IN THE MATTER of the Resource Management Act 1991

AND

IN THE MATTER of an application pursuant to Section 201 for a Water Conservation Order on the Hurunui River.

STATEMENT OF EVIDENCE BRIAN JOHN ROSS
ON BEHALF OF
NORTH CANTERBURY FISH AND GAME COUNCIL
Dated 6 March 2009

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1. INTRODUCTION

Qualifications and Experience

1.1 I have been a Field Officer/Fish and Game Officer with the North Canterbury Acclimatisation Society/North Canterbury Fish and Game Council for 31 years (since 1978).

1.2 During this time I have been involved with the Hurunui River, in particular the South Branch and Hurunui Lakes in work related activities including: compliance and law enforcement (of angling and game bird hunting regulations); trout and salmon spawning surveys and enhancement work; aerial game bird population trend counts; Canada goose control operations; the organisation and participation in trout population studies by drift diving; and a trout tagging and re-sight study to verify the drift diving technique. I was also a member of the Hurunui District Council's Loch Katrine Working Party. In most recent times I have assisted with the collection of trout and salmon specimens by electric fishing, netting and angling means, to provide Fish and Game with evidence for the Hurunui River conservation order.

1.3 I have also enjoyed recreational sports fishing, game bird hunting and both big and small game hunting in this area, in a private capacity.

1.4 I confirm that I have read and agree to comply with the Code of Conduct for Expert Witnesses. This evidence is within my area of expertise, except where I state that I am relying on facts or information provided by another person. I have not omitted to consider material facts known to me that might alter or detract from the opinions that I express.

Scope of Evidence

1.5 My evidence will address:

- An overview of the Upper Hurunui Lakes fishery
- Fish and Game drift dive surveys since 1995
- Experience of Control Structures affecting Fish Passage

2. AN OVERVIEW OF THE FISHERIES VALUES OF THE HURUNUI LAKES

2.1 The Hurunui Lakes group of lakes consists of Lakes Taylor, Sheppard, Mason and Sumner and Loch Katrine.

2.2 All of the Hurunui Lakes drain into the Hurunui River, either via Lake Sumner, the Sisters Stream or the South Branch.

2.3 While some land development has occurred adjacent to the lakes, especially Lakes Sheppard and Taylor, much of their shorelines appear in a “natural” and basically in an unmodified state. This gives anglers a sense of fishing in a somewhat wild and remote location, and thus is a relatively rare experience these days. This is also brought into clear focus to anglers, and visitors alike, because of the lakes closeness to the main divide and the “www factor” this brings (windy wet and wild).

2.4 All of the Hurunui Lakes hold self supporting populations of sports fish, notably Brown trout, with Lake Sumner, Loch Katrine and Lake Mason (only recently found) having stocks of “land locked” Chinook salmon as well.

2.5 In my time with the North Canterbury Acclimatisation Society and Fish and Game, only modest fish stocking or enhancement of the Hurunui Lakes Brown trout fishery has taken place, and yet I believe, from my own observations, and talking to anglers who fish there, these lake fisheries appear to be self sustaining and able to cope with existing angling pressure. As an recent example, anglers submitted against an advertised Fish and Game proposed release of trout into Lake Mason on the basis that the fishery there did not require any enhancement, in their view. Also, during our most recent fieldwork to gather otoliths from trout in the lakes, for analysis for evidence for this application, using both set gill nets and conventional angling techniques, catch rates indicated to me healthy trout populations being present

2.6 While it is fair to say none of the lakes has a reputation for large Brown trout, this is more than made up for by the quality and condition of more modest sized 1-2kg fish, some of which are quite spectacularly coloured.

2.7 Occasionally, adult Chinook salmon are taken by anglers trolling in Lake Sumner during March and April, with less informed anglers mistakenly identifying them as large Brown trout.

2.8 A variety of angling methods are allowed in the Hurunui Lakes, to accommodate virtually every fresh water anglers preference. Examples include fly fishing only at Lake Sheppard, trolling in Lake Sumner and spin and fly fishing everywhere else. Season length and bag limits provide added protection to fish from over harvest and at vulnerable times such as spawning. Bait fishing is not permitted in any of the lakes.

3. THE DRIFT DIVING METHOD OF ASSESSING TROUT POPULATIONS IN THE HURUNUI RIVER

3.1 Drift diving is the most commonly utilised method employed by Fish and Game staff to monitor relative trout abundance in clear, medium to large size rivers.

3.2 Two sites on the Hurunui River below Lake Sumner have been monitored annually by Fish and Game using the drift diving method since 1995. Site 1 is from the Lake Sumner

outlet downstream for approximately 1.2 km, while Site 2 is located a further 5 km downstream, immediately above the Sister Stream confluence, and is 1.9 km in length. These locations are shown in the map attached in Appendix 1 to my evidence. The first section is representative of an unmodified lake outlet, and the second section is representative of the Hurunui River downstream to the Mandamus River confluence, excluding the narrow gorge sections. Results from these surveys have previously been published in our "Sportsfishing News" magazine, Fish and Game magazine supplements and Fish and Game annual reports. These dives have been conducted to gain information on population trends for our own internal management purposes.

3.3 Small (<150mm), Medium (150mm - 450mm) and Large (>450mm) Brown trout, and Chinook salmon smolt or adults, are counted by a team of divers with wetsuits, fins and snorkel gear, as they drift down each section. Divers maintain as close to a right angled line across the river as is possible, given variations in current velocities across the width of the river.

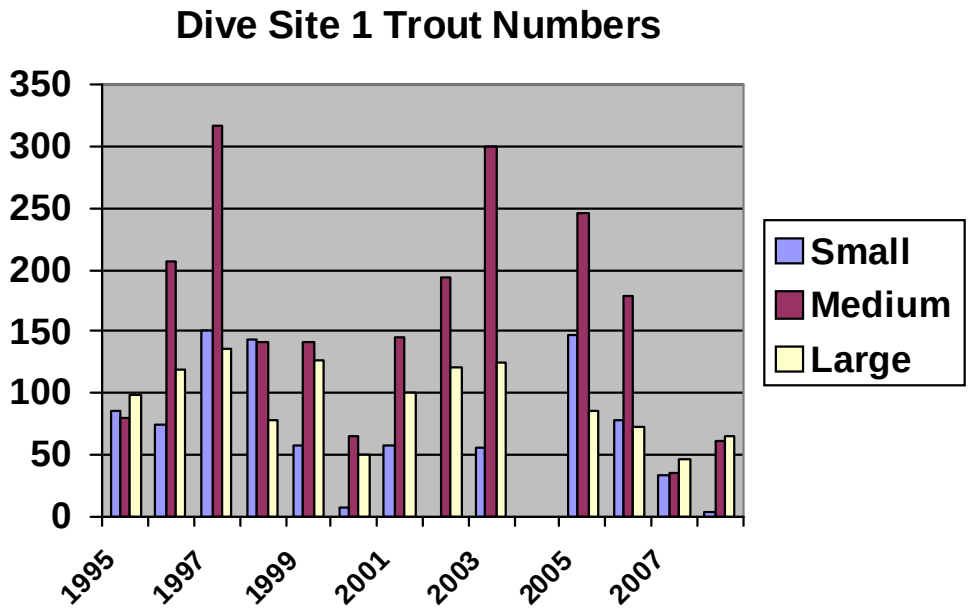
3.4 Fish that move off downstream ahead of the divers are not counted. Only fish that swim upstream beneath each diver, and/or pass upstream to a pre-designated side, are counted. In order to avoid double counting, each diver is given a section of water to count and must ignore the rest. Hand signals are used to clarify who is counting each fish if any doubt exists. At regular intervals throughout the dive, the leader will call a halt and record the number of fish (small, medium and large of each species) each diver has seen.

3.5 Reliable counting of trout depends on a sufficient number of divers being positioned in order to adequately cover the width of the section, and having good visibility through the water. Visibility in metres (m) is ascertained prior to the dive taking place, by the horizontal 200mm black disc technique. Anything less than 4m visibility is generally considered to be inadequate.

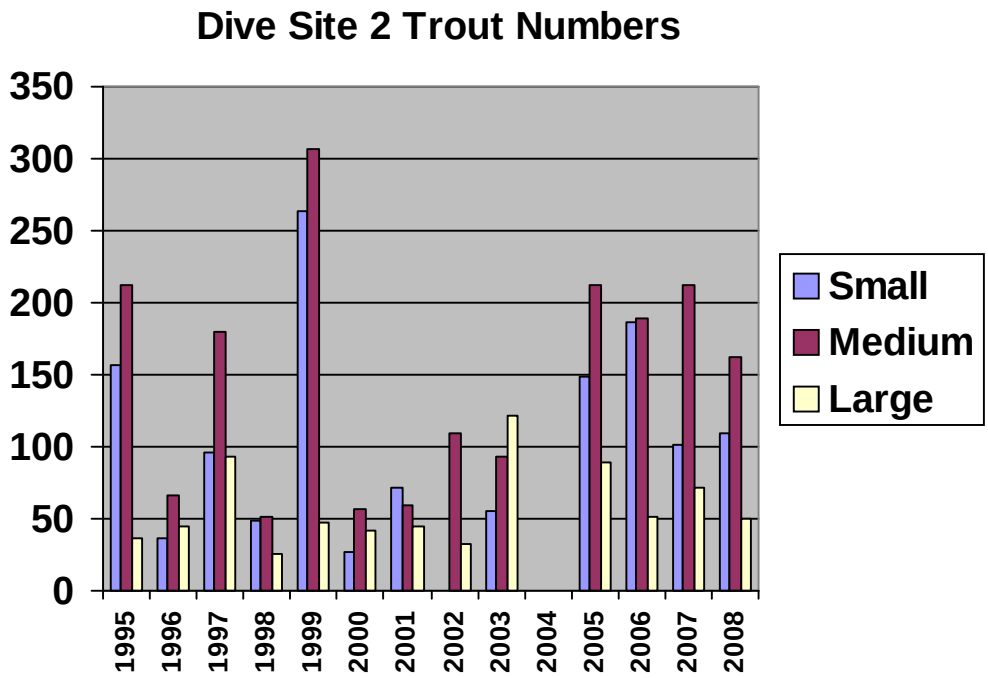
3.6 Comparisons of results may be made from one year to the next to determine what changes to the population have occurred over time for each of the two reaches.

4. **HURUNUI RIVER DRIFT DIVE RESULTS**

4.1 The following graphs indicate the results for drift dives undertaken by Fish and Game from 1995 to 2008, for the two sites that we dive. A table of results is provided in Appendix 1.



This graph shows that for Site 1, the section of river below Lake Sumner, an average of 90.7 large and 162.5 medium Brown trout were observed per year since 1995 (excluding 2004).



4.2 This graph shows that for the section of the mainstem above Sisters Stream an average of 58 large and 146.9 medium Brown trout were observed per year since 1995 (excluding 2004).

Summary of Drift Diving Results.

4.3 At Site 1, large trout numbers have been observed to range from 46 in 2007 to 135 in 1997. Medium sized trout have ranged in number from 35 in 2007 to 317 in 1997. For Site 2, numbers of large trout have ranged from 26 in 1998, to 121 in 2003. Medium trout have ranged in number from 51 in 1998 to 307 in 1999.

4.4 While there will be natural changes in the Brown trout population from year to year, I believe our results are also sometimes affected by physical conditions that affect both the numbers of trout present and the drift dive technique in counting them. Conditions such as diver visibility being reduced by discoloured water in Lake Sumner, which is often caused by floodwater entering the lake or Nor-West wave action stirring up silt at the outlet end. While it is generally regarded that less than 4m visibility is less than ideal, the difference in counting effectiveness between 4m and 6m in reality is not always that

obvious. Other conditions such as a high lake level and thus high river flows affecting effective diver coverage of the river width and the available cover and location of the trout; conversely the effects of low river levels on available habitat area and the effects on the habitat caused by flood events all add to the variability from one year to the next.

4.5 As an example, the relatively low numbers of large and medium trout observed during drift dives in 2007 and 2008 at Site 1 were I believe a reflection of the fact that in both of these years, evidence showed that a large flood had entered the reach not far downstream from the lake outlet via a side stream on the true left bank. It was noted that the substrate, which is usually (literally) smothered in net making caddis and other invertebrates, was clean as a whistle for most of the area immediately downstream from the sidestream that had brought the flood waters, with invertebrates increasing in number only towards the bottom end of the dive site. In my opinion, the lack of trout was a direct result of the effects of the flooding on the habitat, including the loss of the food source provided by invertebrates.

4.6 It would appear to me that Site 2 is not as badly affected by such flood events, as much of the velocity and thus damage is reduced the further downstream one goes.

5. FISH AND GAME HURUNUI TROUT MARKED RE-SIGHT STUDY

5.1 Fish and Game has recently reconsidered the drift dive survey method and the quality of data it produces (S. Terry, Hurunui Marked Re-sight Drift Dive Report 2002). In 2002 a more intensive drift dive programme was initiated to produce more defendable data and also to verify the results of previous surveys. We needed to know what percentage of the population was being counted in a drift dive survey – were we under-estimating trout populations by missing some of the fish or were we over-estimating trout populations by double-counting fish. After consultation with independent fisheries scientists we decided that a mark-recapture experiment was the best way of verifying the drift dive survey method.

5.2 Fish and Game staff dragged nets downstream through sections of the river at the two drift dive sites and captured and Floy tagged a total of 73 large (>450mm) Brown trout.

We tagged and released 40 fish at Site 1, and 33 fish at Site 2. These were released as near to wherever they were caught as possible.

5.3 A week later we returned and drift dived the two sites. For the elimination of confusion, small trout (<150mm) were not counted during the dives.

5.4 At Site 1 divers counted 77 large Brown trout, of which 25 were observed to be tagged. A repeat dive 3 hours later revealed 41 large trout of which 14 were tagged. At Site 2, 33 large Brown trout were seen, with 12 of them seen to be tagged. Unfortunately time constraints did not allow a repeat dive at Site 2, thus not allowing for the reliable estimate of drift diving effectiveness.

5.5 From the ratio of a known number of tagged fish released, to the number of tagged trout observed by the drift dive technique, this study confirmed for us that the drift dive technique is an underestimate of the true number of fish present at the two Hurunui sites that we dive. In essence, the tagged trout make up a percentage of the total trout numbers that are present at each site. If the divers observations accounted for 100% of all the trout in the reach, they would have also seen all of the tagged ones. But they didn't. Therefore the percentage of tagged ones observed, is representative of the percentage of all trout observed in that reach. It would seem that we only see approximately 60% of the large Brown trout present at Site1 in this study, which is in line with findings of other similar studies (Evidence of Roger Young)**.**

6. SUMMARY OF FISH AND GAME DRIFT DIVING SURVEYS

6.1 During the past 14 years, I have been involved in Fish and Game drift diving surveys in the Central South Island, West Coast and Nelson Marlborough regions, as part of a Fish and Game drift dive team. Because no one Fish and Game region has the numbers of staff available to make up its own dive team, inter regional co-operation has enabled rivers to be surveyed by a team of experienced staff and volunteers. This has fortunately enabled me to drift dive and appreciate some rivers that I would not normally have been able to in my role as a Fish and Game Officer for the North Canterbury Fish and Game region.

6.2 There are 30 odd lake fisheries in our region, however not all have an outlet of any significance, with most being too small or otherwise unsuitable to be drift dived. I consider that the Lake Sumner outlet supports the most productive trout fishery. The closest comparable fisheries in the South Island would be those supported by the Gowan River in the Nelson/Marlborough region, the Clutha River in Otago and the Arnold River on the West Coast.

6.3 However, to me, what makes the Lake Sumner outlet Brown trout fishery so special is not only about the numbers of fish observed, but also about the size and quality of the fish observed. Typically, "Large" trout are just that – large, in both length and condition. Many of these are what anglers refer to as "trophy fish" in the 4-5kg plus size range. "Medium" size trout are also top quality fish in the 1.5 - 2kg+ size range, that any angler would be only too pleased to catch.

6.4 These trout are sustained by what can only best be described as a fully stocked supermarket sized larder of invertebrates and terrestrial insects in and on the river and margins. Plagues of beech tree seed eating mice, from time to time, also add bulk protein to the trout diet, leading to already large trout becoming XXL size trout**.**

6.5 In conclusion, it is my belief that the numbers and the quality of both large and medium sized Brown trout, combined with an unmodified river in a relatively unmodified highly scenic fishing location, is what makes the Lake Sumner outlet/Hurunui River worthy of the high regard that anglers have for it. It is without doubt one of "the" truly great fishing locations I have been to and had the privilege to have worked in.

7. MAN MADE STRUCTURES AND FISH PASSAGE

7.1 One of the concerns I have regarding the proposed "weir" at the Lake Sumner outlet relates to fish passage. Specifically, fish passage for Brown trout and Chinook salmon into and out of Lake Sumner.

7.2 These concerns are based on my experience, over 31 years, with a relatively low control gate structure at the Harper River at Lake Coleridge. This is part of Trust Power's Coleridge operation. Fish passage problems are not a recent development at this outlet,

as records indicate it has been going on since the gates were constructed in the early 1930's. It is doubtful that the effects on fish passage were considered important when the structure was built.

7.3 Rainbow trout migrate out of Lake Coleridge on their upstream spawning run, and travel approximately 2km up the Harper River diversion where they meet the diversion control gates structure. Here, depending upon a number of factors including the river flow, velocity and position of one or two of the four control gates, the fish can either negotiate up the weir slope using the momentum and speed developed as they leave the pool at the bottom to over top the weir, or are swept back down by the current.

7.4 Where the conditions are not favourable for fish to negotiate the structure under their own steam, they accumulate at the pool below the gates, sometimes in their hundreds. Here, apart from not being able to complete their spawning cycle, they are also at risk from poachers lured by such a spectacle and the vulnerable position of the fish.

7.5 When this has occurred in the past, Fish and Game have sought to have the gates temporarily shut down, or often worked in with the power generating company and its routine maintenance schedule, to net and transport the fish to the river upstream of the control structure. This is a time consuming and man-power intensive operation, but has been responsible for shifting in excess of 700 Rainbow trout in one operation alone.

7.6 At the Harper River fish also become stranded in the receding waters of the diversion race, as well as at the structure itself. This also requires additional fish salvage operations.

7.7 I have not been privy to any design plans for the proposed "weir" at the outlet of Lake Sumner, but because of my own experiences with such structures, I am not comfortable with the possible effects of another "man-made" structure designed to allow for natural unhindered fish passage. Fish passage issues arising from such a structure would be additional to the permanent and probably irreversible changes to the unmodified environment at the Lake Sumner outlet that would occur should such a structure be built.

8. CONCLUSION

8.1 Based on my experience I recommend that the Hurunui River be preserved in its natural state. Any dams or other man made structures are likely to have a detrimental impact on this outstanding fishery.

B Ross
March 2009

Appendix 1

Hurunui Drift Diving Results 1995 – 2008

Site 1

Year	Small	Medium	Large	Visibility	Comment
1995	85	80	99		
1996	74	207	119		
1997	150	317	135		
1998	143	141	78	3m	Lake dirty by flooding
1999	58	141	127	9.6m	Good Visibility
2000	7	64	50	4.9m	High flow = few smalls
2001	58	145	100		
2002	n/c	197	77		n/c = not counted
2003	55	300	125	4.5m	Low lake level
2004	n/c	n/c	n/c	<2m	Visibility too low
2005	147	246	86	4m	Low river
2006	78	179	73	8m	Low river
2007	33	35	46	6m	Evidence of recent flood
2008	3	61	65	6m	Evidence of recent flood

Site 2

Year	Small	Medium	Large	Visibility
1995	157	212	36	
1996	37	66	45	
1997	96	180	93	
1998	49	51	26	
1999	264	307	47	
2000	27	57	42	3.8m
2001	72	60	45	

2002	**n/c**	**109**	**33**		
2003	**55**	**93**	**121**	**4.7m**	
2004	**n/c/**	**n/c**	**n/c**		
2005	**148**	**212**	**89**	**5.2m**	
2006	**186***	**189**	**52**	**4.3m**	*** Plus 58 Chinook salmon smolt**
2007	**102**	**212**	**72**	**4m**	
2008	**110**	**162**	**50**	**4.5m**	