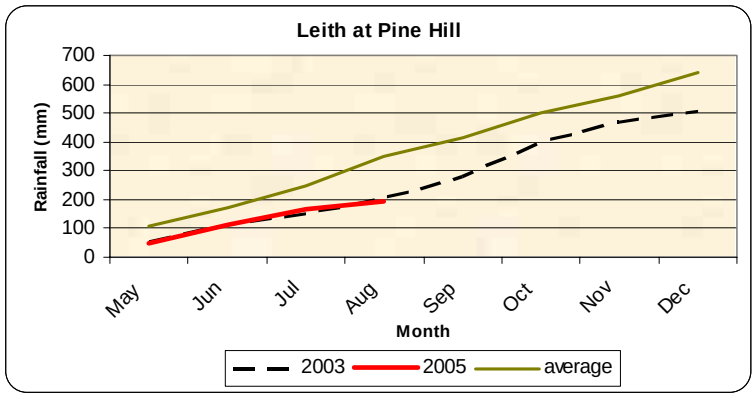
In the Strath Taieri, cumulative rainfall totals for May to August 2005 are well below average, and are slightly less than the total for the same period in 2003. Just 63mm has fallen between May and August at Middlemarch, compared to the average total of 122mm for this period.





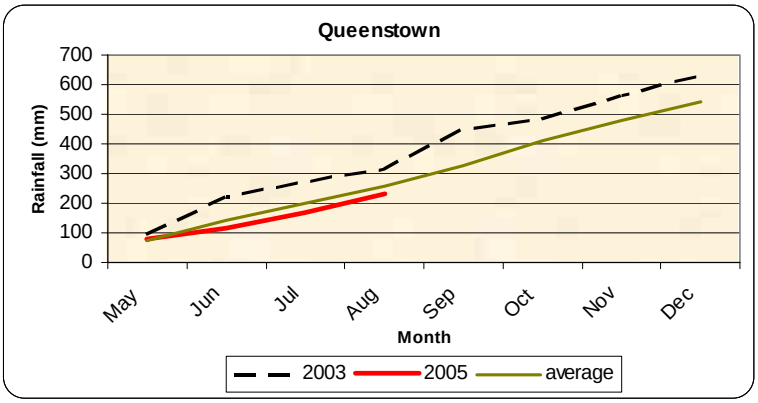
Dunedin

The ORC rain gauge in Pine Hill has received 194mm between May and August, similar to the total that fell in the period leading into the 2003 – 2004 drought, and well below the average total for this period of 350mm.



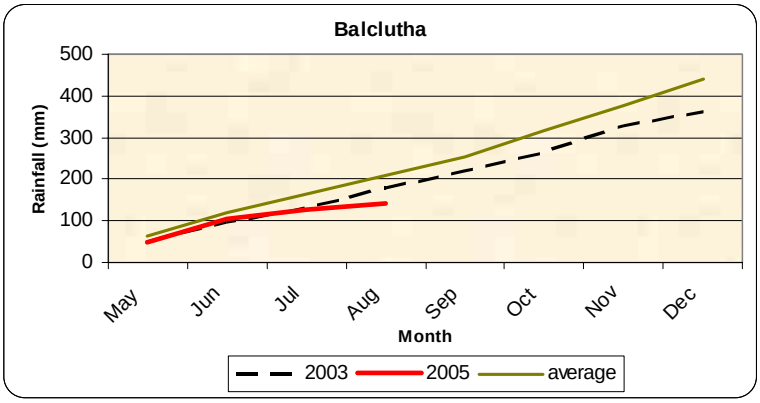
Queenstown Lakes

The Queenstown Lakes district has received reasonable rainfall totals this winter, and the cumulative total for May to August is only 15mm below the long term average for this period.



South Otago

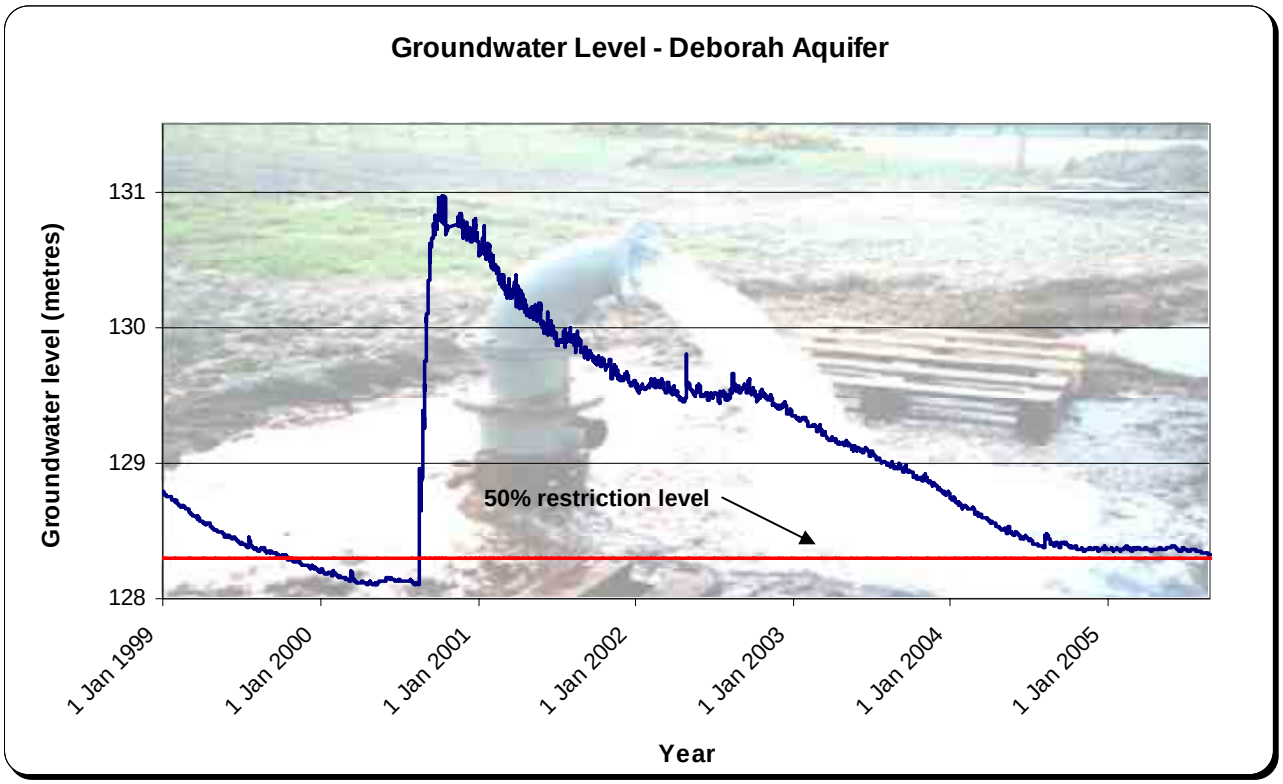
Parts of South Otago have also been relatively dry this winter, with 140mm collected at Balclutha during the last four months. This is approximately 60mm below average. Other rain gauges in the area show rainfall totals to be closer to normal.



Groundwater Summary

Groundwater levels across most of the aquifers monitored by the Otago Regional Council are approximately normal, with the exception of the North Otago volcanic aquifers, where levels are very low. In the Ettrick and Roxburgh areas, groundwater levels are high.

Webster's bore, in the Deborah Aquifer in North Otago is currently sitting at 128.31 metres. According to the Otago Regional Council's Water Plan, a 50% mandatory restriction will apply to all users of the Deborah Aquifer if monthly average water level at Webster's bore falls below 128.3m. Unless the aquifer is recharged soon, the groundwater level is expected to fall below 128.3m in September. A rainfall event in the vicinity of 200-250mm is required to bring the aquifer level back to a high stage.



At Isbister's bore in the Waiareka Aquifer, groundwater level is at a record low of 121.93 metres. 25% restrictions are already in place in this aquifer, and a further drop of 0.2 of a metre would see 50% restrictions put in 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: chris.arbuckle@orc.govt.nz

Mailing list

This report is available online and by email

To update your contact details on our mailing lists, please email: environmental.info@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 (August 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	7.500	40.0	-81.25	220.40	320.00	-31.13
Grandview	North Otago	8.700	51.0	-82.94	305.50	353.00	-13.46
Glenrowan	North Otago	11.800	52.0	-77.31	324.95	419.00	-22.45
Clifton Falls	North Otago	6.500	32.0	-79.69	258.00	294.00	-12.24
The Dasher	North Otago	9.000	61.0	-85.25			
Stoneburn telemetry	North Otago	8.000	57.0	-85.96	324.50	409.00	-20.66
Dome Hills	North Otago	9.000	42.0	-78.57			
Wallfield	North Otago	9.5	49	-80.6			
Leith at Sullivan's Dam	L/S Taieri, Dun	35.500	108.0	-67.13	688.50	825.00	-16.55
Leith at Pine Hill	L/S Taieri, Dun	24.500	92.0	-73.37	590.00	688.00	-14.24
Musselburgh	L/S Taieri, Dun	9.600	55.0	-82.55	416.00	521.00	-20.15
Taieri Depot	L/S Taieri, Dun	16.000	48.0	-66.67	425.00	419.00	1.43
Dunedin Airport	L/S Taieri, Dun	9.700	45.0	-78.44	305.50	435.00	-29.77
Mt Stoker	L/S Taieri, Dun	10.500	22.0	-52.27	278.00	292.00	-4.79
Glengarry	L/S Taieri, Dun	15.500	34.0	-54.41	355.50	372.00	-4.44
Middlemarch-Garthmyl	L/S Taieri, Dun	10.100	28.0	-63.93	292.10	322.00	-9.29
Long Beach	L/S Taieri, Dun	21.5	66	-67.40			
Mooyman	L/S Taieri, Dun	22.4	87	-74.25			
Balclutha	Southwest Otago	14.500	42.0	-65.48	363.50	456.00	-20.29
Clarks Flat	Southwest Otago	32.500	50.0	-35.00	444.50	512.00	-13.18
Cairn	Southwest Otago	49.500	109.0	-54.59	743.50	902.00	-17.57
Waikoikoi at Rosebank	Southwest Otago	30.800	61.0	-49.51	586.00	606.00	-3.30
Moa Flat	Southwest Otago	39.500	56.0	-29.46	612.50	521.00	17.56
Ranfurly	Central Otago	16.400	27.0	-39.26	223.80	293.00	-23.62
Pat-Paerau	Central Otago	10.000	19.0	-47.37	292.50	236.00	23.94
Tima	Central Otago	27.500	43.0	-36.05	424.00	433.00	-2.08
Ettrick No2	Central Otago	23.000	32.0	-28.13	396.90	381.00	4.17
Blackstone Hill	Central Otago	24.700	43.0	-42.56	298.40	416.00	-28.27
Hills Creek	Central Otago	27.000	26.0	3.85	270.50	321.00	-15.73
Lauder EWS	Central Otago	15.400	18.0	-14.44	237.80	296.00	-19.66
Merino Ridges	Central Otago	15.000	26.0	-42.31			
Alexandra	Central Otago	10.800	18.0	-40.00	247.30	221.00	11.90
Clyde EWS	Central Otago	20.400	17.0	20.00	236.80	247.00	-4.13
Makarora telemetry	Lakes district	217.000	191.0	13.61	1151.50	1356.00	-15.08
West Wanaka	Lakes district	96.000	96.0	0.00	493.00	656.00	-24.85
Wanaka DOC HQ	Lakes district	67.6	61	10.8			
Wanaka Aero AWS	Lakes district	54.800	53.0	3.40	316.60	437.00	-27.55
Peat's Hut	Lakes district	74.000	89.0	-16.85	471.00	532.00	-11.47
Routeburn Station	Lakes district	180.500	180.0	0.28			
Glenorchy telemetry, Hillocks	Lakes district	139.000	133.0	4.51	902.74	1053.00	-14.27
Queenstown	Lakes district	61.700	60.0	2.83	478.40	537.00	-10.91
Queenstown AWS	Lakes district	45.400	63.0	-27.94	393.00	490.00	-19.80

RIVER FLOW TABLE (August 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	1.196	3.639	2.051	11.313	-81.87
Kakanui River at Clifton Falls	North Otago	0.965	2.832	1.410	4.527	-68.86
Shag River at The Grange	North Otago	0.448	1.044	0.612	3.649	-83.22
Leith at University Foot Br	L/S Taieri, Dun	0.214	1.095	0.280	1.008	-72.16
Silverstream at Taieri Depot	L/S Taieri, Dun	0.155	2.497	0.306	1.601	-80.86
Taieri River at Outram	L/S Taieri, Dun	13.838	23.926	17.657	49.376	-64.24
Taieri River at Sutton	L/S Taieri, Dun	10.623	16.387	12.815	29.189	-56.10
Taieri River at Tiroiti	L/S Taieri, Dun	6.808	11.947	9.251	19.699	-53.04
Taieri River at Waipiata	Central Otago	5.364	11.781	8.201	12.598	-34.91
Nenthorn Stream at Mt Stoker Rd	L/S Taieri, Dun	0.182	0.461	0.270	1.953	-86.16
Deep Stream at SH 87	L/S Taieri, Dun	0.964	3.134	1.667	3.411	-51.12
Waipori River at Berwick	Southwest Otago	0.730	28.188	16.900	17.827	-5.20
Clutha River at Balclutha	Southwest Otago	203.803	532.088	361.072	516.237	-30.06
Waitahuna River at Tweeds Br	Southwest Otago	1.293	7.323	1.942	3.246	-40.16
Pomahaka River at Burkes Ford	Southwest Otago	11.994	60.793	19.228	35.289	-45.51
Pomahaka River at Glenken	Southwest Otago	4.839	18.062	8.380	14.433	-41.94
Waipahi River at Waipahi	Southwest Otago	1.787	7.222	2.890	7.025	-58.86
Manuherikia River at Ophir	Central Otago	4.586	10.066	6.702	19.366	-65.39
Clutha at Clyde	Central Otago	108.813	687.190	325.274	454.193	-28.38
Clutha River at Cardrona Confluence	Lakes District	120.154	214.820	166.184	231.871	-28.33
Kawarau River at Chards Rd	Lakes District	117.673	181.907	143.970	149.730	-3.85
Shotover River at Bowens Peak	Lakes District	16.957	66.092	24.406	34.492	-29.24
Shotover River at Peat's Hut	Lakes District	8.897	73.592	17.773	21.903	-18.85
Dart River at The Hillocks	Lakes District	18.368	128.810	30.703	41.755	-26.47

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 Wakatipu	309.650	309.723	309.530	309.830	309.680	309.713
Lake Wanaka	276.788	277.086	276.619	277.402	276.898	276.871

Lake	Lake outflow for the month (m^3/s)					Historic mean outflow (m^3/s)
	First Day	Last Day	Min.	Max.	Mean	
Lake Wakatipu	106.9	122.0	83.8	145.8	113.5	124.88
Lake Wanaka	123.8	168.1	101.4	221.4	140.8	132.90

Notes:
L/S Taieri, Dun = Lower Taieri, Strath Taieri and Dunedin.
** = Controlled Outflows.*