

**STATEMENT OF EVIDENCE OF
AARON GEORGE HORRELL
ON BEHALF OF CLUTHA FISHERIES TRUST
18 March 2016**

Introduction

1. My name is Aaron Horrell. I am married and have two sons aged 26 and 22. My family are very keen outdoor enthusiasts and share my passion for outdoor recreation including saltwater and freshwater angling, hunting and tramping.
2. I am presently employed as the Field Officer for the Clutha Fisheries Trust, a position I have held for 19 years. I am an aircraft engineer by training and I have also worked in the marine industry.
3. I moved to Cromwell in 1993 with my young family. I passed up a lucrative career in the marine industry in Australia to return to New Zealand to raise our family in an outdoor lifestyle which we felt was significantly more beneficial to family values. Cromwell and its environs provided us with that opportunity.
4. I have been involved in outdoor pursuits for most of my life. I have been a keen angler for as long as I can recall and have fished salt and fresh water throughout New Zealand, Australia and the Pacific. In Otago waters I enjoy both spin fishing and fly fishing for trout.
5. I am a Field Officer for the Clutha Fisheries Trust based in Cromwell. I worked for the Trust on a project by project basis from 1995 – 1997. In 1997 I was employed as the sole full time staff member.
6. The Clutha Fisheries Trust was established in 1992 through a variation to Schedule 1, condition 15 of the Clutha Development (Clyde Dam) Empowering Act (1982). This Act was the permission or resource consent equivalent for the Clyde Dam.
7. The variation, which required the establishment of a Trust to mitigate the effects of hydro development on sports fisheries, replaced another mitigation condition which would have required the construction and operation of a trout

hatchery to stock the new Lake Dunstan and the river immediately downstream. The Trust was funded by the then Electricity Corporation of New Zealand who paid an amount of \$2.7 million into the trust based on the original determined construction and operation costs of a hatchery for the life of the original consents.

8. Five trustees are appointed to the Trust by:

- a) Otago Fish and Game Council (two),
- b) New Zealand Fish and Game Council (1),
- c) the Minister of Conservation (1),
- d) and the Minister of Fisheries (1) (appendix 1).

9. The Trust's object is:

"To establish, maintain and enhance primarily the sports fisheries values and secondarily the conservation values of the waters of the Clutha Catchment for the benefit of the people of New Zealand in recognition of the effects of the Clyde Dam development"

10. The Trust's core area of focus is the Clutha Catchment upstream from Alexandra.

11. My role with the Trust requires the day to day operational management of the trust including work plan development and monitoring, administration, project development and implementation of field work activities. I have had experience undertaking field research and angler surveys on all of our main lakes as well as the Caples, Greenstone, Hunter, Dingle, Lochy, Hawea, Clutha, Fraser, Manuherikia, Nevis and Lindis Rivers.

12. My introduction to the Lindis River was a fishing trip in the summer of 1994. It was noted by experienced local anglers at the time to be a river that was once held in high regard as a sports fishery, but was not the fishery it had

been up to the late 1980's.

13. Over the years my family and friends have salvaged literally thousands of trout from the drying river for release into the Clutha River.
14. Professionally I have been involved in several field programmes associated with the Lindis River over the past decade. My role as the Trust field officer has required me to undertake and/or assist Otago Fish and Game Council staff with a variety of field studies. In addition, through the Trust's support of academic study I have also provided field technician support to several University of Otago student research programmes. The scope of this work includes;
 - Assisting a PhD study on fish migration patterns in the upper Clutha River which included aerial and ground spawning surveys, sample collection of salmonids and temperature data collection of the Lindis River.
 - Assisted OFGC with a Fish Trapping Programme of the lower Lindis River in the winter of 2011.
 - Supported a Masters study in 2014-15 which included electric fishing, tagging and monitoring movements of brown trout, predator observations and water temperature data collection.

Summary of Evidence

15. My evidence will primarily address the collection of aerial imagery I have collected at various flows of the reach of the Lindis River from Cluden Stream to the confluence with the upper Clutha River.

Flight 15th March 2014

16. On the 15th March 2014 I undertook an aerial survey to photographically record the Lindis River at a flow of 346 litres/second.
17. It was later identified that there were inaccuracies at the Ardgour Road automatic flow recorder over this period. The Otago Regional Council re-determined the flows for this period through an amended rating curve and

produced a corrected flow of 278 litres/second.

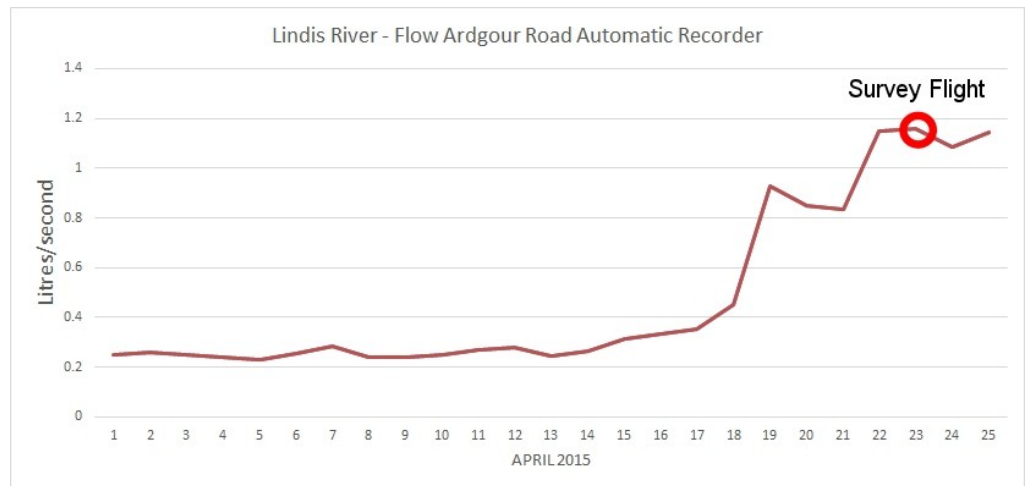
18. A photographic report of the flight attached (Appendix Two)
19. The drying reach of the lower river had previously been the perceived extent of the impact from cumulative effects of low flows, losses to ground water and abstraction. The flight I undertook however identified the magnitude of dewatering and disconnection that takes place further upstream. Approximately 21% of the lower 24.5 kilometres of river surveyed was completely dry. A significant proportion of the remaining river reach held insignificant flow and/or minor standing water insufficient to maintain healthy instream values (Appendix One; Image 1).
20. On Sunday 19th April 2015, whilst on a trip to the upper Clutha River/Lindis River confluence to collect trout samples for a toxin study, I was surprised to observe that the Lindis River was disconnected from the Clutha River. The Ardgour Road automatic flow recorder showed the flow as 831 litres/second for the period I was at the confluence.
21. I revisited the confluence on Wednesday 22nd April 2015 when the flow had increased to 1151 litres/second. A small but connected flow comprising two braids which split into three small channels was observed connecting with the Clutha River;
 - a) The northern braid split into two. First approximately 2m wide and averaging approximately 10cm in depth and the second braid 1.5m wide and ~10cm at its deepest point (Appendix 1; Image 2).
 - b) The second braid had formed a small trickle approximately 1m wide and ~15cm at its deepest point (Appendix 1; Image 3).

Flight Thursday 23rd April 2015

22. Thursday 23rd April 2015 I undertook a flight of the Lindis River from its confluence with the upper Clutha River to Cluden Stream, a tributary of the

Lindis River to photographically record the flow /habitat.

23. A photographic report of the flight attached (Appendix 3).
24. The flow during the month of April averaged 257 litres/second till the 16th from which point the flow began to increase to 926 litres/second by the 19th April, reaching 1,150 litres/second on the 22nd.
25. Flow Graph for April 2015 - Ardgour Road automatic flow recorder.

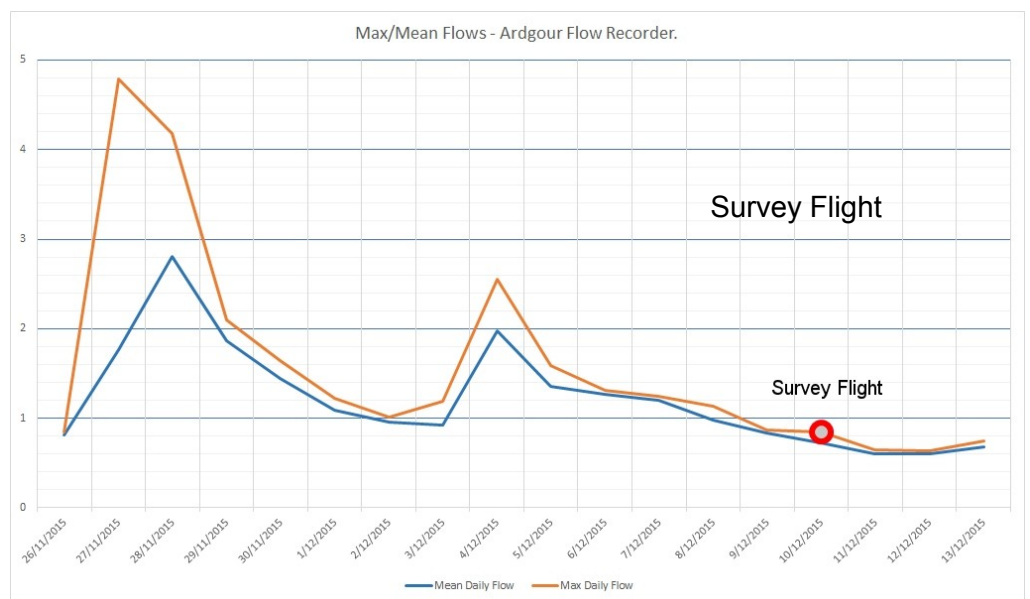


26. On the 23rd April the river was flown at a flow of 1157 litres/second (Ardgour Road automatic flow recorder). The river was observed as providing a connected flow throughout the survey reach to the Clutha River (Appendix 1; Image 4).
27. In general, the flow appeared sufficient to maintain good instream habitat with sufficient connectivity between habitat types to allow for salmonids to freely move between these habitat types.
28. Many of the pool structures observed held sufficient cover for adult trout in the form of water depth, riparian cover and access to undercut bank relief. This cover provides respite from predation and warming conditions during the summer period.

29. This appeared to be a minimum flow to which a ‘meaningful’ connection to the Clutha River existed, as well as providing for improved ecological and recreational values.

Flight 10th December 2015

30. On Thursday 10th December 2015 I replicated the April 2015 flight of the Lindis River from its confluence with the upper Clutha River to Cluden stream, a tributary of the Lindis River (Appendix Four). The river was flowing at 748 litres/second (Ardgour Road automatic flow recorder).
31. I monitored the river flows from late November as they began to drop below 1000 litres/second towards the intended monitoring flow of 750 litres/second. On the 28th November rainfall in the catchment increased the flow from 800L/s to 4100 litres/second. After dropping back to 800 litres/second by the 3rd December, a further rainfall event recharged the flow to 1600 litres/second on the 5th December 2015.
32. Flow graph for November/December 2015 - Ardgour Road automatic flow recorder.



33. The river was observed to hold connecting flow for the length of the section surveyed with the reach below the State highway 8 bridge retaining a braided channel structure.
34. I believe that the observed flow was an indicative of a best case scenario for 750 litres/second. The aquifer would have been recharged by the rainfall prior to the survey, reducing loss to groundwater at the sites above Ardgour Road bridge and below the Ardgour Road flow recorder. If the river was to hold at this flow for a period of time during the summer period, the known loss to ground water would result in loss of flow connectivity, loss of trout habitat and significant habitat fragmentation.

Conclusion

35. The Lindis River is an important public asset for outdoor recreation such as recreational fishing, camping and general family water based activities.
36. The Lindis River connects to a nationally important fishery – the Upper Clutha River. It forms an integral part of the fishery linkages in the upper Clutha catchment and is a primary source of recruitment for the Lake Dunstan sports fishery which forms a central part of the local economy.
37. The lower Lindis River is a rare example of braided river habitat in the Upper Clutha and as such holds value for many native, endemic and at threat wildlife species.
38. I have concluded from my observations from the flights covered in my evidence and from experiences working on the river for more than a decade that there needs to be a robust understanding of the relationship between surface flows and groundwater (aquifer) levels if a “meaningful” minimum flow is to be set.
39. The minimal variation of connection between the flows observed April 2015 and December 2015 flights highlight the variability of connection in relation to aquifer levels in the Lindis catchment.

40. A flow of 750 litres/second at the Ardgour Road automatic flow recorder, less the downstream losses to groundwater, causes the structure of the river to become fragmented. Riffle sections become denuded of flow, depth, and lengthen to a degree which no longer provides refuge for juvenile salmonids or migratory paths for adults. As observed during the 2014/15 research on the Lindis River by Mr Morgan Trotter, this leads to a significant increase in losses to predation.
41. A flow of 750 litres/second at the Ardgour Road automatic flow recorder, less the downstream losses to groundwater, increases the occurrence of algal growth to a level which further diminishes the public amenity values of the river (Appendix One; Image 5).
42. If the flow observed during the December 2015 flight was indicative of a minimum flow of 750 litres/second, without loss to groundwater, the environmental and recreational gains would be negligible at best. In my view this supports the move to seek a 'meaningful' minimum flow of 1,100 litres/second.
43. It is my opinion, based on my observations professionally and recreationally, that a minimum flow less than 1100 litres/second, allowing for the current losses to groundwater in the lower river, will not provide for meaningful connective flows in the reaches upstream and downstream of the Ardgour Road flow recorder and the maintenance of ecological and recreational values.
44. We need to ensure that the natural resources that our generations have enjoyed (though already somewhat eroded) are protected and if I may be so optimistic to suggest; enhanced, for future generations to experience.
45. From a vocational perspective my colleagues and I see too clearly the collective ongoing erosion of our natural resources. We refer to this process as "the salami syndrome". These resources, freshwater in particular, are finite and diminishing. The loss of flow and subsequent environmental values in rivers such as the Lindis typifies this situation. At what stage do we acknowledge what we have already lost and at what cost?