

RAINFALL & RIVER FLOW MONTHLY REPORT

OTAGO REGIONAL COUNCIL

February 2006

In Brief

February rainfall totals were generally below normal in the Dunedin area, Central Otago, Queenstown lakes district, and lower and Strath Taieri. The Alexandra basin received around one third of its normal rain, with just 11mm recorded in Alexandra, and 15mm at Clyde. Most of North Otago received normal rainfall, with the exception of the Shag Valley and lower Kakanui, which were 25% below normal. Southwest Otago rainfall totals were also close to average, except for the Moa Flat area, where 30% more rain than normal was recorded.

With the exception of a few small flow events, river flows remained below normal for the entire month across almost all of Otago. The following flow monitoring sites had average monthly flows **less than half of normal** for February:

- The Shag River at The Grange in North Otago
- The Water of Leith at University Footbridge in Dunedin,
- The Waitahuna at Tweeds Bridge, and Pomahaka at Glenken sites in Southwest Otago.
- All sites in the Taieri catchment, including all Taieri main stem sites, and Silverstream, Nenthorn and Deep Stream tributaries. In particular, the Silverstream and Taieri River at Outram and Waipiata had average monthly flows **75 to 85% below normal**.

Smaller streams such as the Silverstream on the Taieri Plains, the Shag River in North Otago, and Dunstan Creek in the Manuhirikia are now particularly susceptible to extended periods of low rainfall like those experienced during February. Water temperatures can rise dramatically in small shallow streams, and periphyton growth is promoted by low velocities and a shallow water column. The cumulative effects of drier than normal conditions that have dominated since mid 2005 mean that base flow is now well below normal. Rainfall events that would normally have increased river flow for a reasonable length of time, instead result in only very brief 'fresches', with a rapid return to low flow conditions. Above normal rainfall over a period of several months is needed to increase flows back to average levels in these rivers.

The few small rainfall events that did occur in February, along with precise management of consumptive water use from rivers, has generally helped to keep river flows above the level where restrictions begin to take effect. Restrictions on permits for consumptive water use in rivers such as the Kakanui, Shag and Taieri have been only infrequent this summer.

Summary text and graphs are provided for the following districts:

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

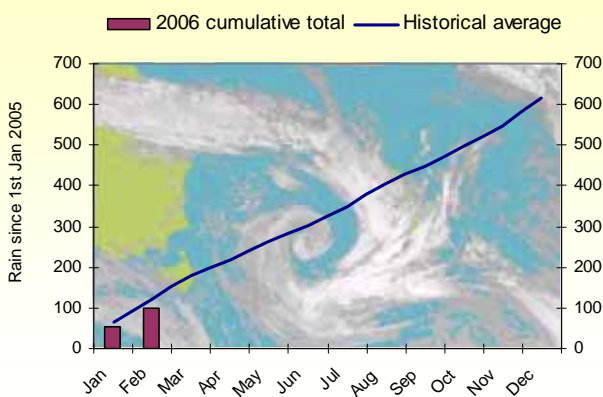
A summary table of flow and rainfall is attached to this report, which gives more detail on sites in each of these areas.

Rainfall & river flows around the region

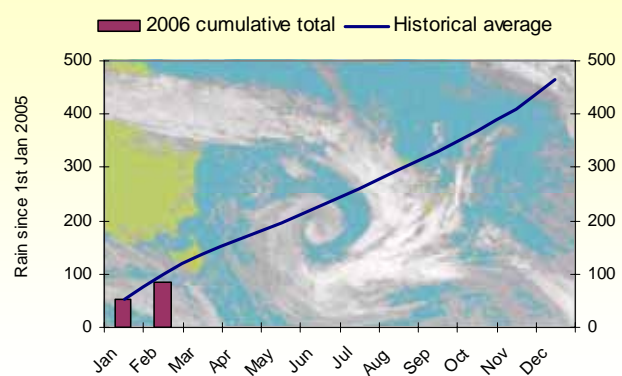
North Otago

February rainfall totals were close to average for most sites in North Otago. Glenrowan in the lower Kakanui catchment, and Stoneburn in the Shag Valley were both 25% below normal, with 35mm and 45mm respectively. Oamaru received 51mm, which is 25% above normal. The Dasher, in the headwaters of the Kauru River had the highest rainfall total for North Otago, with 72mm, which is normal for February.

Accumulated rainfall totals for Shag Valley

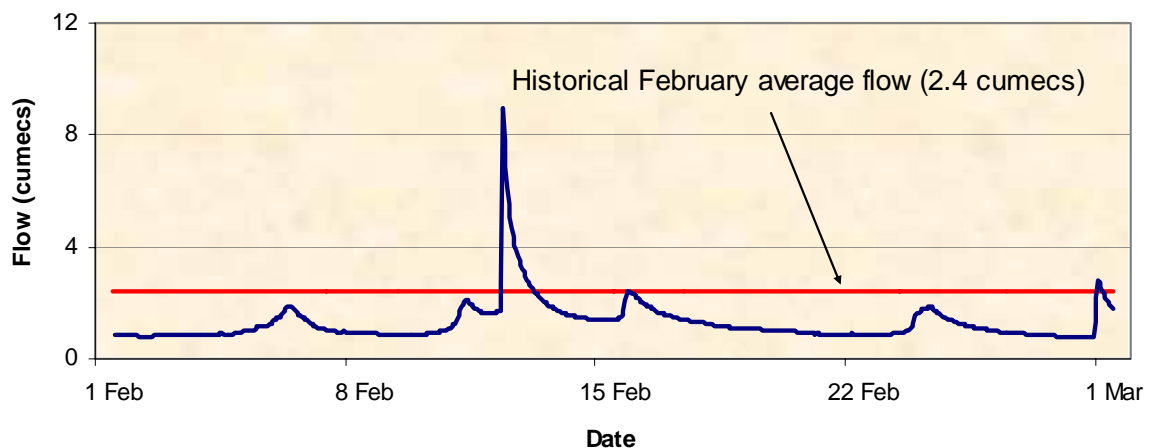


Accumulated rainfall totals for Kakanui



With two months of the year gone already, the accumulated rainfall total for Stoneburn in the Shag Valley is 100mm, 20% below normal. In the Kakanui catchment at Clifton Falls 86mm has fallen so far this year, 13% below normal.

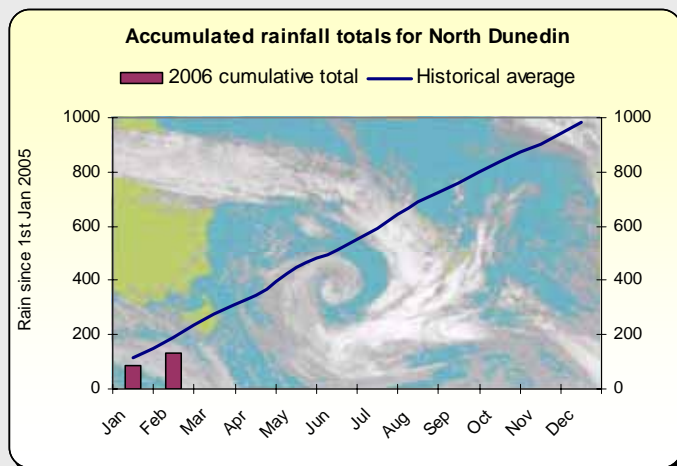
River Flow: Kakanui at Clifton Falls



The average flow in the Kakanui River at Clifton Falls was 1.3 cumecs, 47% below the historical February average. The largest flow peak was 9 cumecs on the 11th of February. Average flow in the Shag River was 70% below normal, and by the end of the month, the Shag at Craig Road was reading 0.17 cumecs, only slightly above the level where primary permits to take water cease operation.

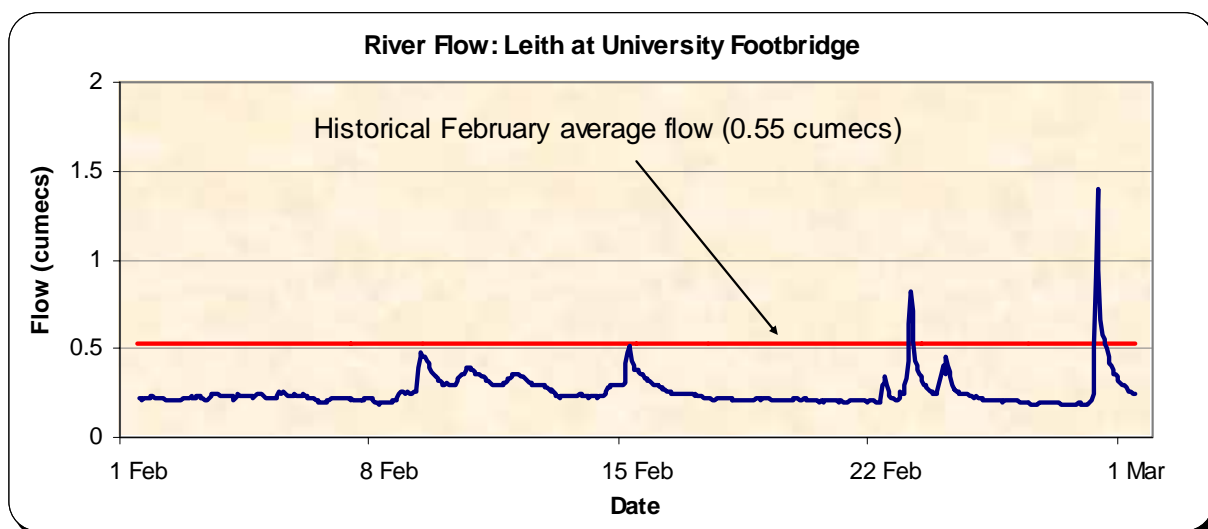
Dunedin

Rainfall totals in the Dunedin area were below normal this month. The Pine Hill gauge recorded 48mm, which is 26% below the average February rainfall of 65mm. The upper Leith catchment at Sullivan's Dam recorded 73mm (16% below normal), while across town, Musselburgh received 31mm (just 50% of normal).



The second month of 2006 was also drier than usual at Pine Hill in the northern part of Dunedin, and the cumulative total of 133mm is 30% below normal.

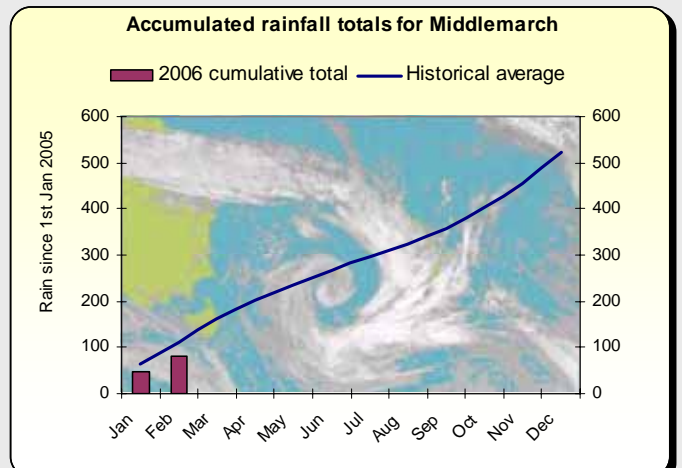
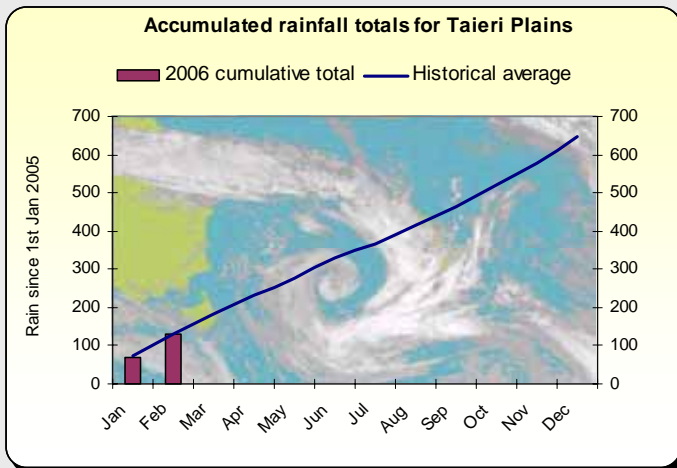
The historical February average flow for the Leith at University Footbridge is 0.55 cumecs, although the drier than normal conditions recently resulted in a base-flow of just 0.2 cumecs this month. A small event at the end of the month very briefly lifted flow to 1.4 cumecs.



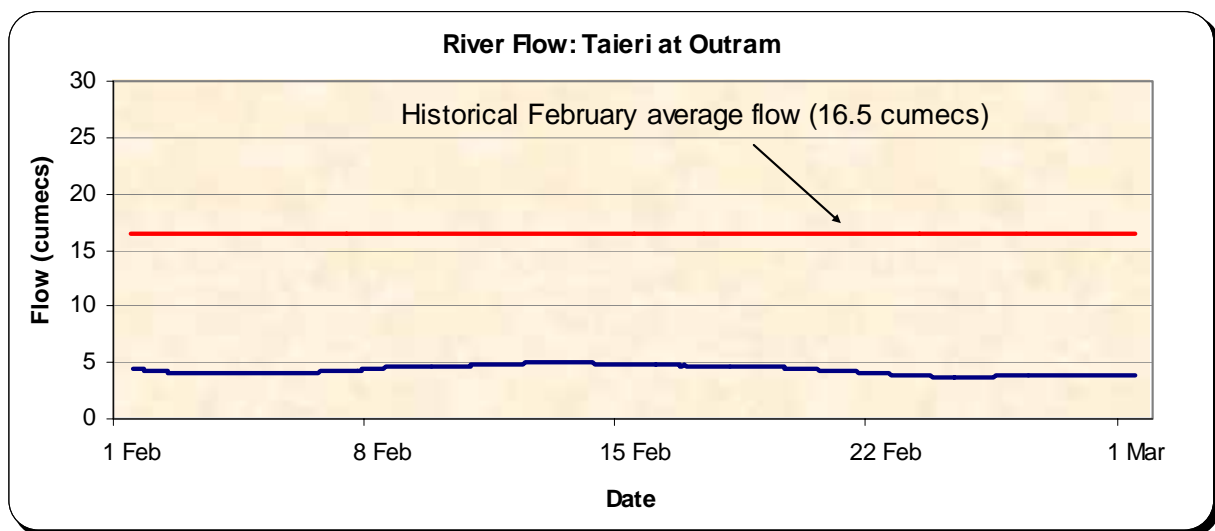
Lower and Strath Taieri

On the Lower Taieri, 59mm was recorded at the Riccarton Road site, which is the same as the long term average for February. The Dunedin Airport area was considerably drier, with the gauge collecting 38mm, 31% below the normal February total of 55mm.

The Deep Stream at SH87 site recorded just 18.5mm this month, 64% below normal. In the Strath Taieri, Middlemarch was also reasonably dry, with 30mm recorded (40% below normal). Further east, 37mm was the total for Nenthorn at Mt Stoker, slightly above normal for February.



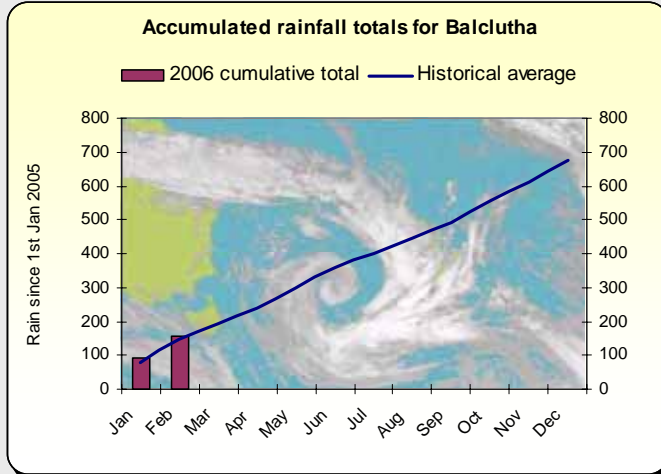
Accumulated rainfall for 2006 at the Taieri Plains at Riccarton Road remains approximately normal at 129mm, while at Middlemarch, the cumulative total of 78mm is still well below the historical average.



The Taieri River at Outram remained well below the normal February flow throughout the month, with no high flow events at all. Average monthly flow was 4.3 cumecs, 73% below normal. The Silverstream flow was just a fraction of normal this month. Apart from a few very small flow events, the Silverstream remained at or below 0.1 cumecs all month, 86% below the historical average flow of 0.66 cumecs.

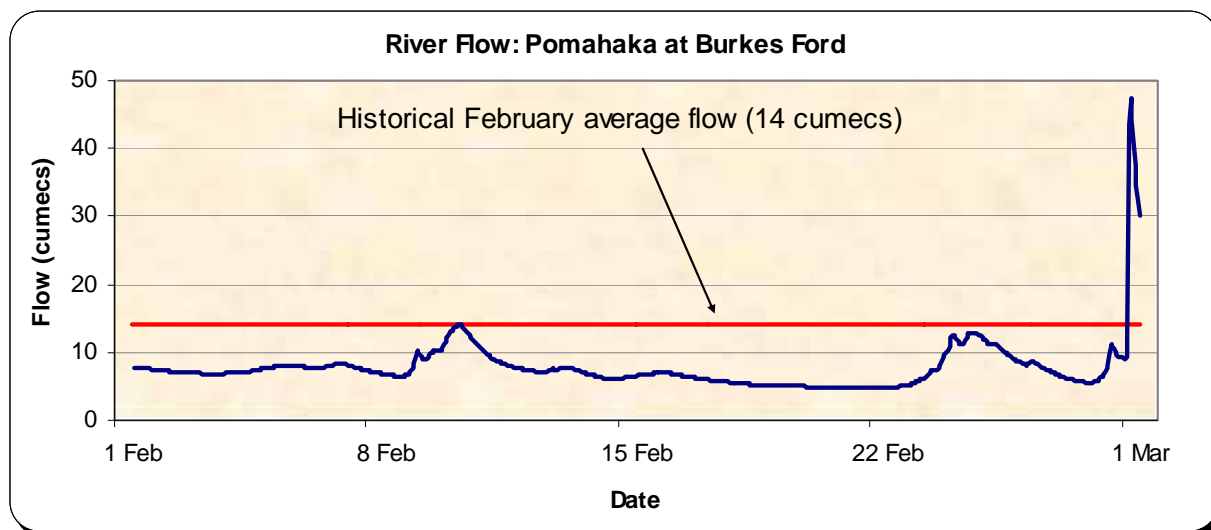
Southwest Otago

Southwest Otago experienced predominantly normal rainfall this month. The Pomahaka at Moa Flat site was the wettest in the district with 90mm (28% above normal), while Balclutha was considerably drier with 66mm recorded (14% above normal). Warepa and Waitahuna at Clarks Flat both received normal rainfall, with 61mm and 72mm respectively.



Cumulative rainfall at Balclutha for 2006 is **157mm**, close to the historical average.

Flow in the Pomahaka River at Burkes Ford remained well below normal for almost all of February, with the exception of a small flood event right at the end of the month. The average monthly flow of 7.8 cumecs at Burkes Ford was 45% below the historical average for February of 14 cumecs. Elsewhere in Southwest Otago, the Waitahuna River at Tweeds Bridge, was flowing approximately 50% below normal, while the Waipahi River at Waipahi had a monthly average flow only slightly lower than normal.



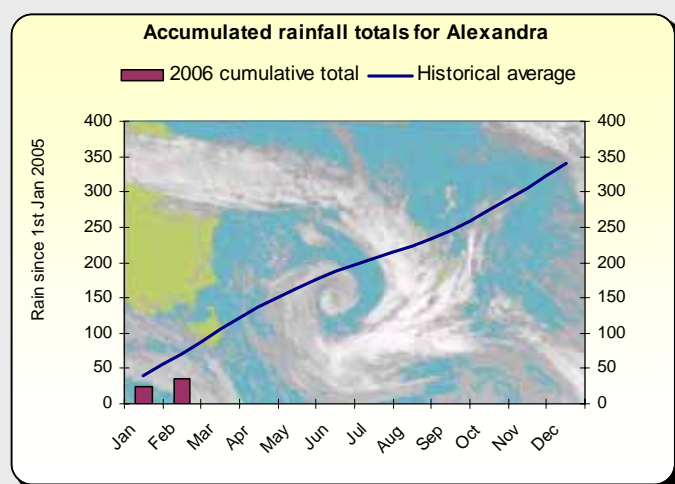
Central Otago

Central Otago rainfall ranged from normal to well below normal this month. Maniototo and Idaburn rainfall was typical of February, and ranged from 31mm at Ranfurly to 36mm at Hills Creek.

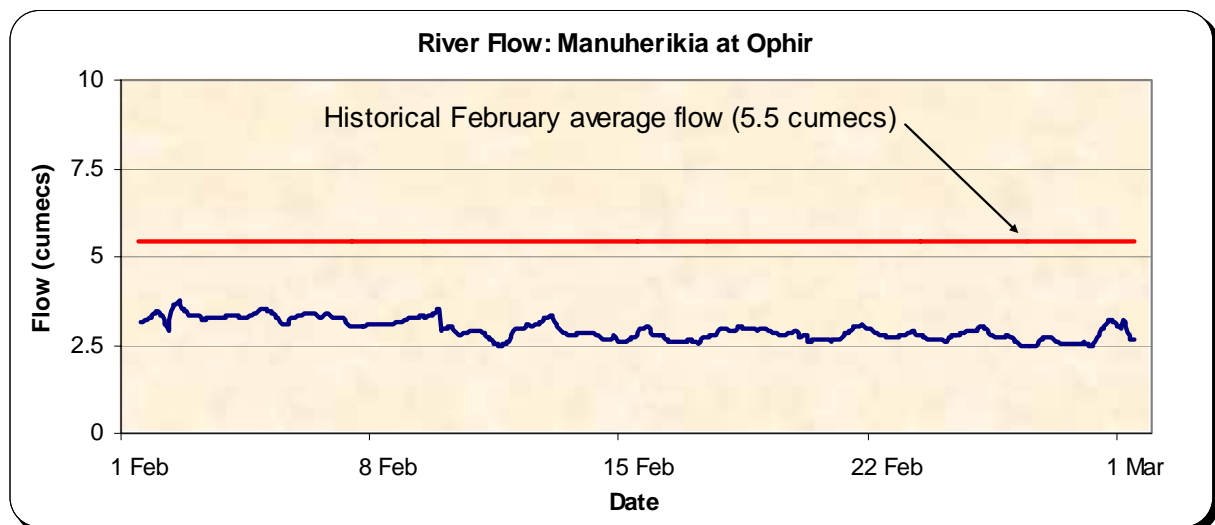
In the Manuherikia, Lauder recorded 29mm, 39% below normal.

The Alexandra - Clyde area was especially dry, receiving between 10 and 15mm, approximately half to one third of what normally falls during February.

Etrick collected 35mm, and Tima (Millers Flat) recorded 45mm, 44% and 27% below normal respectively.



Just 35mm of rain has fallen so far this year in Alexandra, well behind the long-term average cumulative total of 73mm.



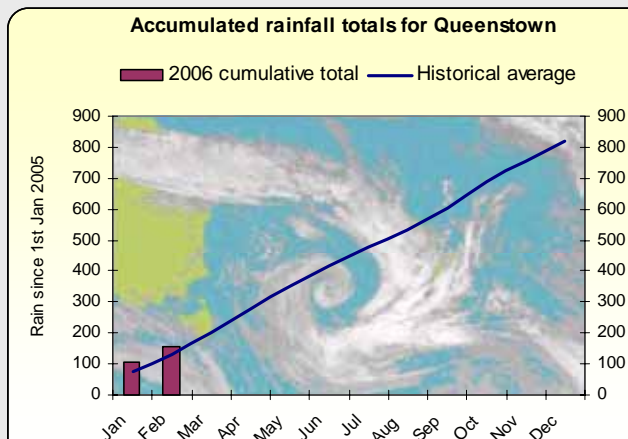
River flow in the Manuherikia at Ophir was once again well below normal this month. The average monthly flow was 2.9 cumecs, 46% below the historical February average flow of 5.5 cumecs. In addition, there was a complete lack of small flow events, or 'freshe' in the Manuherikia this month, and river flow slowly declined during February.

Dunstan Creek is a tributary of the Manuherikia, and was also very low this month, almost drying up at the recorder site at Beatties Road a number of times. The recorder measured an average flow of just **0.17 cumecs**.

Queenstown Lakes

In the Queenstown Lakes district, rainfall was normal to below normal. Shotover at Peat's Hut (51mm), Queenstown (50mm), and Wanaka DOC HQ (36mm) were all close to normal for February.

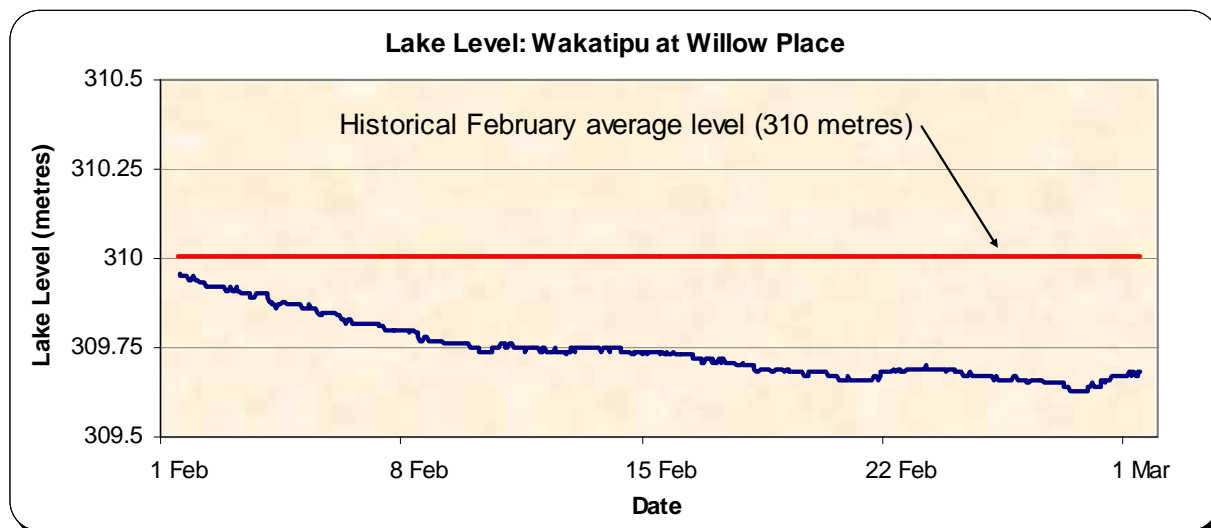
Further west, Makarora recorded 65mm, which is less than half of normal. The Rees Valley was reasonably dry, recording 52mm (32% below normal). West Wanaka was drier than normal, with 36mm recorded (39% below normal).



The cumulative rainfall total for Queenstown remains slightly above normal, with 154mm recorded, compared to the average cumulative total of 131mm.

Average monthly river flows in the Queenstown Lakes district were all below normal this month. The Shotover River at Peat's Hut was flowing at an average of 10.5 cumecs, (43% below normal) while the Dart River at the Hillocks averaged 87 cumecs (25% below normal). In the Kawarau at Chards Road, average flow for the month was 151 cumecs (33% below normal).

Lake Wakatipu began the month just below the historical February average level of 310 metres. Lower than average rainfall resulted in a steady decline in lake level, and by the end of the month, Wakatipu was 0.32 metres below normal. Lake Wanaka began the month 0.4 metres below normal, and also declined steadily to be 0.67 metres below normal by month's end.



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 (*February 2006*)

| 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 | 51.200 | 41.0 | 24.88 | 128.40 | 87.00 | 47.59 |
| Grandview | North Otago | 39.000 | 43.0 | -9.30 | 97.10 | 101.00 | -3.86 |
| Glenrowan | North Otago | 34.950 | 47.0 | -25.64 | 92.75 | 121.00 | -23.35 |
| Waikoura | North Otago | 45.500 | 39.0 | 16.67 | 112.00 | 91.00 | 23.08 |
| Clifton Falls | North Otago | 34.500 | 40.0 | -13.75 | 86.00 | 94.00 | -8.51 |
| The Dasher | North Otago | 72.000 | 67.0 | 7.46 | 135.00 | 150.00 | -10.00 |
| Stoneburn telemetry | North Otago | 45.000 | 58.0 | -22.41 | 100.00 | 122.00 | -18.03 |
| Dome Hills | North Otago | 63.000 | 60.0 | 5.00 | 122.00 | 140.00 | -12.86 |
| Fairview | North Otago | 56.000 | 57.0 | -1.75 | 112.00 | 124.00 | -9.68 |
| Leith at Sullivan's Dam | L/S Taieri, Dun | 73.000 | 87.0 | -16.09 | 163.00 | 197.00 | -17.26 |
| Leith at Pine Hill | L/S Taieri, Dun | 48.000 | 65.0 | -26.15 | 133.00 | 189.00 | -29.63 |
| Musselburgh | L/S Taieri, Dun | 31.400 | 62.0 | -49.35 | 105.00 | 133.00 | -21.05 |
| Taieri Depot | L/S Taieri, Dun | 59.000 | 59.0 | 0.00 | 128.50 | 132.00 | -2.65 |
| Dunedin Airport | L/S Taieri, Dun | 38.000 | 55.0 | -30.91 | 93.20 | 129.00 | -27.75 |
| Mt Stoker | L/S Taieri, Dun | 36.500 | 39.0 | -6.41 | 87.00 | 104.00 | -16.35 |
| Glengarry | L/S Taieri, Dun | 18.500 | 51.0 | -63.73 | 54.00 | 120.00 | -55.00 |
| Middlemarch-Garthmyl | L/S Taieri, Dun | 29.600 | 49.0 | -39.59 | 78.40 | 112.00 | -30.00 |
| Balclutha | Southwest Otago | 66.000 | 58.0 | 13.79 | 156.50 | 129.00 | 21.32 |
| Warepa | Southwest Otago | 60.600 | 63.0 | -3.81 | 193.30 | 147.00 | 31.50 |
| Clarks Flat | Southwest Otago | 71.500 | 75.0 | -4.67 | 162.00 | 157.00 | 3.18 |
| Cairn | Southwest Otago | 78.000 | 93.0 | -16.13 | 259.50 | 204.00 | 27.21 |
| Waikoikoi at Rosebank | Southwest Otago | 79.400 | 71.0 | 11.83 | 202.60 | 164.00 | 23.54 |
| Moa Flat | Southwest Otago | 89.500 | 70.0 | 27.86 | 176.50 | 160.00 | 10.31 |
| Ranfurly | Central Otago | 31.000 | 37.0 | -16.22 | 75.20 | 90.00 | -16.44 |
| Pat-Paerau | Central Otago | 32.000 | 36.0 | -11.11 | 81.00 | 84.00 | -3.57 |
| Tima | Central Otago | 45.000 | 62.0 | -27.42 | 111.00 | 138.00 | -19.57 |
| Ettrick No2 | Central Otago | 34.800 | 62.0 | -43.87 | 82.80 | 133.00 | -37.74 |
| Blackstone Hill | Central Otago | 32.400 | 58.0 | -44.14 | 90.50 | 126.00 | -28.17 |
| Hills Creek | Central Otago | 36.000 | 38.0 | -5.26 | 87.50 | 110.00 | -20.45 |
| Lauder EWS | Central Otago | 29.400 | 48.0 | -38.75 | 68.40 | 110.00 | -37.82 |
| Alexandra | Central Otago | 10.600 | 31.0 | -65.81 | 34.70 | 73.00 | -52.47 |
| Clyde EWS | Central Otago | 15.200 | 24.0 | -36.67 | 44.00 | 75.00 | -41.33 |
| Hunter Valley 2 | Lakes district | 36.200 | 61.0 | -40.66 | 137.60 | 155.00 | -11.23 |
| Makarora telemetry | Lakes district | 65.000 | 134.0 | -51.49 | 230.00 | 302.00 | -23.84 |
| West Wanaka | Lakes district | 36.000 | 59.0 | -38.98 | 104.50 | 136.00 | -23.16 |
| Wanaka Aero AWS | Lakes district | 28.800 | 38.0 | -24.21 | 69.20 | 99.00 | -30.10 |
| Peat's Hut | Lakes district | 51.000 | 47.0 | 8.51 | 145.50 | 101.00 | 44.06 |
| Glenorchy telemetry, Hillocks | Lakes district | 68.500 | 97.0 | -29.38 | 251.00 | 212.00 | 18.40 |
| Queenstown | Lakes district | 50.000 | 57.0 | -12.28 | 154.50 | 131.00 | 17.94 |
| Queenstown AWS | Lakes district | 16.200 | 49.0 | -66.94 | 89.60 | 117.00 | -23.42 |
| Wanaka DOC HQ | Lakes district | 35.500 | 39.0 | -8.97 | 91.40 | 98.00 | -6.73 |
| Rees Valley | Lakes district | 52.500 | 77.0 | -31.82 | 82.00 | 169.00 | -51.48 |

RIVER FLOW TABLE (February 2006)

| 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 | 0.835 | 46.457 | 1.944 | 3.580 | -45.71 |
| Kakanui River at Clifton Falls | North Otago | 0.763 | 9.438 | 1.289 | 2.438 | -47.13 |
| Shag River at The Grange | North Otago | 0.145 | 0.532 | 0.234 | 0.745 | -68.53 |
| Leith at University Foot Br | L/S Taieri, Dun | 0.184 | 1.726 | 0.259 | 0.530 | -51.16 |
| Silverstream at Taieri Depot | L/S Taieri, Dun | 0.034 | 1.133 | 0.092 | 0.663 | -86.07 |
| Taieri River at Outram | L/S Taieri, Dun | 3.754 | 4.985 | 4.341 | 16.540 | -73.76 |
| Taieri River at Sutton | L/S Taieri, Dun | 2.496 | 3.829 | 2.991 | 7.635 | -60.82 |
| Taieri River at Tiroiti | L/S Taieri, Dun | 1.784 | 2.953 | 2.010 | 6.891 | -70.83 |
| Taieri River at Waipiata | Central Otago | 1.157 | 1.702 | 1.439 | 5.520 | -73.93 |
| Nenthorn Stream at Mt Stoker Rd | L/S Taieri, Dun | 0.077 | 0.322 | 0.144 | 0.420 | -65.61 |
| Deep Stream at SH 87 | L/S Taieri, Dun | 0.325 | 4.721 | 0.728 | 2.124 | -65.73 |
| Clutha River at Balclutha | Southwest Otago | 171.831 | 551.517 | 295.194 | 534.297 | -44.75 |
| Waitahuna River at Tweeds Br | Southwest Otago | 0.569 | 3.439 | 0.871 | 1.880 | -53.70 |
| Pomahaka River at Burkes Ford | Southwest Otago | 4.732 | 48.108 | 7.767 | 14.093 | -44.89 |
| Pomahaka River at Glenken | Southwest Otago | 2.140 | 64.075 | 3.755 | 9.820 | -61.77 |
| Waipahi River at Waipahi | Southwest Otago | 0.880 | 3.196 | 1.519 | 1.582 | -3.98 |
| Manuherikia River at Ophir | Central Otago | 2.417 | 3.772 | 2.936 | 5.458 | -46.20 |
| Clutha at Clyde | Central Otago | 108.813 | 563.593 | 293.319 | 488.711 | -39.98 |
| Clutha River at Cardrona Confluence | Lakes District | 109.797 | 215.733 | 135.569 | 266.377 | -49.11 |
| Kawarau River at Chards Rd | Lakes District | 126.523 | 195.272 | 151.150 | 225.409 | -32.94 |
| Shotover River at Bowens Peak | Lakes District | 16.373 | 33.369 | 19.278 | 31.698 | -39.18 |
| Shotover River at Peat's Hut | Lakes District | 8.083 | 30.407 | 10.556 | 18.617 | -43.30 |
| Dart River at The Hillocks | Lakes District | 56.299 | 328.744 | 87.103 | 115.755 | -24.75 |

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 | 343.218 | 343.238 | 343.204 | 343.333 | 343.261 | 343.964 |
| Lake Wakatipu | 309.938 | 309.672 | 309.617 | 309.970 | 309.743 | 310.007 |
| Lake Wanaka | 276.975 | 276.711 | 276.655 | 277.003 | 276.768 | 277.384 |

| Lake | Lake outflow for the month (m ³ /s) | | | | | Historic mean outflow (m ³ /s) |
|---------------|---|----------|-------|-------|-------|--|
| | First Day | Last Day | Min. | Max. | Mean | |
| Lake Hawea | 12.1 | 11.8 | 11.6 | 100.6 | 18.6 | 44.71 |
| Lake Wakatipu | 172.7 | 111.3 | 100.3 | 181.3 | 127.0 | 194.39 |
| Lake Wanaka | 145.1 | 108.2 | 101.3 | 149.5 | 116.0 | 215.49 |

Notes:

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

* = Controlled Outflows.