BEFORE THE INDEPENDENT COMMISSIONERS

IN THE MATTER of the Resource Management Act 1991

AND

IN THE MATTER of the Proposed Canterbury Land and Water Regional Plan

---

EVIDENCE IN CHIEF OF MARK WHITBY WEBB ON BEHALF OF NELSON/MARLBOROUGH, NORTH CANTERBURY AND CENTRAL SOUTH ISLAND FISH AND GAME COUNCILS

4 FEBRUARY 2013

ANDERSON LLOYD
LAWYERS
DUNEDIN

Solicitor: Maree Baker-Galloway

Level 10, Otago House
Cnr Moray & Princes Street,
Private Bag 1959,
DUNEDIN 9054
Tel 03 477 3973
Fax 03 477 3184

QUALIFICATIONS AND EXPERIENCE

1. My name is Mark Whitby Webb.

2. I am employed as a Fish and Game Officer by Fish and Game New Zealand within the Central South Island Region.

3. I graduated from the University of Canterbury with a Bachelor of Science in 1979 and have since worked in freshwater fisheries for the Ministry of Agriculture and Fisheries, the former South Canterbury Acclimatisation Society and subsequently the Central South Island Fish and Game Council. I have 30 years experience in sports fish and game bird management, most of that in South Canterbury. With that experience I have acquired a sound understanding of habitat requirements of sports fish, game birds and recreation based on these species.

4. I am a community member on the Orari-Opihi-Pareora Zone Committee and participated on the community steering groups that developed the Pareora Catchment Environmental Flow and Water Allocation Regional Plan and Policies relating to the Orari River Catchment contained in sub-regional section 14.4 of the proposed Canterbury Land and Water Regional Plan.

4. In preparing this evidence I have reviewed:

   a. The reports and statements of evidence of other experts giving evidence relevant to my area of expertise, including:

      i. Ross Millichamp

      ii. Neil Deans]

5. I have read the Code of Conduct for Expert Witnesses in the Environment Court Practice Note. This evidence has been prepared in accordance with it and I agree to comply with it. I have not omitted

to consider material facts known to me that might alter or detract from the opinions expressed.

6. As referred to above I am employed by Fish and Game, a statutory body whose functions include to advocate for the interest of Fish and Game in the management of sports fish and game and their habitats (section 26C Conservation Act 1987). Notwithstanding this, I am aware of, and in preparing this evidence have complied with, my overriding duty to assist the Court impartially on matters within my area of expertise.

SCOPE OF EVIDENCE

6. I have been asked by Fish and Game to prepare evidence in relation to angler values in Canterbury and national importance of Canterbury's Chinook salmon fishery. This includes:

   a. Freshwater angling in New Zealand;

   b. Freshwater angling in Canterbury; and

   c. Central South Island water body values

EXECUTIVE SUMMARY

7. New Zealand is renowned for the large size of brown and rainbow trout produced naturally in its fresh waters.

8. Approximately 27,000 to 30,000 sports fishing licences are issued in Canterbury annually

9. Approximately 20% of all angling on rivers in New Zealand occurs on the Waimakariri, Rakaia, Rangitata and Waitaki rivers.

10. Lake Benmore is the second most fished lake in the country behind Lake Taupo.

11. The re-emergence of a substantial sockeye salmon population in Lake Benmore may indicate increased presence of plankton. This may be a symptom of increased nutrient input in lake inflows.

12. Salmon anglers are extremely dedicated to their sport. In most seasons greater than 75% will not catch a fish and the average catch is less than one fish per angler per season.

13. Flow variability is an important cue for adult salmon upstream migration.

11. Closure of the Ashburton River mouth is a constraint on the Ashburton salmon fishery and mouth closure is similar in frequency and duration to the Opihi before environmental flow enhancement from the Opuha Dam.

12. The Ashburton Lakes trout fisheries are struggling to maintain sustainability under pressure from limited natural spawning in small tributary streams, encroached agricultural development, and presence of didymo in coastal waters preventing supplementation of stock into the Ashburton Lakes.

13. Small river catchments in South Canterbury e.g. Hinds, Orari, Otaio, Waihao, are characterised by dry mid reaches restricting all natural fish passage. These rivers sustain significant angling only for as long as good flows are sustained coming out of winter.

14. Insufficient river flow to maintain the Opihi River mouth has been addressed through environmental releases from Lake Opuha however water quality issues now impact on all contact recreation in the catchment

FRESHWATER ANGLING IN NEW ZEALAND

15. Annually throughout New Zealand, approximately 190,000 anglers fish our lakes, rivers and estuaries for sports fish. Fishing occurs primarily for brown and rainbow trout and Chinook salmon all of which were first introduced to New Zealand waters between about 1875 and 1910. All three species rapidly colonised freshwater habitats throughout the country with brown trout now being the most numerous and widespread in almost every waterway to which they have access. Rainbow trout strongholds are in the central North Island and South Island high country while salmon are firmly established on the east coast of the South Island.

16. New Zealand is world renowned for the large size of brown and rainbow trout produced naturally in its freshwaters – exceeding even the size of fish in their homelands. Current research suggests the large size of New Zealand trout is related to a plentiful supply of large food items and clear water that allows trout to see them.

17. A big attraction of Chinook salmon is their size with an average salmon likely to be five times the weight of an average trout. Catching such big fish in deep fast flowing water with the backdrop of the Southern Alps is challenging to any angler. New Zealand anglers are extremely fortunate to have a self-sustaining sea-run salmon fishery as it is the only one outside the of the salmon's native range. It is important to note that the salmon fishery only exists on the east coast of the South Island which helps to explain the national reputation of rivers like the Rakaia and Rangitata.

18. Since 1990 management of sports fish angling in New Zealand has been jointly undertaken by the Department of Conservation ("DoC") and Fish and Game New Zealand ("FGNZ"). Functions of the two organisations are separated by regional boundaries. DoC is responsible only for the Taupo Conservancy in the Central North Island while 12 Fish and Game regions cover the remainder of the country.

19. FGNZ has statutory responsibility for freshwater sport fishing and game bird hunting. While the sports fish and game bird populations are a public resource and belong to all New Zealanders they are managed on the Crown's behalf by FGNZ. This management is not a burden on the taxpayer as Fish and Game is funded almost entirely by the sale of fishing and hunting licences. Management of a public resource by the principle user group rather than a department of the state is unique on a world scale. Its operation for 130 years in New Zealand and legislative strengthening in 1990 are testimony to its viability.

20. Every person legally fishing for sports fish in freshwater must do two things; they must have a current sports fishing licence issued by Fish and Game and they must comply with the Anglers Notice in force at the time. The only exception to these requirements is the concession made to landowners who may fish on their own land without a licence although they must still comply with the Anglers Notice. There are few landowners able to confirm that sports fish are wholly available on land they entirely own, so numbers of such anglers will be very small.

21. Historically licence sales peaked in the early 1980s after a steady increase from when sports fishing first became licensed in the late 1860s. After the 1980s peak, a decline in angling participation occurred through to 1993 followed by recovery in the mid-1990s.

FRESHWATER ANGLING IN CANTERBURY

22. In addition to brown and rainbow trout and Chinook salmon fisheries there are smaller localised sports fisheries in Canterbury. Brook char are also available with Lake Emily in the Ashburton Lakes area being the most recognised fishery in New Zealand. Sockeye salmon maintain a self-sustaining population in lakes Ohau and Benmore and are only found there.

23. On average CSI and NC Fish and Game regions issue 27,000 to 30,000 fishing licences annually of which 17,000 to 19,000 are adult whole season licences.

24. The 1994/96 National Angler Survey ("NAS") assessed New Zealand-wide angler effort in terms of total angler-days for each fishery from random interview of approximately 13% of Fish and Game licence holders. For the season New Zealand wide effort put into freshwater angling amounted to approximately 1.34 million angler days of which 57% was directed to river angling and 43% to lake angling. Approximately one-fifth of all river angling effort occurred on the four major salmon rivers on the central South Island East Coast.

CENTRAL SOUTH ISLAND WATER BODIES OF SIGNIFICANCE

Ahuriri River Catchment

25. The application for a National Water Conservation Order for the Ahuriri River was the first application for a Conservation Order in the South Island.

26. The National Water Conservation (Ahuriri River) Order 1990 was the third to be granted, behind the National Water Conservation (Motu River) Order 1984 and the National Water Conservation (Rakaia River) Order 1988.

27. The Ahuriri Water Conservation Order declared that the Ahuriri River and its tributaries include and provide for outstanding wildlife habitat, outstanding fisheries, and outstanding angling features.

28. Over the last 15 seasons the Ahuriri River has sustained between 2,500 and 5,000 angler-days of fishing effort per season or an average of about 15 to 30 anglers per day across a six month season.

30. The upper reaches of the Ahuriri River, above Birchwood Station (45km from Lake Benmore), are particularly valued by anglers seeking an alpine wilderness experience with beech forest and tussock to the waters edge. In this reach the angler is challenged by misleadingly deep pools and large well educated trout.

29. Aerial spawning surveys undertaken by Fish and Game indicate up to 80% of annual trout spawning occurs in the river reach above Clay Cliffs (25km above Lake Benmore) and more particularly in the vicinity of Birchwood Station. Spawning in this reach is indicative of river-resident trout population size while the lower reaches are more likely to be utilised by trout of Lake Benmore origin.

Lake Benmore Catchment

30. Within the upper Waitaki Catchment, Lake Benmore is the most fished lake in any Fish and Game Region and nationally is second only to Lake Taupo. The appreciation of Benmore's qualities as a fishery indicated by its increased use by anglers is indisputable. In only 14 years angler use has more than quadrupled from 12,800 angler days in 1994/95 to 59,700 angler days in 2007/08. In any other fishery an increase in angling pressure of this magnitude would be accompanied by concern at over-fishing and a raft of restrictive regulations. In Lake Benmore the recent resurgence of the sockeye salmon fishery and creation of a landlocked Chinook salmon fishery sustained by Fish and Game releases, plus downstream effects of commercial salmon farming in the hydro canals, have created angling opportunities that have either kept pace with increased angler use or have promoted it. As noted by Mr Deans, this may also reflect a change by anglers from fishing local rivers and streams towards more productive lake fishing.

31. Recent acoustic surveys undertaken by the National Institute of Water and Atmospheric Research ("NIWA"), funded by Fish and Game New Zealand, to assess salmonids in six large South Island lakes, included Lake Benmore.

32. Lakes surveyed were Coleridge, Benmore (Ahuriri and Haldon arms), Hawea, Wanaka, Wakatipu and Te Anau. In 2007 Benmore had the second highest estimated density of salmonids greater than 25cm length at 9.8 per hectare behind Coleridge at 13.4 fish per hectare. In 2008 Benmore had the highest density at 15.9 fish per ha (Figure 1).

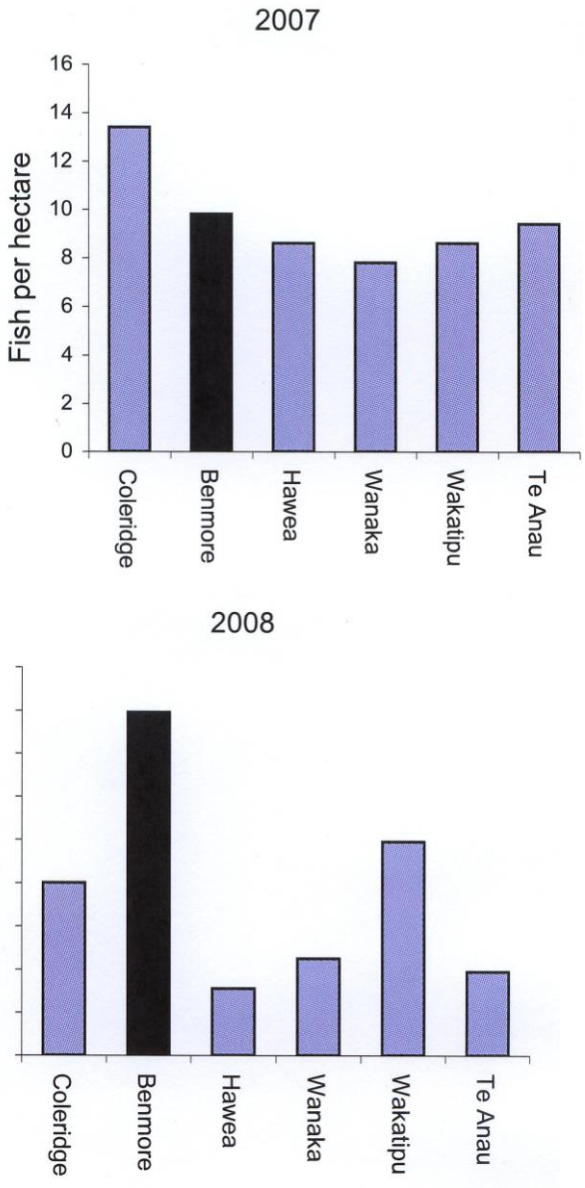

Figure 1. Estimated density of salmonids in each lake (expressed as number of fish per hectare of lake area) during acoustic surveys in February 2007 and 2008.

33. An important result from this research was that Lake Benmore has been a sleeping giant in terms of its salmonid productivity with more renowned lake fisheries such as Wanaka and Wakatipu being widely considered better fisheries. The NIWA research indicates this may not be the case and at least in 2007 and 2008 Benmore had bigger fish stocks and the ability to sustain them.

34. In 2008, NIWA added two new transects to the Lake Benmore survey, the results from which were not included in the 2007/2008 comparison. The transects were in the Haldon Arm and zigzagged down the lake from the lower Ohau River outlet to the Haldon boat harbour. Salmonid densities across the new transects averaged 108 fish per hectare and almost certainly detected sockeye salmon that would have been congregating at the top end of the lake prior to migrating into nearby tributaries to spawn. Fish and Game estimates of the Haldon Arm sockeye spawning population for 2008 were 8,100 fish.

35. That Lake Benmore is able to sustain a sockeye population that produces 8,000 adult three and four year old fish when it was not doing so 10 years ago is testimony to its current ability to sustain healthy mixed salmonid populations to maturity.

32. The reason for the resurgence in sockeye is unconfirmed. It may be related to increased concentrations of nutrients in the lake waters causing proliferation of plankton on which sockeye feed. Sockeye are the only algal-feeding salmonids in New Zealand. If nutrient enrichment of Lake Benmore has occurred this sounds a caution for management of water quality in lake inflows.

36. Salmonids require flowing water and clean, uncemented gravel and cobble substrate in which to spawn. The sustainability of salmonid populations in Lake Benmore relies on spawning habitat provided by inflowing streams, notably the Tekapo, Ahuriri, Twizel and lower Ohau

rivers, and tributaries to the Tekapo River – Greys River and Mary Burn.

37. The Tekapo River is the most significant spawning tributary, annually providing between 100 and 300 trout redds (nest sites) and total production of approximately 100,000 to 300,000 fry.

24. The Tekapo River is also an important recreational fishery in its own right sustaining between 2,000 and 5,000 angler-days of fishing effort each season. Access along the length of both sides of the river is easy and it is a popular freedom camping area in the summer

Rangitata River Catchment

38. In 2000, the New Zealand and Central South Island Fish and Game Council applied for a water conservation order for the Rangitata River. The Water Conservation (Rangitata River) Order 2006 was granted and recognised the following outstanding characteristics, features and values:

a. amenity and intrinsic values;

b. habitat for terrestrial and aquatic organisms;

c. fishery values;

d. wild, scenic and other natural characteristics;

e. scientific and ecological values;

f. recreational, historical, spiritual or cultural characteristics; and

g. significance in accordance with Tikanga Maori.

39. The Water Conservation (Rangitata River) Order 2006, Schedule 1 Waters to be retained in natural state, identifies outstanding characteristics or features of the Clyde and Havelock rivers and all their tributaries, being:

a. Amenity and intrinsic values;

b. Indigenous plant communities;

c. Wild and scenic and other natural characteristics; and

d. Significance for Ngai Tahu.

41. These qualities of the Havelock and Clyde rivers should be acknowledged in the table of High Naturalness Waterbodies in Section 12.7 of the Plan.

36. On each side of the river mouth fishing reserves each with over 100 huts or batches have developed. Peak occupancy coincides with summer holidays, when many family activities in and on the water are supported, and also around the opening of the fishing seasons for trout, salmon and whitebait, and the waterfowl hunting season.

40. In the CSI region results of a long-term programme of angler interviews on the Rangitata River support the NAS cross boundary fishing estimates for the Region. Fish and Game ranger interview of 1,763 anglers fishing the Rangitata between 1987/88 and 2002/03 identified that local licence holders accounted for approximately 77% of all anglers. Twenty-three percent of anglers held licences that were not local – 16% were North Canterbury licence holders, 4% had Otago licences and licence holders from other regions contributed 3%. Greater than 97% of anglers interviewed were fishing for salmon.

41. For the three seasons 1997/98 to 1999/00 that are likely to reflect average angler use of the Rangitata over the period 1957 to 2000, between 2,720 and 3,240 salmon anglers used the river annually.

42. I believe it is reasonable to assume that a long-term average of about 3,000 anglers fish the Rangitata River for salmon, annually.

43. During the 1993/94 season the NAS estimated approximately 36,000 angler-days of trout and salmon fishing effort were sustained by the Rangitata sports fishery.

44. The high regard in which salmon are held as a sports fish coupled with their large size and eating quality motivate anglers to continue to fish for salmon long after they would have given up fishing for any other sports fish. In the 1998/99 to 2002/03 seasons on average 70.8% (SD=8.3) or almost three-quarters of all salmon anglers caught nothing for the season.

45. The exact nature of environmental conditions which trigger salmon runs are unknown however river flow, water temperature, barometric pressure, and sea conditions, are implicated in most anglers theories. Once in the river, flow, flow variation, water temperature and water clarity largely dictate angler catch of salmon.

46. Flow variation is certainly important. Angling activity and success of expert salmon anglers relative to actual flow fished in the Rangitata below the RDR intake was recorded for the three fishing seasons 1990/91 to 1992/93. Over the three seasons 542 angling days were recorded by diarists and 132 salmon were landed.

47. Flows were in the preferred salmon angling range of between 40 and 80 m^3/s on 215 days or 39.5% of the time during which 325 angler visits (60.0% of the total) were made and 97 salmon (73.5% of the total) were caught.

48. A feature of the increased angling effort and success in this flow range is the tendency for the flow to be in this range over short periods of five to ten days duration as flow generally decreases through the range.

49. Day to day flow variation when flows were below 40 m^3/s was just as important for promoting angling opportunity and success as it was in the 40 to 80 m^3/s preferred flow range. Days when flow varied by between 5 and 10 m^3/s from the day previous occurred 13.8% of the time when flow was below 40 m^3/s and attracted 25.8% of all diarist activity and 40% of harvest (Table 1).

Flow Variation from Day Previous(m^3/s)	Occurrence of Flows		Diarist Angling		Salmon Caught	
	Days	%	Days	%	No.	%
0 & 1	63	41.4	55	41.7	9	30
2 – 4	62	40.7	37	28.0	9	30
5 – 10	21	13.8	34	25.8	12	40
11 – 15	5	3.3	6	4.5	0	0
> 15	1	0.8	0	0	0	0
	152		132		30	

Table 1. Angling opportunity and success provided to angler diarists by flow variability when the Rangitata River below the RDR intake was flowing at less than 40 m^3/s in the 1990/91 to 1992/93 fishing seasons

48. Stable flows deemed to be those where flow varied by 1 m^3/s or less from the day previous occurred 41.4% of the time when the river below the RDR was less than 40 m^3/s. These stable flows attracted only a corresponding proportion (41.7%) of angler interest and a lower proportion (30%) of angler success.

49. Clearly, when the river is flowing at less than 40 m^3/s below the RDR intake it can be described as low and generally unfavourable for angling. It is flow variability that provides the stimulus for angler action and improves the likelihood of success.

50. I believe that low flow regimes proposed without flow sharing and are likely to result in river flow being held constant will reduce angler opportunity with only periods where flow changes from one minimum flow level to the next likely to be targeted for angling.

51. Despite large annual variation in size of the spawning population in the river the distribution of spawning effort remains constant. Annually approximately 70% of known spawning occurs in Deep Stream (Mesopotamia) and Deep Creek (Mt Potts). Remaining spawning occurs in Black Mountain Stream above the gorge, and McKinnons Creek and Ealing Springs below the gorge.

Wainono Catchment

52. Wainono Lagoon and its associated streams and wetlands between the Hook and Waihao rivers, are the largest coastal wetland complex in the Central South Island Fish and Game region and are an important link in the South Island coastal wetland chain. The lagoon would qualify as a wetland of international significance under the 1975 Ramsar Convention (the Convention on Wetlands of International Importance, especially as Waterfowl Habitat).

53. The lagoon is formed behind the gravel beach bar and covers an area of approximately 350 ha. The water is brackish and shallow with a typical water level of 1 m above sea level. It provides habitat for waterfowl, migratory birds, coastal birds and native fish particularly whitebait and eel.

54. Lake Wainono is a Conservation Area managed by DOC and is a site of considerable significance to Ngai Tahu, being a Statutory Acknowledgement area in their treaty settlement. Since Māori occupation Lake Wainono and its associated wetlands have been significant natural resources for mahinga kai (Deans 2007).

55. The lagoon has been considerably modified since human settlement. The area and depth of the lagoon has been reduced by drainage, and input of sediment and nutrients from the catchment has contributed to deterioration in water quality. The lagoon is currently classified as *supertrophic* which is the second most degraded trophic state in the New Zealand lake trophic level classification (Norton, 2007).

56. The Wainono Lagoon and its surrounding area are hunted extensively by between 300 and 350 hunters who account for between 4,000 and 9,000 waterfowl annually. It is also used by birdwatchers and as a mahinga kai site by local Māori.

57. Central South Island Fish and Game have owned 164 ha of land on the southern boundary of Lake Wainono since 1989. This land is being encouraged to revert to its original wetland state by removal of artificial drainage features and stop banks, development of island habitat, and replanting of wetland species. The Fish and Game area, known as the Wainono Reserve, has long term statutory protection through a QE II National Trust Open Space Covenant. The purchase and development of the Reserve was funded by sports fish and game bird licence holders.

Ashburton Catchment, Lakes and River

Ashburton River

58. The entire Ashburton River was identified in an inventory of wild and scenic rivers as being nationally important from the source to the sea (NWASCA, 1984). Whilst these values have diminished over recent years as pressure from abstraction and discharges of contaminants have escalated, the river still possesses high natural character and a high degree of naturalness above the lower gorge of the South Branch. This section of the river deserves a level of protection that retains fish passage to spawning waters.

59. Chinook salmon were first introduced to New Zealand in the 1870s but it was not until the use of Sacramento River stock released from the Hakataramea River hatchery on the lower Waitaki between 1901 and 1907 that adult salmon dispersed northwards contributing to establishment of runs in other rivers particularly the Rangitata, Rakaia and Waimakariri (McDowall 1994). The Ashburton River salmon fishery undoubtedly developed from straying fish during this time.

60. Salmon returns to the Ashburton River are likely to have peaked in the 1960s when season catch of 1,000 to 2,500 salmon was common (Graynoth and Skrzynski 1973, Hardy 1972). This period corresponds to the boom time for Ashburton River trout and salmon fishing. At that time the Ashburton salmon run was larger than any of the current returns to what are now our large salmon rivers, some of which have Water Conservation Orders in recognition of their salmon fisheries.

61. There is no certainty to the reason for peak Ashburton salmon runs in the 1960s – it could have been the natural increase in the fish populations as they exploited the resources the river offered or supplementation of river flow and salmon stock from Rangitata Diversion Race ("RDR") bywash. Unfortunately there are no pre-RDR salmon fishery data for an objective appraisal of the extent of the fisheries at the time. The high salmon catches in the 1960s occurred some 20 years after the commissioning of the RDR.

62. Current angler use of the Ashburton River is estimated by the National Angling Survey ("NAS") which is conducted by NIWA and funded by FGNZ.

63. The NAS found approximately 4,200 angler days were fished on the Ashburton River in the 1994/95 season, 5,500 angler days were fished in the 2001/02 season and 3,200 angler days in the 2007/08 season. This equates to an average of between 13 and 23 anglers fishing the river for trout or salmon each day during the 240 day fishing season.

64. In terms of total seasonal angler use the NAS suggests the Ashburton River currently ranks with the Ashley and Tekapo rivers.

65. To obtain annual salmon harvest information for the Chinook salmon fishery within its boundaries, CSI Fish and Game has undertaken random interviews of 800 to 1,200 licence holders, or about 10% of all licence holders, at the close of each fishing season since 1994/95.

66. Averaged over the last 15 seasons about 120 anglers (range 15 to 360) have fished the Ashburton River for salmon each season and caught approximately 20 salmon (range 0 to 270). In four of the last six seasons none of the anglers interviewed during the end of season survey had caught a salmon in the Ashburton.

67. For rivers where Fish and Game surveys estimate the total run of salmon returning each year and the proportion of it harvested by anglers, anglers usually catch about 35% to 45% of the run. If this was the case for the Ashburton, then the average run over the last 10 years has been about 50 salmon compared to about 500 salmon in the 1990s and 5,000 in the 1950s and 1960s.

68. Salmon begin their lives in the clean gravels and cobbles of spawning redds where they were deposited by their ocean-going parents in autumn – early winter. Salmon redd counts as an index of the spawning population size in tributaries and sections of the South Ashburton River mainstem commenced in 1973. Surveys since have been sporadic at best, largely reflecting the lack of positive results for the effort involved in undertaking the surveys. The most consistently surveyed areas are in the mainstem of the Ashburton between the North and South Branch junction upstream to Valetta, Bowyers and Taylors streams and the Māori Lakes outlet. Of these only Bowyers Stream appears to have maintained spawning levels across the period of record.

69. The current (from August 2012) minimum flow for the Ashburton at SH1 is 6000 l/s. This is an improvement on previous February to April minimum flows of between 3,500 l/s and 5,000 l/s. Fish and Game believe the restricted distribution of current salmon spawning to the mainstem below Valetta and Bowyers Stream identify that the previous Febraury to April minimum flows were not adequate for salmon passage. I believe flows of 7,000 l/s to 10,000 l/s at SH1 will provide for adult salmon passage throughout the river and provide flows attractive for salmon fishing at the river mouth.

70. Unhindered adult passage through the river mouth is the cornerstone of the recreational fishery from November to April and becomes critical from February to April if salmon are to spawn. If adult salmon are prevented from entering the river in April it is unlikely those fish will spawn successfully as they will not reach preferred spawning grounds where spawning peaks in mid to late April.

71. At the start of the 2004/05 fishing season, Fish and Game initiated a diary scheme with a resident of the Hakatere Huts at the river mouth to collect daily records during the fishing season of trout and salmon angler activity and catch, river mouth condition, and sea, wind and weather conditions at the river mouth.

72. The records are extensive and detailed and Canterbury Regional Council have previously been provided with them to assist with clarifying conditions that affect maintenance of an open river mouth.

73. In four of the five fishing seasons between 2004/05 and 2008/09 the river mouth was blocked for between 19 and 61 days in total with a maximum continuous closure of 34 days (Table 1). The average annual maximum mouth closure was 24 days.

Season	Days closed	Most consecutive	Periods of closure	Flow on day of closure	Mean flow during closure	Flow to open
0405	0					
0506	19	17	2	3.7	3.3	11.6
0607	51	22	3	5.0	4.9	11.3
0708	61	29	3	4.3	4.3	7.2
0809	34	34	1	4.8	5.4	>12

Table 1. River mouth closure and Ashburton River flow at SH1 for fishing seasons from 2004/05 to 2008/09.

74. The river mouth did not block in October, November or December, when the river was seldom below 5 m^3/s. In January, February and March the first river closure appears to occur at around 5 m^3/s after the river has been continuously below 10 m^3/s for the previous 15 to 30 days. Subsequent closures through to at least April each year may occur as little as 3 days after flows less than 10 m^3/s.

75. I have no doubt that the river mouth closures in March and April in 2007 and 2008 would have detrimentally affected the ability of salmon to enter the river and to reach preferred spawning grounds. Salmon that were unable to enter the river may have sought the Rakaia or Rangitata rivers as alternatives or died at sea. Those salmon that entered the river late in the season would have spawned in marginal habitat in the mainstem where floods would reduce hatching success and the ability of fry to imprint on the Ashburton River before being flushed to sea.

76. Poor river and mouth conditions in 2007/08 reduced opportunities for salmon angling at the river mouth and were reflected in the low estimate of total angling in the Ashburton River from the NAS. In 2007/08 the NAS estimated 3,200 angler days compared with 5,500 in 2001/02 and 4,200 in 1994/95. I believe the 2007/08 season of large floods followed by low flows and three periods of river closure may have reduced the number of days on which anglers chose to fish by about half compared to 2001/02.

77. Angler interest in salmon fishing is generally triggered by change in river flow. In particular, the declining flow after floods where flows were greater than 30 m^3/s, and freshes where flow may have increased 10 m^3/s above base flow. Even small changes in flow of less than 5 m^3/s are targeted by anglers.

78. Over the five seasons salmon catch was very low, the best season being the most recent with 32 salmon caught up to 15 March. With numbers of this size establishing a relationship between flow and catch as an indicator of conditions that encourage salmon to enter the river, contains a fair degree of intuition. Success for salmon angling at the river mouth appears greatest in river flows of between 7 m^3/s and 10 m^3/s and an associated flow change, a recent fresh or declining flood in the previous 48 hours.

79. Brown trout introduced to New Zealand were from river-resident stocks that should have been content to live their lives entirely within freshwater. That some New Zealand brown trout fisheries particularly those of the South Island's east coast, have developed a substantial sea-run component could be seen as a response to adverse conditions in rivers and ensures that river stocks are rejuvenated after prolonged depression.

80. The Ashburton River has a very good sea run brown trout fishery. Their requirement for entry to the river to spawn is the same as for salmon.

South Ashburton River

81. The South Ashburton River flows through a diverse range of landscapes before it emerges from the foothills. From here on it gradually widens, separates into a braided form and meanders over a shingle bed. The river supports both trout and salmon fisheries and is joined by the North Ashburton just upstream of Ashburton township.

82. The South branch provides the most reliable angling opportunity largely because it exhibits more stable flows.

91. Fish and Game submitted for a minimum flow of 4,000 l/s all year in the South Ashburton downstream of the RDR intake as the equivalent of the 1:10 yr low flow and as a level that would better facilitate fish passage past the RDR syphon. We are not seeking “optimal” flows for minimums rather adequate flows to provide for the basic life supporting capacity and characteristics of a healthy waterway.

North Ashburton River

83. Over the past 30 years, the North Ashburton has had little or no visible flow for extended periods during the summer in the section from Thompson’s Track down to the confluence with the South Ashburton.

84. Both the North and South branches should naturally flow throughout their length however the North Branch has been going dry since the 1980's and has been induced to significantly more frequent and prolonged periods of drying than that which would occur naturally (Horrell, 2001 and 2003).

85. Prior to the 1970s Chinook salmon were occasionally seen migrating up the North Ashburton River to spawn.

86. Ashburton Acclimatisation Society annual reports record few incidents of fish strandings up until the late 1970s. One record of significant fish salvage being required in the North Ashburton River is known from 1932 and reported in the 100 year anniversary report of the Ashburton Acclimatisation Society (Tonkin 1986).

87. It is not known if the Plan's 1000 l/s minimum flow to apply from August 2012, will represent continuous flow in the river most years. Fish and Game seek 2,100 l/s as the minimum – it being approximately the equivalent of the 1:10 yr low flow.

Pudding Hill Stream

88. Pudding Hill Stream is very steep with an estimated natural 7D MALF of about 435 l/s. The stream is thought to contain resident brown trout but is not known to be utilised significantly by anglers. The ADC stockwater take often abstracts all the flow, cutting off fish passage and reducing the contribution of any surface flows to the North Branch.

89. The proposed Plan provides an 80 l/s minimum flow below the ADC water race from August 2012. Fish and Game seek 200 l/s as the equivalent of a 1:10 yr low flow.

Taylors and Bowyers Streams

90. Salmon historically spawned in both these streams until approximately the late 1990s.

91. Since at least the mid-1990s salmon spawning in Taylors Stream has been negligible. It appears that salmon now either prefer or are restricted to spawning in Bowyers Stream. Bowyers is considered the most important salmon spawning stream in the Ashburton. In the spawning records for 1997, 1999, 2002 and 2005 both streams were surveyed and 177 redds in total were counted in Bowyers while none were counted in Taylors.

92. Bowyers Stream is a popular brown trout fishery however much of its appeal to anglers has been lost in the last five years through significant river control works. Despite liaison between Fish and Game and local Environment Canterbury works staff, sections of the stream, measured in kilometres, are channelized.

93. The proposed Plan provides a 500 l/s minimum flow in Taylors Stream at the confluence from August 2012. Fish and Game seek 700 l/s as the equivalent of a 1:10 yr low flow.

Mt Harding Creek

94. The proposed Plan provides a 500 l/s minimum flow in Mt Harding Creek at Aitkens Rd from August 2012. Fish and Game seek 600 l/s as the equivalent of a 1:10 yr low flow.

The Ashburton Lakes (O Tui Wharekai)

87. The Ashburton Lakes area is a large high country wetland system in the headwaters of the South Ashburton River. The basin is largely unmodified and areas of native scrub and tussock with an alpine backdrop provide unique fishing experiences. There are up to 11 lakes and numerous tarns supporting five sports fish species – brown trout, rainbow trout, Chinook salmon, brook char and perch.

Lake Clearwater

95. Lake Clearwater is the most heavily fished lake in the Ashburton lakes area with an estimated average of 3,000 angler-days over the three NAS seasons. Most angler activity originates from the presence of 180 huts on the south eastern shore however on most summer weekends anglers are outnumbered by windsurfers and other small yachts, swimmers and picnickers.

96. The lake has only one inflow, Whisky Creek, of sufficient size to support trout spawning. Its short length, steep gradient, small flow, and lack of spawning gravel raise doubts about its ability to provide juvenile trout in sufficient numbers to maintain the lake fishery.

97. Traditional sources of brown trout for stocking have become infected with didymo and no approvals have been obtained since 2009 for release of wild origin trout to Lake Clearwater.

98. In recent years Fish and Game have endeavoured to enhance spawning production from Whisky Creek in preference to release of hatchery origin juveniles or trout salvaged from coastal rivers during summer low flows.

Lake Emily

99. This lake is recognised by anglers across the country for its trophy sized brook char. The fishery is capable of producing fish up to 3kg compared to stunted fish of less than 200g in other wild fisheries.

100. Brook char spawning is limited to the lake edge on the western shore of the lake. It is believed that sufficient oxygenation for egg incubation occurs from wave action and upwelling of groundwater from Barrosa Hill.

101. Angler management practices – fly fishing only and no fishing from boats, and limited physical access, act as controls on fishing pressure.

Lake Heron

102. Lake Stream drains Lake Heron and flows to join the Rakaia River about 10km upstream from the Rakaia River – Mathias River Junction. As such, Lake Heron is part of the Rakaia River Catchment and receives sea run Rakaia salmon as they pass through seeking

spawning grounds in Mellish Stream on the eastern shore of Lake Heron. It is not truly part of the Ashburton Lakes however with only one access road servicing all of the area it is commonly considered an Ashburton lake.

103. The Lake Heron sports fishery has resident brown trout, adult sea-run salmon and of most significance to anglers, land locked salmon.

104. Land locked salmon are the progeny of Mellish Stream sea-run salmon spawners that choose to stay and rear in Lake Heron rather than making the migration downstream to the more productive ocean environment. Although much smaller than their sea-sun brothers of the same age, about 2kg compared to 10kg at maturity, land locked fish are voracious and indiscriminate feeders making them an appealing target for anglers.

105. Three other tributaries to Lake Heron on the western shore – Olliver, Tinshed and Triangle streams are used for spawning by lake resident brown trout. There has been considerable pasture development in the catchments of these streams in the last five years.

106. There are no hut settlements around Lake Heron and only one camping area, at the mouth of Olliver Stream. This has sites for about 30 camps and is full throughout the fishing and summer holiday camping seasons.

107. On the opening weekend of the fishing season up to 300 anglers will fish the lake where very good access and consistent supply of landlocked salmon provide a reliable high country fishery.

Lake Denny

108. This is a small tarn in Pudding Valley which runs from the south end of Lake Emma down to the Rangitata River just upstream from the gorge.

109. Lake Denny does not have any surface water tributaries or outlet streams but lies in a wetland area fed by groundwater drainage from the upper Pudding Valley and Denny Stream.

110. As recently as five years ago Lake Denny had a recognised brown trout fishery. Since that time water quality has deteriorated and the fishery with it. The Department of Conservation has fenced the lake although the causes of the lakes decline are likely to be further afield. The immediate catchment of Lake Denny was stripped of tussock and native scrub cover in the late 1980's and pasture has been continually improved since then.

SOUTH CANTERBURY LOWLAND RIVERS GENERALLY

111. Throughout lowland South Canterbury Fish and Game believes rivers that once contained valued and productive trout fisheries have become degraded. Objectively substantiating those concerns is difficult - rarely is there pre-impact information of sufficient strength for comparison with present conditions; degradation is often incremental with minor impacts from individual modifications but major cumulative effects; and natural variation in fisheries populations may mask changes that only become evident after considerable time has passed.

112. In 2001, FGNZ engaged NIWA to carry out a national survey of experienced anglers to document angler perceptions of the extent of changes to lowland river trout fisheries. Almost half the total annual freshwater angling effort of 1.3 million days is expended on what can be termed "lowland" rivers. The survey targeted anglers who had fished for at least 20 years and asked them to rate the extent to which angling quality, trout abundance, and trout size had changed in rivers with which they were familiar. Valid responses were received from 268 anglers, with an average of 35 years experience, who provided

1454 assessments of changes in 321 lowland rivers throughout New Zealand (Jellyman et al. 2003).

113. The survey results provide compelling evidence that, amongst anglers with an average 35 years of fishing experience, there is a widely held perception that angling quality has declined since they first started fishing. The extent of this decline varied significantly across New Zealand, being most marked in Hawkes Bay, Nelson, Marlborough and Canterbury. In these regions approximately five out of six assessments (82.6%) indicated either a general decline or a marked decline.

114. One of the most striking contrasts within the South Island was between the North Canterbury and Central South Island regions, both of which were considered to have suffered a marked decline in angling quality. Where reduced water quality (43%) was the most commonly cited factor in North Canterbury, followed by low flows (22%), the situation was reversed in the Central South Island. Here, low flows accounted for 48% of comments, compared to 25% relating to reduced water quality. This difference appears to be a natural consequence of the nature of the lowland rivers in each region. In North Canterbury, most lowland fisheries are associated with spring-fed streams around Christchurch with relatively little abstraction. Anglers perceive fishery decline to be due to reduced water quality rather than water quantity. In the Central South Island region, by contrast, the main lowland fisheries are associated with larger streams such as the Kakanui, Pareora, and Opihi, which rise in the foothills. The high level of concern in these rivers is consistent with the high levels of abstraction to which they are subjected. This suggests that reduced water quantity, rather than quality, is the main concern. Comments on low flows due to excessive water abstraction for irrigation dominated comments for the Pareora and Selwyn rivers (Jellyman et al. 2003). These comments apply equally to rivers like the Hinds and Makikihi.

115. In the Central South Island region, anglers commented favourably on the increased flows in the Opihi River as a result of discharges from the Opuha Dam.

116. Attempts to corroborate the survey findings using more quantitative data were generally unsuccessful. Long term angler diaries which provide potentially useful information on changes in fish abundance tend to be confounded by a catch rate that increases with angler experience (Jellyman et al. 2003).

113. Fish and Game support policies 4.90 and 4.91 relating to gravel extraction from river beds. In addition to the proposed plan wording of Policy 4.90 we believe that justification for gravel extraction could include for development and enhancement of water bodies and their values. In some rivers the bed has aggraded due to increased gravel supply from erosion and decreased transport. This has caused surface stream flow to decrease and subsurface flow to increase. By lowering the bed level through extraction, surface flow can be improved to restore or increase fish habitat and fish passage. In Policy 4.91 Fish and Game believe gravel extraction can be undertaken if it does not disturb fisheries habitat in addition to wildlife habitat.

Orari River Catchment

117. The Orari River is a river divided into two parts by a middle reach that is dry more often than it flows. The upper reach includes the gorge that is an area of high naturalness. The lower flowing reach extends from about 15km above the mouth to the sea and the main stem is sustained by groundwater recharge and spring fed tributaries.

118. Brown trout are the dominant sports fish in the upper reach while brown trout and salmon are present in the lower reach.

119. The Orari River is the smallest river in New Zealand with a self sustaining salmon run, with up to 400 salmon redds being counted in the mid 1990s however a marked decline in redd counts has been recorded up to present time.

120. Salmon are found in the lower river and the critically important Ohapi Stream. The Ohapi is spring-fed with three branches rising just below SH1 and flowing for about 10km before joining in a single channel about 2km from where the Ohapi meets the Orari, about 500m inland from the coast.

121. Spawning occurs April to June with 75% of spawning activity in the Ohapi and 25% in the Orari mainstem. Juvenile salmon rearing in the lower Catchment occurs July to March before the salmon move out to spend 18 to 30 months at sea. Salmon return at two to four years of age to spawn in their natal stream.

122. The salmon angling season runs from October to April and angling is limited to the surf, the mouth and the lagoon where there is sufficient water to cast. The Orari River had an outstanding season for fishing in 2011/12 – the best in 19 years of record. An estimated 210 salmon were caught spread between 270 anglers who fished it.

123. Each season 1000 - 4000 angler-days of fishing effort are expended on the Orari River (NIWA NAS records). Most of this effort, approximately 90%, is generated by salmon anglers.

124. The brown trout fisheries of the upper and lower Orari are self sustaining though largely independent. Spawning occurs May to July, with incubation lasting for 3 months. Fifty to 100 redds are counted in the lower river and 20-50 redds in the gorge and above. The trout fishery is more dependent on river conditions than the salmon fishery and is much more susceptible to instream changes that

occur from water and gravel abstraction, river control works, water quality and temperature impacts.

125. The lower fishery also comprises a very important sea run trout component that supports an angling experience targeting large fish. More importantly sea-run fish spend most of their lives at sea and avoid low flow population controls acting on resident trout. When sea-run trout return to spawn they offer the potential to enhance productivity above the level able to be sustained by the depressed resident adult population. I believe the prominent sea-run component of the brown trout fisheries for most South Island east coast rivers is an adaptation to the intermittency of flows experienced.

126. Trout angling in the lower river ensures larger and more plentiful fish with easy access, a high catch rate and sea run trout opportunity. The upper river has fewer fish, low catch rate but with superb angling challenges that are often sought by experts and catch and release being common practice. The gorge terrain controls angler numbers as access is not easy. The trout angling season runs from October to April and is utilised by 100 – 200 anglers who typically catch between 500 and 2,000 trout.

118. In the 1950s a permanent mouth for the Orari River was artificially cut through the beach bar to alleviate flooding of coastal farmland. The original lagoons to the north of the river mouth have largely remained intact and likely represent the best example of the once extensive wetlands that were common along the South Canterbury coast between the Ashburton and Waihao rivers. The protection and enhancement of the Orari coastal wetlands has been given top priority by the Orari-Opihi-Pareora Zone Committee by identifying the area as its foundation project for demonstrating how to achieve the objectives of the Canterbury Water Management Strategy.

Opihi River Catchment

127. There is no question that provision of environmental flows for the Opuha and Opihi rivers by release of water from the Opuha dam has benefitted the sports fisheries in those rivers. Lake Opuha now also sustains a rainbow trout fishery where previously this sports fish was very rarely caught in the Opihi Catchment.

128. Daily records held by Fish and Game for the Opihi River mouth for the four fishing seasons from 1989/90 to 1992/93, prior to construction of the Opuha Dam, record an average of 35 days per October to April fishing season when the river mouth was closed. The maximum consecutive days of closure was 20 and average days per closure was 4.7. On average there were seven periods of closure per season.

129. For the four fishing seasons from 2006/07 to 2009/10, after dam construction and supplementation of environmental flows, average days per season of mouth closure has reduced to 14, a 60% reduction. Maximum consecutive days remains at 20 days being the days of closure during the single Water Shortage Directive event of April 2008, otherwise maximum consecutive days would have reduced to 3 days, an 85% reduction. Average days per closure reduced to 1.2 days, a 75% reduction, and on average there were 5 periods of closure per season, a 29% reduction.

130. The Opihi salmon fishery continues to track its own course that has little in common with trends and variations exhibited by the larger salmon fisheries. The Opihi fishery has not shown the decline apparent in other fisheries in 2000/01 and continues to depress those fisheries. Instead the possible benefits of enhanced flows to maintain the river mouth and provide assured fish passage that came with the Opuha Dam in 1998, may have offset the decline seen in other rivers.

131. In the last 10 years the Opihi salmon run has averaged 1,200 fish per season with a range from 300 to 3,000 fish. Angler catch averages

about 30% of the run and 300 to 800 anglers will fish for salmon annually.

132. Salmon spawning is spread throughout the Catchment with about 50% in the Temuka, Tengawai and Opuha tributaries and 50% in the mainstem Opihi. This distribution is quite different from the pre-Opuha Dam era when unreliable mainstem flows and low flows eliminated these spawning grounds and most spawning was in the lower river tributaries – the Temuka and Tengawai rivers.

133. On average, angler effort in the Catchment totals 20,000 to 30,000 angler days each year with about 10,000 days contributed by trout anglers. Trout angling effort is distributed approximately evenly between Lake Opuha, sea-run trout fishing in the lagoon and lower reaches, and fishing for resident brown trout in the remainder of the river. Angler use of the Opihi is comparable to that of much larger rivers such as the Waitaki, Rangitata and Rakaia, and is attributable to the diversity of experiences available.

134. To date the variable monthly environmental flows appear to have worked for maintaining an open river mouth but have changed the dynamics of the beach bar and mouth channel. During extended periods of low inflows the mouth channel through the beach barrier can become shallow and very long, up to 1000m. While the mouth is open and flowing, water depth and velocity may not allow sports fish to ascend to the lagoon. Further criteria around channel length, width and depth, water velocity and flow may need to be considered for addition to existing mouth opening criteria.

146. When first proposed, the Opuha Dam offered a solution to the primary constraint on the sports fishery, being river mouth closure. At that time it was water quantity and not quality that was the problem. Environmental flows sustained by releases from Lake Opuha have significantly reduced the occurrence of river moth closure. Unfortunately the benefits of this to the fishery have been

compromised by water quality issues, primarily blooms of the toxic algae, *Phormidium*, that render fish inedible and prevent contact recreation.

Pareora River Catchment

135. In a 1973 review of the South Canterbury trout and salmon fishery from angling results collected since 1947 by eight diary schemes, the Pareora was considered important for angling in the district, yielding high crops of small brown trout and occasional rainbow trout. The Acclimatisation Society (forerunner of Fish and Game) commented that the river at that time was not greatly affected by irrigation but that water was abstracted for the Timaru town supply (Graynoth and Skrzynski, 1973).

136. However, by 1982 there is evidence that irrigation abstraction was affecting the river's fishery. A national angler diary scheme run by the Ministry of Agriculture and Fisheries in 1979 summarised the Pareora as being fished by about a quarter of South Canterbury Acclimatisation Society licence holders who responded to the survey, and as easily accessible in its middle and lower reaches which were in close proximity to Timaru. Once at the river however, very restricted areas of water supported one of the lowest catch rates of small trout in the district.

134. Respondents' comments indicated the reasons why the Pareora was no longer highly regarded (Tierney et al. 1982). They included:

a. Fifteen years ago until the sap-sucking irrigators got going, this was the finest fly fishing river in the district;

b. Over the years irrigation and poaching have spoilt the good fishing;

c. Spent hours of pleasure teaching many anglers the art of dry fly fishing on this river. Now that I want to teach my son, there are only memories;

d. Low flows are a problem;

e. Shame to see it dry in the summer nowadays when spray irrigators are working;

f. Unfortunately the good natural holes are being drastically changed; and

g. Not enough fish in this river.

137. The most recent information Fish and Game has on angler use of the Pareora River is provided by the National Angler Survey. This gives estimates of angler use for the Pareora River for the 1994/95 and 2001/02 seasons of 190 ± 110 and 850 ± 290 angler days respectively (Unwin and Image 2003). During the October 1994 to April 1995 fishing season the median flow of the Pareora at Mt Horrible was 1,030 l/s and for the same period during the 2001/02 season it was 2,659 l/s.

138. NAS estimates of angler use are based on survey periods of two months duration. Correlation of two-monthly estimates of angler activity with median river flow at the CRC Mt Horrible recorder site over the same periods indicate the degree of dependence of angler use on river flow in the 1994/95 (Figure 3) and 2001/02 seasons (Figure 4).

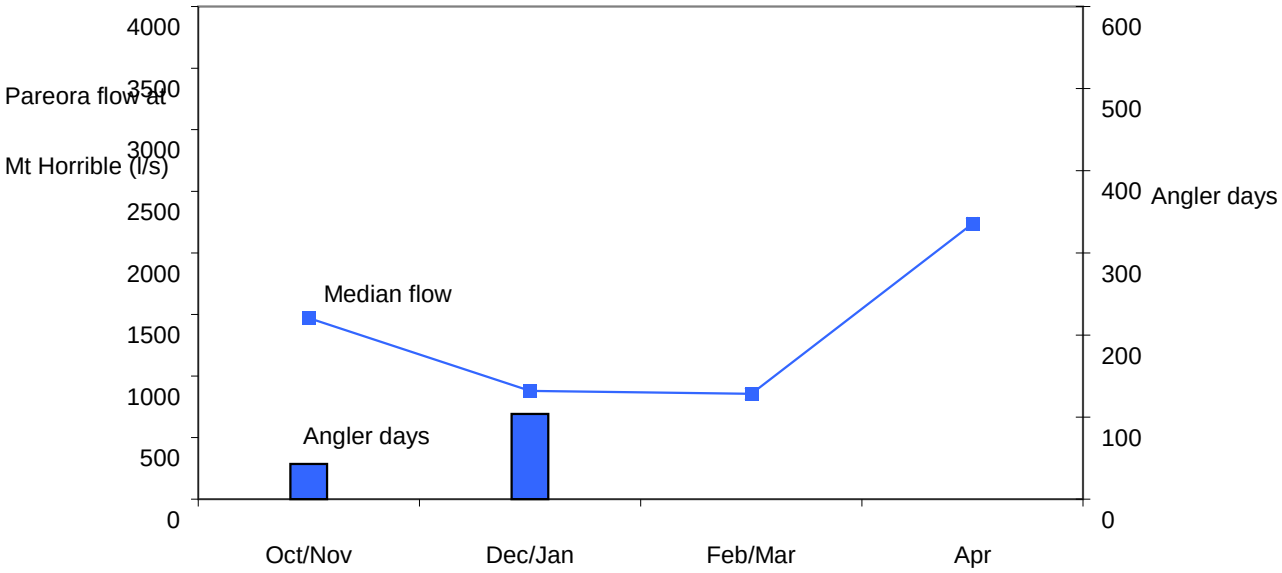

Figure 3. October 1994 to April 1995 angler use of the Pareora River and median river flow at Mt Horrible for the corresponding intervals.

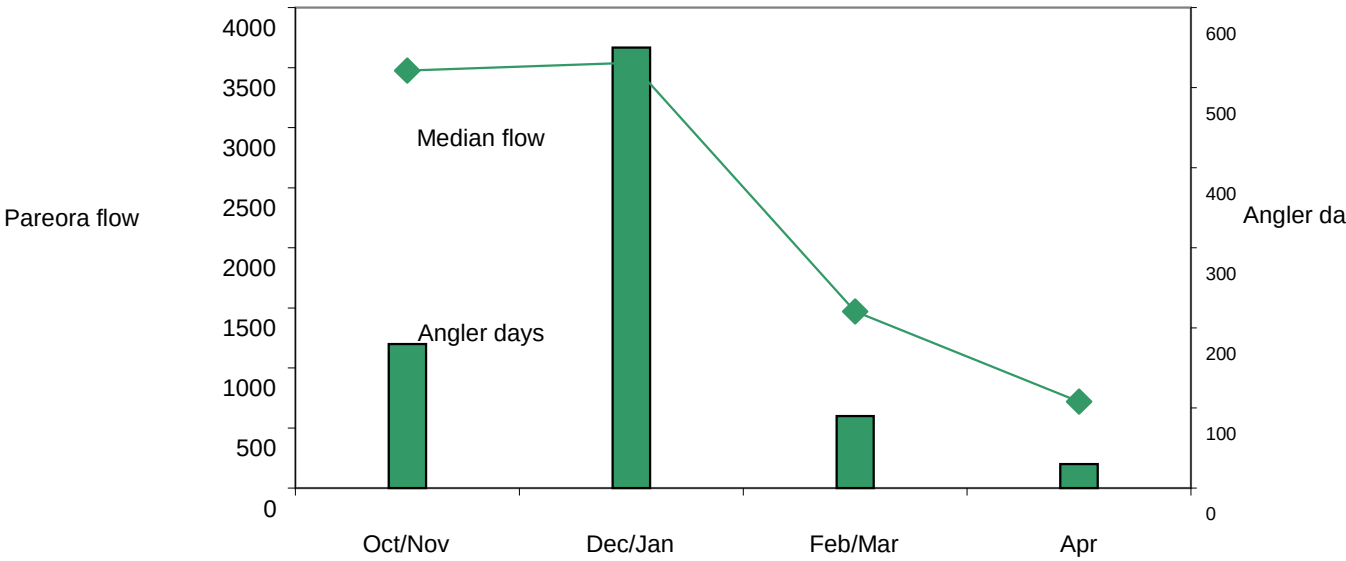

Figure 4. October 2001 to April 2003 angler use of the Pareora River and median flow at Mt Horrible for the corresponding intervals.

139. The preferred trout fishing reach of the Pareora River is below the Mt Horrible recorder site. Coming out of winter and when river flows are in excess of about 1,500 l/s, the river can be described as good for angling. Flows of less than this are likely to restrict angling to the more limited area of the upper Pareora.

140. I believe river flows and angling results of 1994/95 and 2001/02 indicate early season flows of 1,500 l/s or more at Mt Horrible provide a well utilised trout fishery in the Pareora. Improved flows, above 1,500 l/s, later in the summer after earlier low flows do not inspire angler activity as fish distribution is not restored until after the following winter's spawning.

Otaio River Catchment

141. In early 1991 Canterbury Regional Council called a meeting of Otaio water users, Including Fish and Game and DoC, to report on the hydrology of the river, establish who were current water users and elect a water users representatives committee prior to expiry of all water take consents on the river in July 1992.

142. The Otaio River has its source in the Hunter Hills. Flow data made available by the Canterbury Regional Council in 1991 from measurements taken at the Gorge gauging site (Colliers) correlated with continuous data from the Rocky Gully catchment to the north, indicated a mean annual discharge at the gorge of approximately 530 l/s, a median flow of about 300 l/s and a mean annual low flow of 85 l/s. An estimated flow of 250 l/s at the gorge is the lowest flow required to maintain a continuous flow in the lower river. There is no designated minimum flow for the river so there are no restrictions imposed on abstraction from the river or connected shallow groundwater.

143. As part of the consent renewal process Fish and Game undertook to prepare a review of the Otaio sports fishery to assist CRC with formulation of a minimum flow policy.

144. The review found that the Otaio Gorge is the mainstay of the fishery and when flows in the lower river are sufficient to provide adult trout habitat, the migration of fish from the gorge sustains angling activity. During these periods anglers make use of the trout fishery in the lower reaches and if flows maintain an open mouth, sea-run trout supplement and replenish the resident population. During the inevitable dry up that follows, the majority of these fish become stranded in pools by receding flows and perish unless salvaged by anglers or Fish and Game.

145. At the end of the 1991/92 trout fishing season a postal questionnaire was distributed to 91 licensed anglers resident in the Pareora, Makikihi, and St Andrews areas to obtain information from anglers who were more likely to have fished the Otaio River during recent seasons and more particularly the 1991/92 season. It was the function of the survey to gather information on where and when anglers fish and the value they place on the fishery. It was not an aim to estimate total angler use of the Otaio.

146. Of the 91 forms sent, seven were returned unopened, and 45 (54%) of the possible 84 were returned completed, which I considered to be a very good response given the expectation that the majority of anglers would not have positive results to contribute.

147. Five anglers (11%) stated they had fished the Otaio in the last 10 years with two of these being in the most recent season and the five anglers on average fished four seasons each in the last 10.

148. From the 45 responses received 17 respondents (38%) including the five who fished in the last 10 years, considered they had a contribution

to make in support of the Otaio River trout fishery although most had not fished the river for many years. The full comments of the 17 respondents were:

> *"Being a local (35 years) I remember when fish were plentiful in the Otaio. Many fish were taken from that river, and the flows were constant. The mouth was open frequently. Now it is often dry. If the river returned to its former glory I would surely fish it."*
>
> *"Owing to the draw off for irrigation around here there is hardly ever any water, in fact the lower reaches are dry for most of the year, (no water, no fish). Why are restrictions never put on our poor wee Otaio?"*
>
> *"Dry most of the year due to irrigation. No fish in lower reaches."*
>
> *"The Otaio River usually runs too low normally to fish but I have found the Otaio river mouth fished well after a good fresh. Have caught salmon there.*
>
> *"I have lived beside the Otaio River for the last thirty-two years and have never seen a fisherman on the river."*
>
> *River is mostly dry in fishing season in lower reaches downstream of last irrigating farmer.*
>
> *"I have never fished the Otaio at any time."*
>
> *"Of 11 years in Pareora I have never heard of any fish being caught let alone there being more than a trickle in the Otaio. A survey of the Pareora River in my opinion, would be of higher priority as there is far more potential to fish for salmon, trout, and whitebait."*
>
> *"I consider the questionnaire superfluous because of lack of water due to over irrigation. Having been a neighbour to the Otaio River for over 20 years and in the last 10 haven't even considered wasting my time by going down there to try."*
>
> *"I have found that the river is too small to fish in. The water flow is not flash. It is mainly small ponds. I have never heard of any person who has fished the Otaio River. I hope this information helps you."*
>
> *"Lack of water in both the Otaio and Pareora rivers around the coast area prevents river fishing. In the flush of the fishing season the irrigation schemes drain most of the water out."*
>
> *"Fishing mostly poor from lack of water. Good fishing when plenty of water. This is only after a fresh."*
>
> *"Have kept a diary when I was a school boy and caught a lot of fish in the Otaio. No water in the main road area big enough to catch a fish even if there were fish about."* [This respondent was 43 years of age in 1992]

"Very little water in river Feb/March. Very few fish. I only saw one brown trout of any size. This river is very close to home for me and it would be good to see it maintained."

"I have lived beside and walked the Otaio for 55 years. I have not fished the Otaio River for over twenty years because irrigators pump it dry every summer. I spent some time in the past ten years transferring fish from water holes drying up but has become impossible with Catchment Board straightening river which increases direct flow and destroys deep water holes."

"Lack of constant water from Greys Crossing to the mouth. The river is not fishable nine months of the year and when good water is flowing it's usually out of season."

"Sir, further to your questionnaire regarding the Otaio River, I live about a quarter of a mile from the river and spend quite a bit of time there mainly swimming my dogs when the river has water running and the mouth is open. I have seen numbers of sea run trout around the main road bridge. When the river is dry you can find trout trapped in pools up the river. I took a five pound brown out of a hole, the size of the pool was about six feet across with about twelve inches of water in it. In the winter there is always water in the river but is quick to dry up as summer comes along and no rain. Another problem is the lagoon at the beach. When it fills up and the mouth stays closed, it tends to get stagnant and you get a build up of rubbish, so the mouth should be opened regularly to keep the area clear. I believe if water was kept flowing in the river all year it would not be long before it would carry a good stock of fish, but you must consider the local farms along the river who irrigate it. Without that water supply they would soon be out of business. Another point is between the main road and Greys Crossing [5 km] there are some small backwaters on the south side of the river which are used by ducks in the breeding season. The rising edges carry a lot of watercress which the ducks seem to feed off. If managed properly the river has a good chance to survive but going by the last couple of years it is going downhill fast."

Note: Original questionnaire replies are available if the Commissioners wish to see them.

149. In the 1992 Otaio River consent review process Fish and Game, supported by DoC, conditionally acknowledged that there was little benefit to the fishery in restricting abstractions after the river ceased to flow over its full length and we submitted that it would be advantageous to maintain surface flow throughout the river for as long as possible by imposing 1:1 flow sharing rules between the river and abstraction for gorge flows between 250 and 500 l/s. At flows above 500 l/s or below 250 l/s there would be no restriction on abstraction. The 250 l/s lower limit was based on Regional Council flow records indicating this was the minimum gorge flow required to provide continuous flow within the lower river.

150. Canterbury Regional Council did not impose irrigation restrictions on renewal of Otaio River water permits.

151. The National Angler Surveys of 1994/95, 2001/02 and 2007/08 did not identify any anglers who had fished the Otaio River in those seasons.

Waihao River Catchment

152. The greater proportion of the Waihao River catchment and therefore its water source is upstream from Waihao Forks about 20 km above the river mouth. The North Branch which is the dominant tributary drains the western slopes of the Hunter Hills behind Waimate and the South Branch drains hill country north of the lower Waitaki River catchment. The upper catchment is largely in its natural state

153. Flow records are taken at McCullough's Bridge, about 4 km downstream from the North and South branch junction. Below Waihao Forks there are no significant surface water inflows other than the by-wash of irrigation water at the Railway bridge about 1km below SH1 and 5 km above the river mouth, however river flow exhibits considerable variation due to groundwater gains and losses. The mean annual low flow at McCullough's Bridge is about 305 l/s and this flow fails to sustain continuous flow at SH1, meaning the river is dry in its 6 km middle to lower river reach just about every year. The Waihao has a minimum flow condition of 300 l/s at McCullough's Bridge at which all abstraction must cease, and at a flow of 600 l/s, 50% restriction is applied.

154. The recreational sports fishery is largely supported by brown trout with occasional catches of Chinook salmon in the lower reaches and rainbow trout thought to originate from the Morven-Glenavy irrigation by wash at the Railway bridge. Resident brown trout are found throughout the catchment and sea-run stocks provide a boost to the fishery in spring and early summer when they enter the river to feed on whitebait and smelt in the lower reaches. Sea-run trout appear to

restrict their range to the lower river, the dead arm and Wainono Lagoon.

160. The Morven Glenavy Ikawai Irrigation Scheme discharges an environmental flow of 700 l/s into the lower Waihao River at the Railway bridge as a normal part of their operation. There is no question that the discharge provides wide environmental benefits in summer and sustains the lower river sports fishery at a higher level than would otherwise occur. Fish and Game seek clarity in Policy 15.4.5 that the environmental flow discharge does not provide elevated flows to enable increased abstraction downstream of the discharge site.

155. Spawning surveys for the Waihao indicate spawning concentrations consistent with separate upper and lower river populations. More intense use is made of the lower river between 2km and 5km above the Waihao Box and of the upper river between the Waihao Forks and the North Branch gorge than elsewhere.

156. I believe removal of the barrier to adult trout upstream migration by provision of continuous river flow between McCullough's and the sea would improve the Waihao River trout population size and its dispersal to the angler's benefit.

157. A review of anglers' diary schemes from 1957 to 1968 rated the Waihao River trout fishery as the most important of the coastal fisheries in the Waitaki Valley Acclimatisation Society (WVAS) district, an area that covered from Shag Point, near Palmerston in the south to the Pareora River in the north. The report noted that some decrease in the anglers' crop from the Waihao and the Kakanui rivers has probably occurred because of continued water abstraction (Graynoth and Skrzynski, 1973).

158. The NAS of 1994/95 and 2001/02 identified similar levels of angler use of the Waihao to that of the Pareora River and similar trends related to the presence and timing of river flows sufficient to accommodate angling.

159. The 1994/95 season was the poorer of the two NAS surveyed seasons on the Waihao and the median flow for the October 1994 to April 1995 fishing season was 506 l/s at McCullough's. The NAS estimated 650 ± 290 angler days were spent on the Waihao that season. Early season effort in October and November accounted for about 20% of the season total although flows were too high for angling for most of October. There were no more freshes in river flow until mid-April and daily mean flows were below 1000 l/s for 143 days in succession. Flows of less than 1000 l/s do not appear to offer good conditions for angling and without freshes anglers had no other fishable flows to target. Low season angling effort reflected poor season angling conditions.

160. For October 2001 to April 2002 the season median flow was 1,614 l/s and 1100 ± 590 angler days were sustained. Over 80% of the 01/02 season effort occurred in October and November when the median flow was 2200 l/s and only 5% of angling effort occurred in April when the median flow was 524 l/s.

161. I believe flow records, trout population dynamics, and angling results from the 1994/95 and 2001/02 seasons, indicate flows of 1,500 l/s or more at McCullough's will maintain sufficient continuous flow to the sea to provide for trout passage and improve the diversity of angling experiences available to Waihao River anglers.

162. From the Waihao Forks downstream approximately 4 km to McCullough's Bridge river gradient is slight and stream habitat is characterised by willow-lined pools up to 400m long, 20m wide and 3m deep, with short riffles between pools. This provides very good adult trout habitat and provides very challenging conditions for anglers

where it is best fished from a row boat. Habitat like this is not found anywhere else in the Waihao.

169. Policy 15.5.2 prohibits damming upstream of the Waihao Forks. This does not afford protection to the fishery that exists downstream to McCullough's Bridge. Fish and Game request that damming be prohibited above McCullough's Bridge and that the impoundment effects of damming downstream not encroach above McCullough's Bridge.

UPPER WAITAKI LAKES AND RIVERS

163. The upper Waitaki is a huge resource for recreational sports people especially freshwater anglers. It offers sports fishing for three trout species – brown, rainbow and brook char, and two species of salmon – Chinook and sockeye. No other fishery in the country offers this variety. The upper Waitaki provides a full range of experiences from river fishing in the wilderness of the Ahuriri River to the unlimited access and fish size of the hydro canals and for lake fishing from the peace and Calendar beauty of Lake Alexandrina to the metropolis of Lake Benmore.

164. Between 1994/95 and 2007/08 angler use of the Waitaki Catchment above Waitaki Dam increased from 51,600 angler days to 146,500 angler days. Angler use almost trebled in 14 seasons. Among FGNZ managed fisheries, the upper Waitaki and the upper Clutha above Roxburgh Dam now rate as the most important for the amount of angling they sustain. The upper Clutha contains fisheries of note such as lakes Hawea, Wanaka, Dunstan and Wakatipu plus rivers – Greenstone, Caples and Makarora.

165. In 1994/95 angler use of the upper Waitaki at 51,600 angler days provided a national rating as the fifth highest. In 2000/01 it was second and by 2007/08 it was equal with the upper Clutha on about 150,000 angler days (Unwin and Brown 1998, Unwin and Image 2003,

Unwin 2009). Clearly, the upper Waitaki provides a large and increasingly valued freshwater fishing resource and that appreciation is increasing at a greater rate for anglers distant to the fishery than those who are local.

166. Between 1994/95 and 2007/08 use of the upper Waitaki fishery increased two-and-a-half fold for CSI Fish and Game licence holders. In the same period use by licence holders with NC Fish and Game (Christchurch) or Otago Fish and Game (Dunedin) region licences increased fourteen fold. Those two regions contributed 35% of all angling in the area in 2007/08 compared to only 10% in 1994/95. For anglers from further afield the increase was also significant. North Island licenced anglers contributed less than 0.1% of angling in 1994/95 compared to 1.9% in 2007/08.

167. Lakes and hydro canals in the upper Waitaki sustain about 80% of the recreational fishery. None of these fisheries are self-sustaining and all require access for trout and salmon to natural spawning habitat or juvenile recruitment from tributary streams. Two rivers, the Tekapo and Ahuriri, account for almost half of remaining angler activity. These fisheries are self-sustaining and they contribute juveniles for maintenance of the Lake Benmore and downstream fisheries. While 90% of the recreational fishing is undertaken on relatively few, well known areas, those fisheries will founder if management of the Catchment's water resources reduces the ability of small tributary streams to provide habitat for spawning and juvenile rearing to sustain the adult fisheries downstream.

168. While the catchment's bigger lakes and canals may be the focus of angler attention, Fish and Game consider the greatest threats to maintaining the current high status of upper Waitaki fisheries are excessive abstraction from nursery streams and reduced water quality from intensified land use.

LOWER WAITAKI RIVER CATCHMENT

Lower Waitaki River

169. Averaged over the 1994/95 and 2000/01 fishing seasons the National Angler Survey found that the Waitaki River was the fourth most fished New Zealand river managed by Fish and Game New Zealand (Unwin and Brown 1998, Unwin and Image 2003).

170. The NAS found approximately 34,500 angler days were fished on the Waitaki River in the 1994/95 season and 27,600 angler days were fished in the 2001/02 season.

171. On six occasions between 1976 and 1986 and again in 2007, salmon redd (nest) counts were made over the length of the lower Waitaki River. The distribution of spawning in 2007 was comparable with that of the earlier surveys. The reach of river from the Waitaki Dam to the Stonewall on average accounts for 75% of all salmon spawning in the lower Waitaki River. The remaining 25% occurs downstream of the Stonewall.

172. From the mid 1960s through to the mid 1980s a variety of survey methods estimated an annual trout harvest of 8,000 to 10,000 trout (Graybill et al. 1988).

173. Just over half of trout angler activity occurs downstream from Stonewall (Pierce and Smith 1989).

Hakataramea River Catchment

174. Four salmonid species are present within the catchment, being Chinook salmon, brown and rainbow trout and brook char.

175. The Hakataramea River sustains 1,600 to 1,900 days of trout angling effort per season or on average about 10 anglers fishing for each day

of the season. About 60% of season activity occurs in November and December (Unwin and Brown 1998, Unwin and Image 2003).

176. In reality recreational fishing in the Hakataramea is for trout and its most valuable attribute is early season rainbow trout fishing upstream of Cattle Creek Bridge about 35km upstream from the Waitaki River.

177. While some of these rainbow trout will be resident fish, most will have originated from the annual July to September spawning run of adult fish from the Waitaki River to the upper reaches of the Hakataramea River. The rainbow spawning run has been estimated to be between 100 and 300 fish annually into the Hakataramea and about 100 and 500 fish into the Maerewhenua and Awakino rivers, respectively. Annual runs of brown trout of 300 to 500 fish into the Hakataramea and 200 to 300 fish into the Maerewhenua have also been recorded, although in the Hakataramea the main brown trout spawning grounds are below Cattle Creek Bridge (Webb et al. 1991).

178. The large Waitaki River rainbow trout fishery estimated to sustain angler harvest of about 5,000 fish per season is believed to be totally dependent on tributary spawning. No rainbow trout spawning has been identified in the Waitaki River itself and newly emerged rainbow trout fry have only been recorded in the Waitaki River near spawning tributaries.

179. The Hakataramea and Awakino rivers are the major known sources of rainbow trout recruits from tributaries for the lower Waitaki River and are of comparable importance.

180. Diarist results identify the Hakataramea rainbow trout fishery in its upper reaches – 35 to 50 km above the Waitaki junction – as an important recreational resource, albeit early in the season. This fishery is dependent on winter access for adult rainbow trout upstream from the Waitaki and spring and summer access for their offspring

downstream to the Waitaki. Brown trout angling increases in importance downstream and endures for the remainder of the season.

FISH SCREENING

177. In relation to Schedule 2 – Fish Screen Standards and Guidelines, Fish and Game have requested minor amendments to conditions 1(b) and 2(b). These amendments do not alter the specification for the approach velocity to not exceed 0.12 m/s, they simply emphasise to the consent applicant that under normal operation a “routine level” of clogging will occur and this needs to be accounted for in design and maintenance of the screen to ensure the approach velocity does not exceed 0.12m/s.

CONCLUSION

181. A systematic process was used to identify the selection of Central South Island water bodies and their respective values for inclusion in Schedule XX. This process utilised the extensive experience and knowledge of Fish and Game staff in relation to field work such as habitat assessments and observations, drift diving surveys, electric fishing monitoring, fish trapping, hatchery operations, aerial spawning, aerial fish count surveys and game bird habitat projects; including expertise gained by working with other regions and other Fish and Game related agencies in other parts of the world. The selections in Schedule XX were also based on available research, expert evidence and management plans.

182. Freshwater angling in New Zealand is an important recreation indicative of and dependent on good water quality and natural flow variation. In Canterbury, the added presence of self sustaining Chinook salmon, the largest sports fish, places additional requirements on flows necessary for fish passage and angling.

183. A high proportion of plains rivers become disjointed in their mid reaches in mid-summer if not all year. Trout fisheries are retained in

some of these as independent headwater and coastal fisheries. Sea-run brown trout are important for maintaining lower river populations and may represent a necessary survival regime for small Canterbury rivers.

184. Increasing occurrence of toxic algal blooms in lowland rivers, that prohibit fishing and other contact recreation provide a very public report on trends in health of Canterbury waterways.

Mark Whitby Webb

4 February 2013

REFERENCES

Deans, N., 2007. Evidence presented to Hunter Downs Irrigation Scheme consent hearing, October 2007.

Graybill, J. P., Palmer, K.L., Jowett, I.G., Rutledge, M.J., Pierce, L.A., James, G.D., Graham, A.A., and Bloomberg, S. 1988. Fisheries requirements and design features of a residual river within the proposed Lower Waitaki Power Scheme. Report prepared for ECNZ by Freshwater Fisheries Centre, MAFish, Oamaru, New Zealand PD 37. 100 p.

Graynoth, E. and Skrzynski, W., 1973. The Ashburton trout and salmonfishery. New Zealand Ministry of Agriculture and Fisheries, Fisheries Technical Report 88. 21p.

Hardy, C.J., South Island Council of Acclimatisation Socieities proceedings of the quinnat salmon fishery symposium 2-3 October 1971 – Ashburton, New Zealand Ministry of Agriculture and Fisheries, Fisheries Technical Report 83. 298 p.

Horrell, G.A., 2001. Ashburton River Low Flow Regime. Canterbury Regional Council Report No. Uol/26, Canterbury Regional Council, Christchurch, New Zealand.

Horrell, G.A., 2003. Ashburton River Low Flow Regime. Canterbury Regional Council Report No. Uo3/28, Canterbury Regional Council, Christchurch, New Zealand.

D Jellyman, D. J., Unwin, M. J., James, G. D. 2003. Anglers' perceptions of the status of New Zealand lowland rivers and their trout fisheries. NIWA Technical Report. 62p.

McDowall, R.M., 1994. Gamekeepers for the nation, the story of New Zealand's acclimatisation Societies 1861 – 1990. Canterbury University Press, Christchurch, New Zealand. 508p.

National Water and Soil Conservation Authority, 1984. A national inventory of wild and scenic rivers.

Norton, E.J., 2007. Evidence presented to Hunter Downs Irrigation Scheme consent hearing, October 2007.

Pierce, L.A. and Smith J.J.L.1989. Angling postal questionnaires schemes on the lower Waitaki River, 1980/81 and 1981/82. New Zealand Freshwater Fisheries Report No.106. 35 p.

Tierney, L. D., Richardson, J., Unwin, M.J. 1982. The relative value of South Canterbury rivers to South Canterbury anglers: A preliminary report. New Zealand Freshwater Fisheries Report No. 17. 46p.

Tonkin, J. 1986. The First 100 years. Ashburton Acclimatisation Society Annual report and balance sheet for the year ended 31 August, 1986.

Unwin, M.J., and Brown, S., 1998. The geography of freshwater angling in New Zealand. A summary of results from the 1994/96 National Angler Survey. NIWA Client Report CHC98/33. National Institute fo Water & Atmospheric Research Ltd. Christchurch. 78p.

Unwin, M.J. and Image, K., 2003. Angler usage of lake and river fisheries managed by Fish and Game New Zealand: results from the 2001/02 National Angling Survey. NIWA Client Report CHC2003-14. National Institute fo Water & Atmospheric Research Ltd. Christchurch. 48p.

Webb, M. W., Dungey, R. G, Graynoth, E. 1991. Brown and Rainbow trout spawning migrations in tributaries of the lower Waitaki River, 1981 – 1983. New Zealand Freshwater Fisheries Report No. 125. 21p.