

File Note

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From: Dean Olsen
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Re: Analysis of flow loss between the Ardgour Road hydrological site and Clutha confluence on the Lindis River in 2015/16

2015/16 Flow losses

An analysis was carried out to estimate the flow loss in the Lindis River between the Ardgour Road hydrological site and Clutha confluence using data collected between 1 October 2015 and 18 January 2015. This analysis was conducted using hourly flow data from each site for low flows (<1000 l/s at the Ardgour Road hydrological site), with data only being used if flows were dropping or steady (<50 l/s change over an hour). Flows were not time-shifted for this analysis and only dates/times where flow was present at both sites were used.

Flows ceased at the Clutha confluence on 23 December 2015, when flows at Ardgour Road were 401 l/s.

The regression equation resulting from this analysis was:

$$Q_{\text{Clutha confluence}} = 0.9168 * Q_{\text{Ardgour Rd}} - 322.654$$

This analysis estimated flow losses between the two sites at 352 l/s, although looking at the actual data, there was no instance of flows at the Clutha confluence site when flows at Ardgour Road were below 380 l/s (Figure 1).

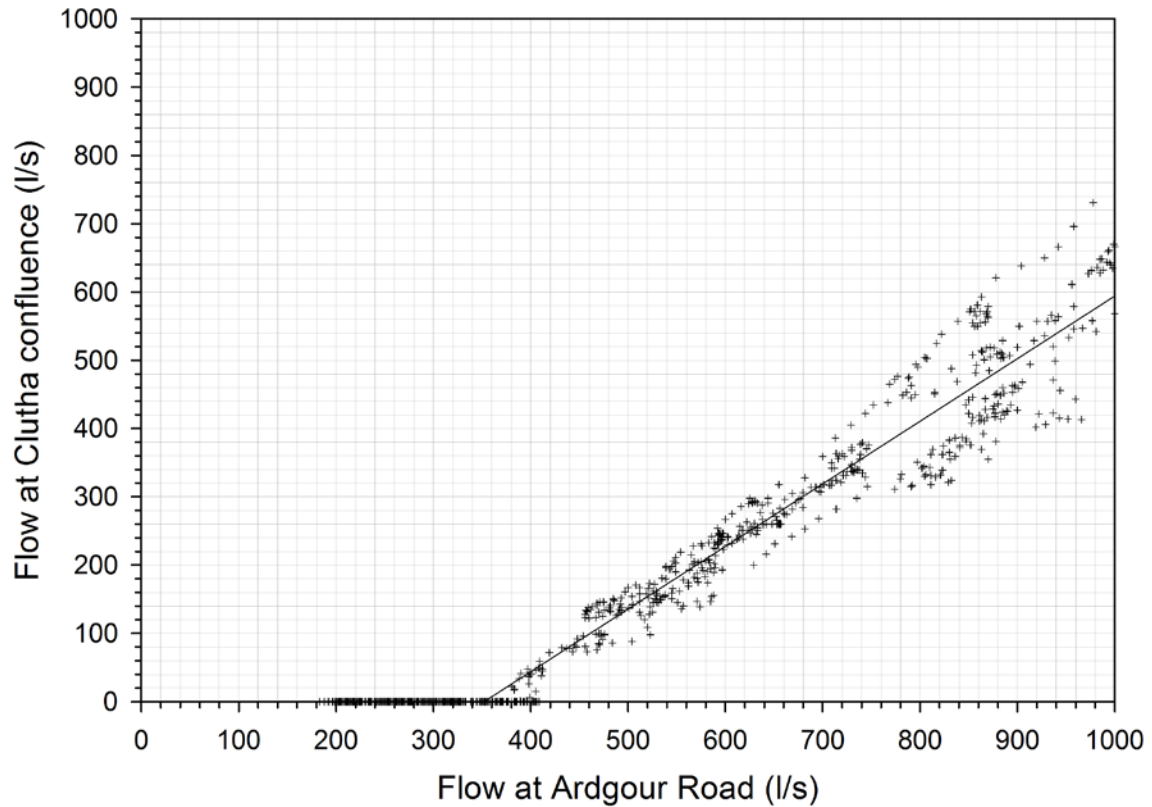


Figure 1 Plot of the relationship between low flows at the Ardgour Road hydrological site and the Clutha Confluence site in the Lindis River based on data from 2015/16. The linear regression applied to flows where $0 < Q < 1000$ l/s.

2006/07 Flow losses

For consistency, the same analytical method was applied to estimate the flow loss in the Lindis River between the Ardgour Road hydrological site and Clutha confluence using data collected between 7 November 2007 and 22 January 2008.

Flows ceased at the Clutha confluence on 29 December 2008, when flows at Ardgour Road were approximately 400 l/s.

The regression equation resulting from this analysis was:

$$Q_{\text{Clutha confluence}} = 0.895 * Q_{\text{Ardgour Rd}} - 335.831$$

This analysis estimated flow losses between the two sites at 375 l/s (Figure 2).

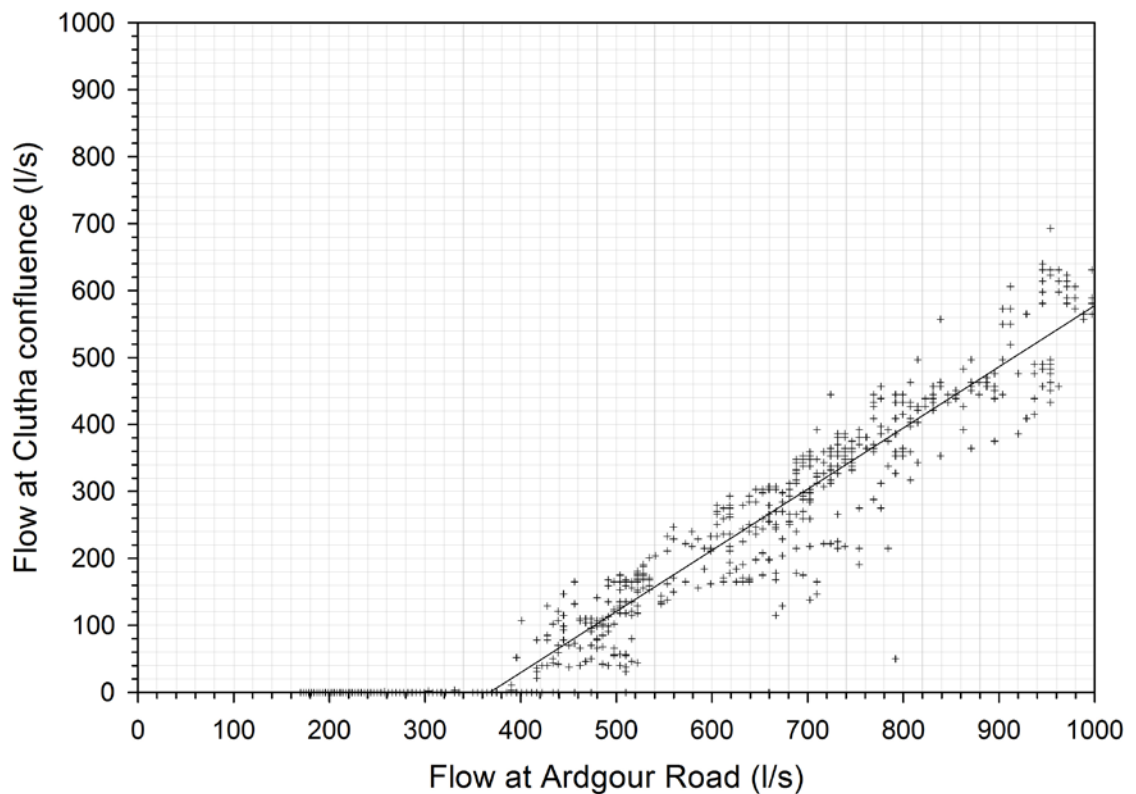


Figure 2 Plot of the relationship between low flows at the Ardgour Road hydrological site and the Clutha Confluence site in the Lindis River based on data from 2007/08. The linear regression applied to flows where $0 < Q < 1000$ l/s.

Conclusion

Most previous estimates of flow losses have been in the range 440-450 l/s (ORC 2008, 2016). An estimate of 550 l/s presented in ORC (2016) was likely to be an over-estimate due to the manner in which it was derived (ORC 2016). Using a consistent method (as outlined in this memo), the flow loss in the lower Lindis was estimated to be 375 l/s in 2006/07, 450 l/s in 2014/15 and 350 l/s in 2015/16.

This new information complements previous information and does not invalidate previous estimates of flow losses between these sites.

References

Otago Regional Council (2008). Management Flows for Aquatic ecosystems in the Lindis River. Otago Regional Council, Dunedin. July 2008. 50 p. + appendices.

Otago Regional Council (2016). Update of scientific work in the Lindis catchment: 2008-2015. Otago Regional Council, Dunedin. January 2016. 18 p. + appendices.