
in the matter of: the Resource Management Act 1991

and

in the matter of: a number of applications to take and use water from
the Upper Waitaki catchment

Draft brief of evidence of Robert James Greenaway

Dated: 16 September 2009

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1. **QUALIFICATIONS AND EXPERIENCE**

1.1 My full name is Robert James Greenaway.

1.2 I am in practice as a consultant leisure and open space planner. I operate a private Nelson-based consultancy called Rob Greenaway & Associates and I am a Director of the Pacific-based leisure planning consortium, the Global Leisure Group Ltd.

1.3 I graduated from Lincoln University in 1987 with a three-year Diploma in Parks and Recreation Management with Distinction, and then completed 18 months of postgraduate study. Between 1990 and 1995 I worked with an international tourism and recreation development consultancy – Tourism Resource Consultants – on a range of large and small development and advisory projects, including ecotourism development planning in Samoa and for potential World Heritage Sites in the Solomon Islands for the Ministry of Foreign Affairs and Trade, event management, and domestic reserve, tourism and recreation management planning.

1.4 Between 1995 and 1997 I worked for Boffa Miskell Ltd, focusing on recreation planning for local authorities and tourism development planning for private agencies. Since 1997 I have worked independently. The majority of my work is for local and central government, private companies, and environmental and community agencies.

1.5 I have been a member of New Zealand's leading professional leisure management association – the New Zealand Recreation Association (NZRA) – since 1990 and was a member of the Association's National Executive from 2000 to 2006. In 2004 I was awarded the Ian Galloway Memorial Cup by the NZRA, 'to recognise excellence and outstanding personal contribution to the wider parks industry.' I am on the Association's inaugural Board of Accreditation to assess candidates for the status of Accredited Recreation Professional (ARPro) and Accredited Recreation Practitioner (ARPra), and hold the status of an Accredited Recreation Professional. I am also a member of the New Zealand Association for Impact Assessment and the

Australia and New Zealand Association for Leisure Studies (ANZALS). This year I was appointed to the inaugural Sir Edmund Hillary Outdoor Recreation Council, an advisory panel tasked with assisting Sport and Recreation NZ (SPARC) in the implementation of the National Outdoor Recreation Strategy.

- 1.6 Over the past several years, as an example, I have worked as either lead, co-lead or sole consultant on recreation, park and sport development strategies, assessment of effects and research programmes for: Meridian Energy (Waitaki, Manapouri, Mokihinui, Hayes schemes), Contact Energy (Clutha), TrustPower (Arnold, Patea, Matahina), King Country Energy (Mokau), Bay of Plenty Energy (Kaituna), Fish and Game (Hurunui), MainPower (Mount Cass), Mighty River Power, the Department of Conservation, Christchurch City Council, SPARC (Sport and Recreation New Zealand), the Royal Forest and Bird Protection Society, Summit Road Society, LandCo, Fiordland Link Experience, Central Plains Water Trust, Christchurch Estuary Association, Port Levy Coastal and Marine Protection Society, Far North District Council, Infinity Investment Group, Darby Partners, Auckland Regional Council, the Canterbury West Coast Sports Trust, Environment Canterbury, Selwyn District Council and the Dunedin City Council, amongst others.
- 1.7 I have lectured at Lincoln University for several years on recreation planning, project design and professional development at under and post-graduate levels. In 1995 I wrote Massey University's original extra-mural third year outdoor recreation management course programme. I have had over 100 articles on recreation and tourism published in popular, professional and academic publications in Australasia and Asia and have managed several major multisport events.
- 1.8 I confirm that I have read the Environment Court's Code of Conduct for expert witnesses and this evidence has been prepared in accordance with that code. I agree to comply with the code's terms. In that regard, I confirm that the statements made in this evidence are within my area of expertise (unless I state otherwise) and I also confirm that I have not omitted to consider material facts which might alter the opinions stated in this evidence.

- 1.9 I have been involved in the following investigations and studies. These describe and assess the recreation values in the Waitaki Catchment and review the effects of various development proposals:
- a. Investigations and reporting for Meridian for the Project Aqua proposed hydro-electricity development (effects on recreation and on the Waitaki Valley community);
 - b. Investigations and reporting for Meridian in relation to the Waitaki Catchment Water Allocation Regional Plan (WRP), and presentation of evidence at the Waitaki Catchment Water Allocation Board (WAB) hearing;
 - c. Presentation of evidence at the Waitaki River North Bank Tunnel Concept Council and Environment Court hearings; and
 - d. Presentation of evidence at the Hunter Downs Irrigation Scheme Council hearing.
- 1.10 I have completed a major user survey of recreational activity on the Lower Waitaki River (Greenaway 2002a), a door-to-door survey of residents of the Waitaki Valley (Greenaway 2002b), and an observational analysis of recreational use of the Waitaki River between Kurow and the Waitaki Dam which I presented in evidence at the Waitaki Catchment Water Allocation Board hearing. While I do not quote all relevant literature in this evidence, key documents to which I have referred over the past eight years of my work on the Waitaki Catchment are listed in my references.
- 1.11 I participated in the caucusing session with experts from Mackenzie Water Research Limited (MWRL) and Environment Canterbury (ECan) in Christchurch on the 22nd of July 2009.

2. **SCOPE OF EVIDENCE**

- 2.1 I have been asked by Meridian to prepare evidence in relation to recreation values in the Upper Waitaki Catchment (above the Waitaki Dam) and to review the potential cumulative effects on recreation of the irrigation development scenarios presented in the MWRL reports, relying on the data presented by MWRL.
- 2.2 Specifically, my assessment refers to the recreation potential of the Upper Waitaki Catchment. That is, the physical ability to carry out recreation activities (for example, physical access and adequate water quantity and quality) and the environmental and social values which

support a quality recreation experience (such as inter- and intra-recreation activity conflict, fish health and noise). I often rely on the assessments of other specialists to assist me in my work. For example, aquatic ecology and hydrology are important issues for me to consider in relation to recreation, but I am not an expert in defining the potential effects of flow regime changes on, for example, periphyton. However, I understand what effects periphyton growths can have on recreation amenity.

2.3 Visual amenity and other landscape values is another area of high importance to recreation. I also defer to landscape planners for their opinion about what effects a proposal may have on visual amenity, and refer to how the outcome may affect recreation. In this project, potential changes to landscape values are an important consideration for recreation and tourism (tourism is a subset of recreation), but no assessment of landscape change has been carried out by MWRL and a review of visual amenity changes has not formed part of my brief.

3. **SUMMARY**

3.1 The key recreation opportunities in the Upper Waitaki Catchment include:

- a. Trout angling throughout the catchment;
- b. Salmon angling in several waterbodies;
- c. Viewing the scenery;
- d. Camping and walking throughout the catchment;
- e. Power and jet boating on the hydro lakes, including water skiing, sailing and jet skiing;
- f. Swimming throughout the catchment; and
- g. Game bird hunting.

3.2 Several sites in the catchment have been developed specially for recreation pursuits. These include the artificial white water course on the Tekapo River and the rowing course on Lake Ruataniwha.

3.3 The Tekapo River has been substantially modified by the canal diversion and has, as a result, become a very important trout angling setting, with appropriate flows and high water quality. High flows with poor visibility previously limited the River's trout angling values.

- 3.4 The Upper Waitaki Catchment affords a number of nationally significant recreation opportunities, particularly angling for trout and salmon, and recreational boating.
- 3.5 The important values supporting recreation in the catchment are:
- a. Physical access to the water and other settings, such as access to campsites and fishing spots;
 - b. The availability of suitable built facilities, such as boat launching ramps and campsites;
 - c. The health of fish stocks (quality and quantity of fish and diversity of species);
 - d. The availability of an appropriate range and number of recreation settings, matching expectations, equipment and skills with the right level of accessibility and challenge;
 - e. Appropriate water quantity, including river flow and lake level reliability;
 - f. High water quality, including suitable clarity and perceived low levels of contaminant, such as didymo and other periphyton;
 - g. Hazard minimisation, or appropriate information and advice about hazards; and
 - h. Quality landscape settings.
- 3.6 It is not possible for me to assess the potential scale of effect on recreation resulting from the MWRL assessed scenarios due to a lack of data in relation to these issues. For example, there are no data presented by MWRL for:
- a. Trout and salmon spawning activity in any affected waterbodies, especially Lake Benmore and the Tekapo, Twizel and Ahuriri Rivers;
 - b. Potential for breaches of Suitability for Recreation Grades throughout the catchment¹;
 - c. Potential for the persistence of periphyton blooms, including didymo, due to the low flushing frequency in many waterways;

¹ There are two components to providing a Suitability For Recreation Grading (SFRG) for an individual swimming area:

- The Sanitary Inspection Category (SIC), which generates a measure of the susceptibility of a water body to faecal contamination
- Historical microbiological results, which generate a Microbiological Assessment Category (MAC), which provides a measurement of the actual water quality over time.

These two combined give an overall SFRG, which describes the general condition of a site at any given time, based on both risk and indicator bacteria counts. This grade helps to determine whether ongoing monitoring is required, and provides the basis for telling people whether or not the water is suitable for recreational use, from a public health perspective (MfE, 2003).

- d. The effects of increased nutrient loads on macrophytes, such as lagarosiphon, in lakes and the implications for recreation activities (such as swimming, angling, water skiing, propeller and jet fouling on boats),
 - e. The effects on recreation of changes or shifts in the trophic level of the lakes, and
 - f. The scale and location of abstractions and the resulting modified flow regimes in affected waterbodies.
- 3.7 The 25% increase threshold for acceptable change to periphyton biomass in each of the river and stream sub-catchments relied on by MWRL requires more thorough calibration, and specific regard to recreation and the cumulative environmental values upon which recreation depends is required. I discuss these specific water-quality and quantity issues later in my evidence (in my recommendations).

4. RECREATION IN THE WAITAKI CATCHMENT

- 4.1 There is no comprehensive research available to quantify the recreational use of the catchment. The exception is the national angler surveys completed for Fish and Game New Zealand by NIWA (Unwin 2009, the National Angler Studies), which I discuss below. However, these studies only apply to angling and do not consider any other activity. Other studies can be referred to for the lower Waitaki Valley. These include, the Waitaki River Recreation Survey (Greenaway, 2002a), the Waitaki Community Survey (Greenaway, 2002b) – both completed to inform the Project Aqua resource consent application – and the Visitor Survey of the Lower Waitaki Valley (Kearsley, 2005).
- 4.2 Notably, no study, besides the National Angler Surveys, considers the recreational uses of the entire catchment within one methodology.
- 4.3 To assist with this information gap, I completed an additional study for the WAB hearing to help describe the entire catchment's recreation setting within a single methodology. The method relied on a review of relevant popular guides to recreation and tourism in New Zealand (103 texts, Appendix 1), and the completion of a count of individual references to recreation activities and opportunities within the catchment. The objective of the study was to identify where activities occur, and which destinations are most heavily

recommended for specific activities. While the results cannot be used to directly reflect user numbers per site and activity, they do offer guidance when assessing the significance of a site for recreation generally, and the occurrence of specific activities.

4.4 Nineteen on-water or near-water activities were recorded, plus accommodation and references to scenic views over the water bodies. References were sought for the 13 main waterbodies within the catchment:

- Ahuriri River;
- Lake Ohau;
- Ohau River;
- Lake Pukaki;
- Pukaki River;
- Lake Tekapo;
- Tekapo River;
- Lake Ruataniwha;
- Lake Benmore;
- Lake Aviemore;
- Lake Waitaki;
- Lower Waitaki River; and
- Hakataramea River.

4.5 Figure 1 (references by activity) shows the main form of recreation recommended within the catchment to be angling (trout fishing *per se*, fishing generally and salmon fishing). Almost all waterbodies were recommended as angling destinations. Camping, boating, walking and jet boating are the other key recommended activities. If the activities of 'boating' and 'jet boating' are combined, boating (excluding sailing and kayaking) was the second most referred to activity.

4.6 All activities identified also occur elsewhere in New Zealand, including the ability to combine, for example, angling for salmon and rainbow and brown trout on the same river.

4.7 Records of references to accommodation were taken, showing dominance in relation to Lake Tekapo.

- 4.8 Figure 2 (references by location) show Lake Tekapo to be well ahead of all other destinations in the frequency of references, although almost half of those referred to scenic views over the lake and accommodation beside it. Lakes Benmore and Aviemore and the Ahuriri River are frequently referred to, all supporting a range of activities, although the lakes more-so. The Ohau and Pukaki Rivers were infrequently referred to.
- 4.9 Most waterbodies support a number of recreation activities. While the literature review does not provide an exhaustive list of activities which do occur on and around each water body, it does indicate those which are *recommended* as suitable.
- 4.10 'Boating' as an activity may include jet boating and power boating. Many texts do not make a distinction, but it is likely that when the term 'boating' is used, the reference is to power boating. 'Kayaking' is predominantly lake kayaking. Whitewater kayaking only occurs during artificial releases down the Tekapo and Pukaki Rivers and in the Hooker River near the Mount Cook village.
- 4.11 Both Figures 1 and 2 are based on the data in Table 1, which gives the numbers of references recorded for both location and activity. This assessment considers both the upper and lower catchment, and also provides detail about the Waitaki Valley and the lower Waitaki River. The upper catchment received far more references in the data than did the lower.

The two charts presented below indicate the number of references made by activity and by location. Table 1 includes the base data for both these charts.

Figure 1: Recreational uses as indicated by literature review: By activity

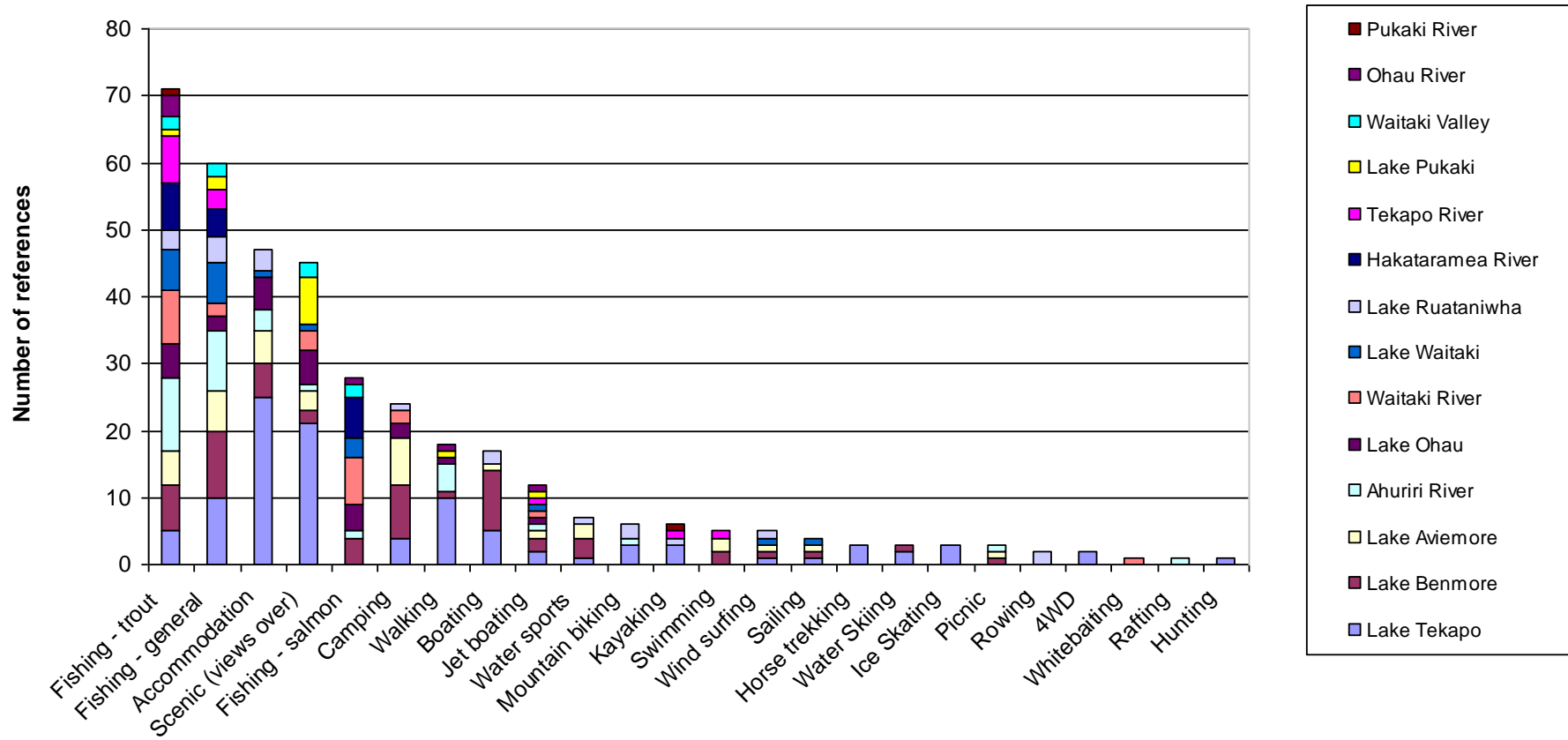


Figure 2: Recreational uses as indicated by literature review: By location

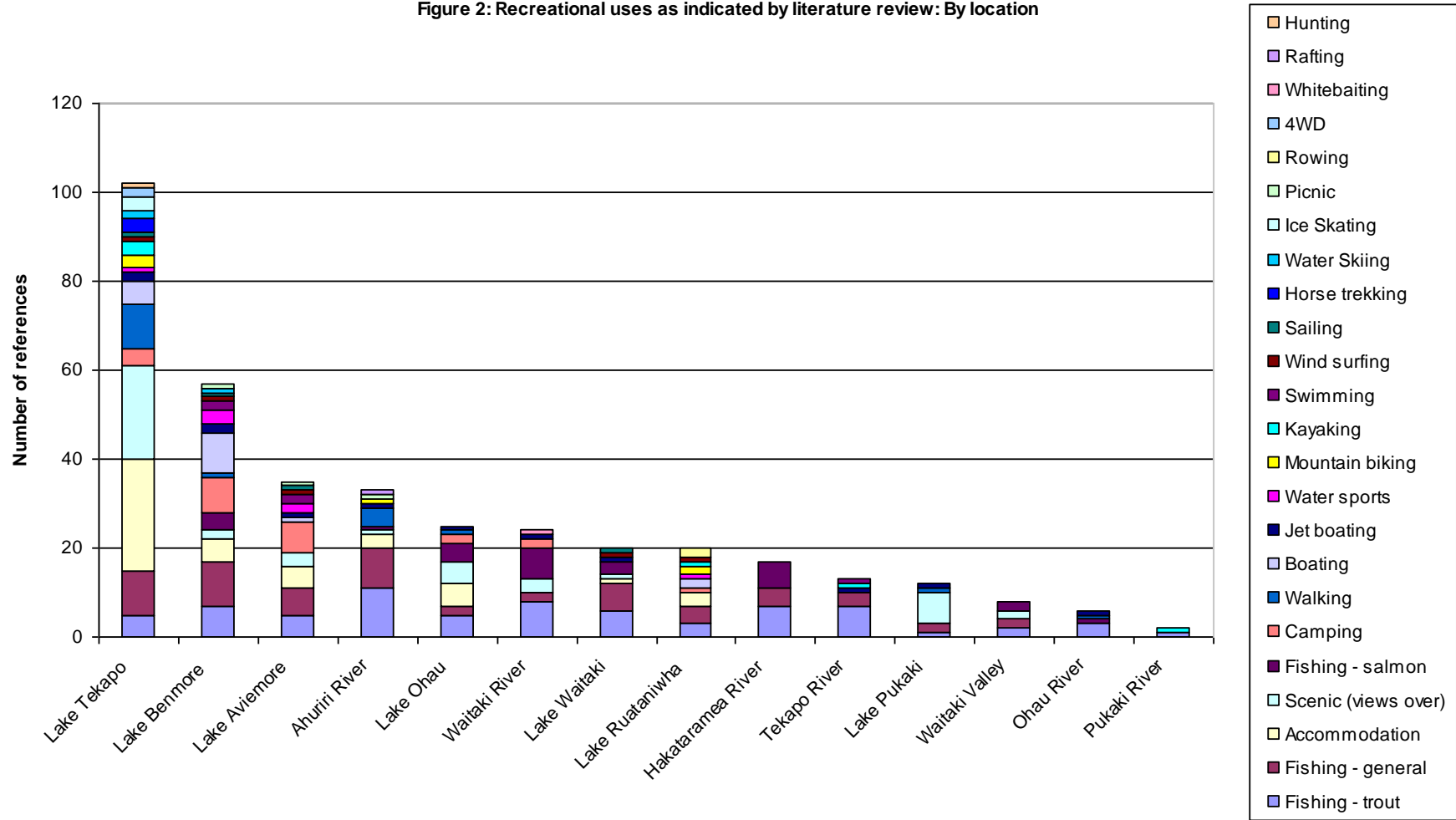
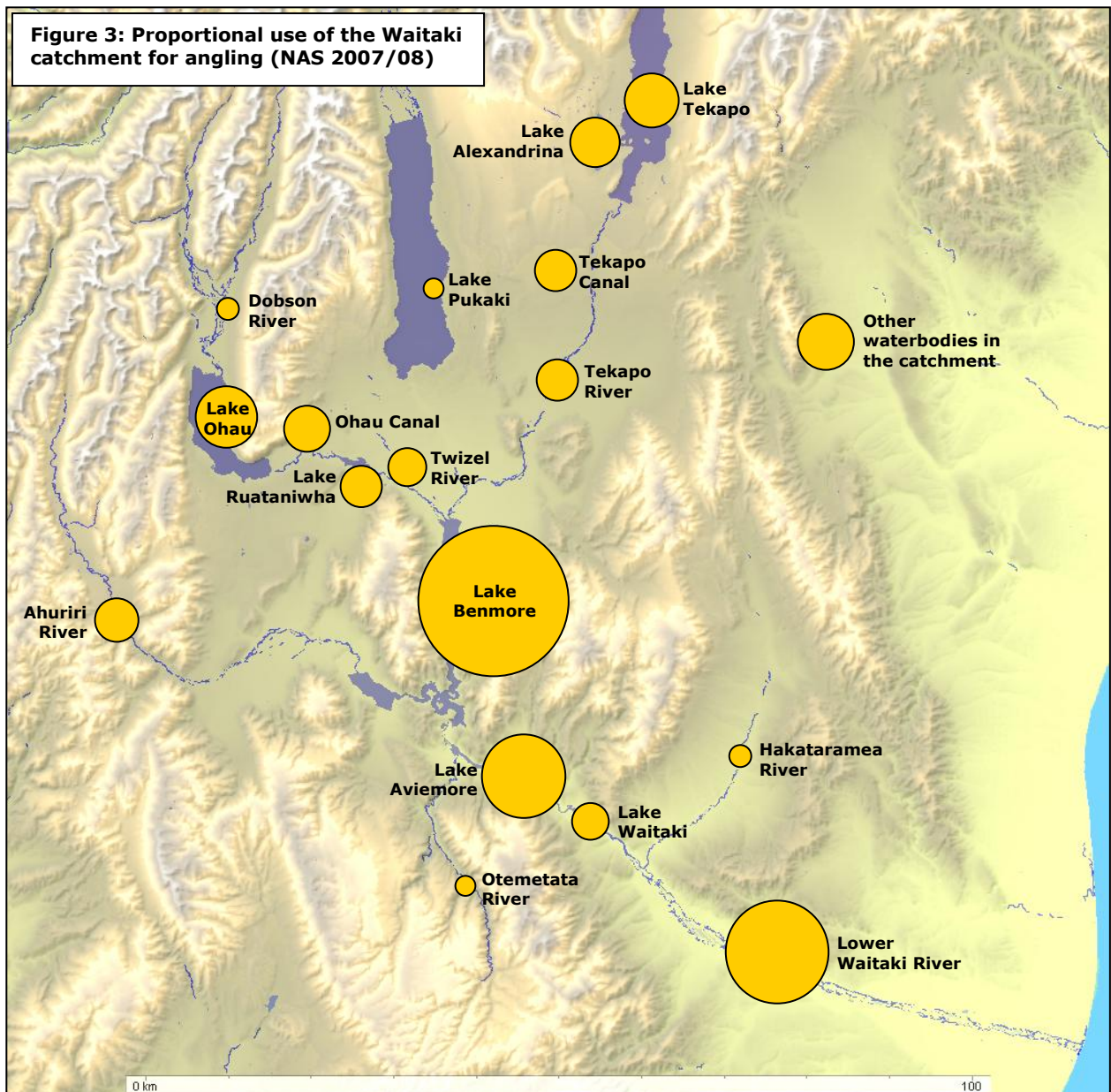


Table 1: Summary table: literature review – number of references by activity and location															
Activity	Lake Tekapo	Lake Benmore	Lake Aviemore	Ahuriri River	Lake Ohau	Waitaki River	Lake Waitaki	Lake Ruataniwha	Hakatarama River	Tekapo River	Lake Pukaki	Waitaki Valley	Ohau River	Pukaki River	Total
Fishing - trout	5	7	5	11	5	8	6	3	7	7	1	2	3	1	71
Fishing - general	10	10	6	9	2	2	6	4	4	3	2	2			60
Accommodation	25	5	5	3	5		1	3							47
Scenic (views over)	21	2	3	1	5	3	1				7	2			45
Fishing - salmon		4		1	4	7	3		6			2	1		28
Camping	4	8	7		2	2		1							24
Walking	10	1		4	1						1		1		18
Boating	5	9	1					2							17
Jet boating	2	2	1	1	1	1	1			1	1		1		12
Water sports	1	3	2					1							7
Mountain biking	3			1				2							6
Kayaking	3							1		1				1	6
Swimming		2	2							1					5
Wind surfing	1	1	1				1	1							5
Sailing	1	1	1				1								4
Horse trekking	3														3
Water Skiing	2	1													3
Ice Skating	3														3
Picnic		1	1	1											3
Rowing								2							2
4WD	2														2
Whitebaiting						1									1
Rafting				1											1
Hunting	1														1
<i>Total</i>	<i>102</i>	<i>57</i>	<i>35</i>	<i>33</i>	<i>25</i>	<i>24</i>	<i>20</i>	<i>20</i>	<i>17</i>	<i>13</i>	<i>12</i>	<i>8</i>	<i>6</i>	<i>2</i>	<i>374</i>

4.12 Figure 3 presents the data from the only quantitative survey of recreational use of the catchment: the results of the 2007/08 national angler survey (NAS) (Unwin 2009). This shows the key angling locations to be the Lower Waitaki River and Lake Benmore (16 and 34 percent of angler days in the catchment respectively – or 27,800 and 59,750 angler days respectively).



4.13 It should be noted that the results for the national angler survey have not been calibrated (Martin Unwin, NIWA, pers comm.) and the use of absolute figures should be treated cautiously. That is, no analysis has been completed to show whether the results of the survey do in fact match reality. However, if any bias is inherent in the study, it is likely

to apply evenly across all waterbodies. This means that while the figure of 59,750 angler days on Lake Benmore for the period covered by the national angler survey might be unreliable, it is possible to more confidently state that 66% of the catchment's angler days were spent in the Upper Waitaki Catchment.

- 4.14 The 2007/08 NAS estimated that almost 14% of days spent fresh water fishing across New Zealand were in the Waitaki Catchment. Over 55% of all angling in the catchment in 2007/08 occurred on water bodies created by hydro-electricity development (i.e. Lakes Benmore, Waitaki, Aviemore and Ruataniwha and the three hydro canals).
- 4.15 MWRL (in GHD 2009) assesses 11 stream nodes for potential effects on water quality (Table 11, Section 4.5.3). Table 2 summarises the level of reported angling activity on each of those between the 1994/95 and 2007/08 seasons. Three waterbodies (Wairepo Creek, Quail Burn and Willow Burn) had no reported angling. In total, these waterbodies contributed 8% of all angler days in the Waitaki Catchment in 2007/08.

Table 2: Angler days in identified waterbodies (Unwin 2009)

River	1994/95	2001/02	2007/08
Stony River		40 ± 40	
Greys River	90 ± 60	260 ± 100	310 ± 180
Tekapo River	2420 ± 490	4910 ± 700	4460 ± 590
Mary Burn	30 ± 20	200 ± 80	410 ± 180
Wairepo Creek			
Twizel River	720 ± 360	1250 ± 320	3820 ± 650
Hen Burn			20 ± 20
Ahuriri River	2590 ± 720	2900 ± 580	4890 ± 720
Omarama Stream	490 ± 170	390 ± 290	260 ± 120
Quail Burn			
Willow Burn			

- 4.16 There are no other empirical data available to indicate the scale of use of these waterbodies for other forms of recreation, such as swimming and proximate terrestrial activities like picnicking. Leisure Matters (2004) provides some relative descriptions of recreation activity levels in the Upper Waitaki Catchment, but the recreation counts are very coarse.

- 4.17 The key recreation opportunities include:
- a. Trout angling throughout the catchment;
 - b. Salmon angling in several waterbodies;
 - c. Viewing the scenery;
 - d. Camping and walking throughout the catchment;
 - e. Power and jet boating on the hydro lakes, including water skiing, sailing and jet skiing;
 - f. Swimming throughout the catchment; and
 - g. Game bird hunting.
- 4.18 Several sites in the catchment have been developed or designed to specially accommodate recreation pursuits. These include the artificial white water course on the Tekapo River and the rowing course on Lake Ruataniwha.
- 4.19 The key environmental values supporting these activities include:
- a. Appropriate water quantity, including river flow and lake level reliability;
 - b. High water quality, including suitable clarity and low levels of contaminant, such as didymo and other periphyton;
 - c. The health of fish stocks (quality and quantity of fish and diversity of species);
 - d. The availability of suitable built facilities, such as boat launching ramps and campsites;
 - e. Physical access to the water and other settings, such as access to campsites and fishing spots;
 - f. The availability of an appropriate range and number of recreation settings, matching expectations, equipment and skills with the right level of accessibility and challenge;
 - g. Hazard minimisation, or appropriate information and advice about hazards; and
 - h. Quality landscape settings.

5. **POTENTIAL EFFECTS OF LAND USE INTENSIFICATION**

- 5.1 My review of the MWRL assessment indicates the following potential effects associated with the proposed scenarios of land use intensification in the Upper Waitaki Catchment:
- a. Changes to water flow regimes due to abstraction activities affecting contact recreation opportunities and angling;

- b. Changes to water quality, including Suitability for Recreation Grades (see footnote 1) due to bacterial contamination resulting from increased stock and nutrient levels;
- c. The effects of changes to macrophyte communities, such as lagarosiphon, on, for example, swimming, angling and water skiing and the fouling of propellers and jet intakes on boats;
- d. Changes to swimming and angling amenity due to changes in didymo and other periphyton biomass and the scale and duration of blooms; and
- e. Changes to angling amenity due to affects on the habitat of trout and salmon.

5.2 It is not possible for me to assess the potential scale of effect on recreation resulting from the proposed land use intensification due to a lack of data and assessment by MWRL in relation to these issues. For example, there are no data or assessment presented by MWRL for:

- a. Trout and salmon spawning activity in any affected waterbodies, especially Lake Benmore and the Tekapo, Twizel and Ahuriri Rivers;
- b. Potential for breaches of Suitability for Recreation Grades throughout the catchment;
- c. Potential for the persistence of didymo and other periphyton blooms in rivers and creeks affected by abstraction and / or additional nutrient loading, compounded by low flushing frequencies;
- d. The potential for increased nutrient loadings to encourage macrophyte growth on the lakes, and particularly Lake Benmore where lagarosiphon is an issue, as discussed in the evidence of **Mr Turner** and **Ms Sutherland**;
- e. The scale and location of abstractions and the resulting modified flow regimes in affected waterbodies; and
- f. The physical scale and number of the structures necessary for the abstraction of water.

5.3 I note that the MWRL assessment (GHD 2009) relies heavily on a threshold of a 25% increase in periphyton biomass, "on the basis of it being undetectable to the casual observer or constituting a significant

adverse effect above existing state"². I note that the evidence of **Dr Coffey** presents a revised justification for the 25% increase in periphyton biomass in his evidence, and this has been discussed by **Mr Turner** and **Ms Sutherland**. Many of the important angling settings, such as the Tekapo, Ahuriri and Twizel Rivers, will have a high level of repeat visitation by experienced local, regional and national anglers. I would not class these individuals as 'casual observers', considering the likelihood for long personal associations with each waterway and an intense level of interest in their fishability and environmental condition. The 25% increase threshold would need more review in such locations before it can be accepted as an appropriate effects threshold. **Dr Snelder** considers the relevance of the 25% threshold, with regard to a more comprehensive review of peak biomass and periodicity and duration of periphyton growths in his evidence.

- 5.4 Periphyton makes rocks slippery and means wading for angling is more hazardous, and similarly access for swimming. It changes the visual amenity of the setting. The weed fouls hooks and can make casting very frustrating. Floating and thick weed is unpleasant for contact recreation, and when river levels fall, can present unpleasant smells and foul river-side settings.
- 5.5 As noted in the evidence of Dr Ryder (para 3.10), salmonid-rearing habitat is a fundamental value of the McKenzie Basin rivers, and one which should be managed carefully. Dr Ryder also notes that managing periphyton and macrophyte growth in fish habitat, as well as the physical characteristics of the rivers, is important to protect fish species (para 3.12). However, there is no identification of important salmonid spawning sites in the MWRL evidence and no corresponding site-specific assessment of likely periphyton and flow regime changes resulting from the proposal. Rather, a more broad approach has been adopted, and my concern is that this may neglect effects on important salmonid spawning sites, which may have greater susceptibility to flow and periphyton biomass issues, or be currently in marginal settings.

² GHD 2009. Page 35. Also page 6. See also the evidence of Dr Coffey, para 7.15.

6. **RECOMMENDATIONS**

6.1 I would recommend that several tasks are completed prior to decisions being made in relation to the consent applications to advise an assessment of recreation effects:

- a. Review, based on interviews with relevant experienced anglers, the current status of periphyton and its effect on angling, and benchmark modelled changes against these perceptions. Through this process, identify specific locations where periphyton issues are, or are not currently experienced and use these as monitoring sites over time;
- b. Identify swimming sites and review the local existing water quality (SFRG), water clarity and periphyton status, and assess likely changes in light of the proposal. Monitor changes at these sites over time;
- c. Review the effects of the proposed irrigation development on trout and salmon habitat and spawning;
- d. Review the potential effect of additional nutrient loading on macrophyte proliferation within the lakes, particularly Lake Benmore in relation to lagarosiphon;
- e. Identify and review any changes to angling and swimming options as a result of changes in flow regimes where abstractions are proposed to occur.

6.2 The scale of effect on recreation values identified by these assessments will assist in defining the level of water take and nutrient input that is appropriate for the nationally important recreation opportunities in the Upper Waitaki Catchment. I am recommending the above information be collected and assessed prior to decisions being made, as without it, it is not possible to determine the degree of effect the nutrient thresholds proposed by MWRL for Lakes Benmore and key sub-catchments will have on recreational values and activities.

7. **CONCLUSION**

7.1 The Upper Waitaki Catchment is one of the most important inland recreation settings in the South Island. Its attraction for angling in New Zealand is probably second only to the Taupo region. (The national angler survey does not record angling activity in the

Taupo/Tongariro DOC Conservancy, and so direct empirical comparisons are difficult.) Any development proposal in this setting needs to carefully assess potential changes to water quality, particularly suitability for contact recreation, as well as periphyton effects on visual amenity, the ability to fish and wade, and on the health of the fish themselves.

7.2 The effect of the Waitaki Power Scheme on recreation has been significant. It has broadened the appeal of the setting, created opportunities especially suited to families, and has diversified the angling options. While there have been adverse effects on the salmon fishery, the net value of the recreation setting with the Scheme in operation are broadly positive. The Tekapo River especially has been vastly improved as an angling setting via improvements in water clarity and the reduction in flow. These changes represent notable modifications to the pre-existing setting. Although the catchment prior to hydro-development would have supported fewer recreation days and less recreation diversity, it would have still been a busy recreation area. Consequently, the benefits afforded by the modified setting need to be carefully managed.

7.3 My assessment is that the potential effects of the proposed land use intensification on recreation values and activities in the Upper Waitaki Catchment have not been evaluated at all by MWRL. Considering the value, at a national level, of the Upper Waitaki Catchment to recreation, the potential for significant adverse effects is apparent. The degree to which the modification of flow regimes and increased nutrient loading is appropriate needs to be described before a decision can be made about the net effect of the applications.

DATED this 16th day of September 2009



Rob Greenaway

REFERENCES

- Alan, S. & Christie, G. Sept. 1997 ECNZ - Confidential Report. *Waitaki Recreational Study*. Montgomery Watson.
- Davis, S.F. 1987. *Wetlands of national importance to fisheries*. New Zealand Freshwater Fisheries Report No. 90. MAFFish, Christchurch.
- Egarr, G.D, Egarr, J.H. 1981. *New Zealand Recreational River Survey Parts I, II and III*. Water & Soil Division, Ministry of Works and Development.
- Fink-Jensen, K. Johnson, M. Simpson-Edwards, M. 2004a. *Freshwater recreational users. Survey of freshwater use in New Zealand*. BRC Marketing & Social Research for MfE.
- Fink-Jensen, K. Johnson, M. Simpson-Edwards, M. 2004b. *Freshwater recreational users. Internet survey of freshwater use in New Zealand*. BRC Marketing & Social Research for MfE.
- Greenaway, R. 2002a. *Waitaki River Recreation Survey. Appendix to Project Aqua Assessment of Effects on the Environment*. Rob Greenaway & Associates client report for Meridian Energy.
- Greenaway, R. 2002b. *Waitaki Community Survey. Appendix to Project Aqua Assessment of Effects on the Environment*. Rob Greenaway & Associates client report for Meridian Energy.
- Greenaway, R. and Boffa Miskell. 2003. *Project Aqua Recreation Effects Assessment Report*. Rob Greenaway & Associates and Boffa Miskell client report for Meridian Energy.
- GHD, 2009. *Cumulative Water Quality Effects of Nutrients from Agricultural Intensification in The Upper Waitaki Catchment Summary Report*. GHD client report prepared for Mackenzie Water Research Ltd.
- Grindell, D.S. (ed) 1984. *A national inventory of wild and scenic rivers*. Water and Soil Directorate, Ministry of Works and Development.
- Grindell and Guest (eds) 1986. *A list of rivers and lakes deserving inclusion in a schedule of protected waters*. Water and soil miscellaneous publications No.97
- Kelly, G.R. 1988. *An inventory of whitebaiting rivers in the South Island*. New Zealand Freshwater Fisheries report No. 101. MAFFish, Christchurch.
- Kent, J. 2002. *South Island, Trout Fishing Guide*. Reed Publishing (NZ) Ltd.
- Leisure Matters. 2004. *Waitaki Catchment Recreation and Tourism Activities: Collation, synthesis and presentation of existing studies*. Report commissioned by the Ministry for the Environment for consideration by the Waitaki Catchment Water Allocation Board.
- Millichamp, R. 1997. *Salmon Fever. A Guide to Salmon Fishing in New Zealand*. Shoal Bay Press.
- Ministry for the Environment. 2004a. *Potential Water Bodies of National Importance for Recreation Value*. MfE number 559. Wellington.
- Ministry for the Environment. 2004b. *Sustainable Water Programme of Action: Potential water bodies of national importance. Technical Working Paper*. MfE number 562. Wellington.

- Ministry for the Environment. 2003. *Microbiological Water Quality Guidelines for Marine and Freshwater Recreational Areas*. Technical Working Paper MfE number 474. Wellington.
- Ministry of Tourism. 2004. *Waters of national importance for tourism*. Ministry of Tourism, Wellington.
- Pierce, L.A. 1989. *Aerial surveys of angling on the Lower Waitaki River, 1974-1983*. New Zealand Freshwater Fisheries Report No. 113. MAFFish Oamaru.
- Pierce, L.A., 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. MAFFish Oamaru.
- South Canterbury/Waitaki Eel Management Committee. 1999. *South Canterbury/Waitaki Eel Management Plan*.
- Teirney, L.D., Richardson, J. Unwin, M.J. 1982. *The relative value of Waitaki Valley rivers to Waitaki Valley anglers*. New Zealand Freshwater Fisheries Report No. 19. MAFFish
- Teirney, L.D., Unwin, M.J., Rowe, D.K., McDowall, R.M., Graynoth, E. 1982. *Submission on the draft inventory of wild and scenic rivers of national importance*. Ministry of Agriculture and Fisheries. Fisheries Environmental Report No. 28.
- Unwin, M.J. 2009. *Angler usage of lake and river fisheries managed by Fish and Game New Zealand: results from the 2007/08 National Angling Survey*. NIWA Christchurch.
- Unwin, M.J., Brown, S. 1998. *The geography of freshwater angling in New Zealand: A summary of results from the 1994/96 National Angling Survey*. NIWA Christchurch
- Unwin, M.J., 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 Christchurch.

APPENDIX 1

REFERENCES FOR LITERATURE REVIEW

Texts with reference to recreation in the catchment

Bischke, S. 1996. *Two wheels around New Zealand: A bicycle journey on friendly roads*. Ecopress Corvallis Oregon

Bloxham, L. Stark, A. 1994. *The Jet Boat, The Making of a New Zealand Legend, Second Edition*. Reed Publishing (NZ) Ltd

Booz, E. B. 1989. *Collins Illustrated Guide to New Zealand First Edition*. The Guidebook Company

Booz, E. B. 1994. *5th Edition New Zealand*. Odyssey Guides

Busch, T. 2003. *Trout Fishing Guide to New Zealand's South Island, 5th Edition*. David Bateman Ltd.

Carr Rollett, F. 1953. *Angling in New Zealand*. Whitcombe and Tombs Limited

Charles, G. 2002. *125 Great Kayaking runs, New Zealand white water Revised edition*. Craig Potton Publishing

Chowdhury, D. 2004. *Driving Scenic New Zealand, Second Edition A guide to touring New Zealand by road*.

Cobb, J. 2001. *Explore New Zealand over 60 scenic driving tours*. New Holland

Donald, D. 2001. *New Zealand Handbook: The Travel Guide*. Footprint Publishers Group West

Dowling, C., 1990. *New Zealand*, Apa Publications

Egarr, G. 1988. *White water River Running in New Zealand*. Reed Methuen Publishers Ltd 1988

Giles, R. 2000. *Hooked on Trout, How and Where to catch large Trout in New Zealand*. Reed Publishing Ltd

Giles, R. 2002. *Catch that Trout, Fishing the South Island of New Zealand*. Reed Books

Gould, P. 1989. *Advanced Trout Fishing*. Heinemann Reed

Greening, M. Greening, E. 2005. *Baches and Holiday Homes to Rent, New Zealand Guide Book*.

Hema Maps 2004. *South Island Touring Atlas and Guide*. Hema Maps NZ Ltd

Hema Maps. 1999. *New Zealand Road Atlas*. Hema Maps in association with New Zealand Automobile Association

Jackson, K. Harre, J. 1969. *New Zealand*. Thames and Hudson, London.

Jefferies, M. 2000. *AA What to see and do, New Zealand Guide 2004 Adventuring in New Zealand, A Sierra Club travel Guide*. Sierra Club Books

Kent, J. 2004. *South Island Trout Fishing Guide*. Reed Publishing (NZ) Ltd

- Kent, J. Hallett, D 2003 *Classic Fly Fishing in New Zealand Rivers*. Craig Pottton Publishing
- Kent, J. Madsen, P. 1998. *New Zealand's Top Trout Fishing Waters*. Reed 1998.
- Kent, J. Magnano Madsen P, 2003. *New Zealand's Top Trout fishing waters*. Reed
- Kerr, G. 1992 .*The New Zealand Camping Guide, South Island 13th revised edition*. T.O.W Travels
- Let's Go: New Zealand with coverage of Fiji adventure guide 2005*. St Martins Press
- Millichamp, R. 1997. *Salmon Fever, A guide to Salmon Fishing in New Zealand*. Shoal Bay Press
- Mitchell, P. 2000. *Great Escapes, A guide to Motorcycle touring in New Zealand*. Longacre Press
- Moore, C. 2002. *Weekends for Trout Fishing in New Zealand*. New Holland Publishers NZ Ltd
- New Zealand Conservation Authority. 2003. *New Zealand's Walkways*
- Orman, T. 1980. *Trout and Salmon Sport in New Zealand; An Angling Anthology* .A.H and A.W Reed Ltd
- Orman, T. 1993. *21 Great New Zealand Trout Waters*. David Bateman Ltd
- Orman, T. 1995. *Fishing New Zealand*. A Cosmos Guide
- Parsons, J. Hammond, B. 1989, *New Zealand's Treasury of trout and salmon; An angling anthology* The Halcyon Press
- Parsons, J. Hammond, B. 1999. *One Hundred years of Trout Fishing in New Zealand*. The Halcyon Press
- Peat, N. Patrick, B. 2001. *Wild Rivers Discovering the Natural History of the Central South Island*. University of Otago Press 2001
- Pickering, M. 1995. *Wild Walks, Sixty Short South Island Walks*. Shoal Bay Press
- Pickering, M. 2003. *202 Great Walks, The best day walks in New Zealand*. Reed Publishing (NZ) Ltd
- Ringer, B. 1994. *New Zealand by bike, 14 tours geared for discovery Second Edition*, Reed
- Rodgers, M. 2003. *Tales from Paradise at dusk; Running with the river*. Hazard Press Publishers
- Shadbolt, M. 1988. *Readers Digest Guide to NZ*. Sydney Readers Digest Services
- Simon, P. Kennett, J. 2002. *Classic New Zealand Mountain Bike Rides , Fifth Edition*. The Kennett Bros
- Sinclair, G. 2001. *Gone Fishin' : In search of the Anglers Eldorado*. Halcyon Press
- Smitz, P. 2004. *Lonely Planet New Zealand 12th Edition*. Lonely Planet Pty Ltd
- The Backpackers Ultimate Guide BUG New Zealand 2004*. BUG Backpackers Guide

- Tichborne, N. Tichborne, B. 1996. *Anglers Paradise Favourite Fishing waters of New Zealand and the Flies to Fish them with*. The Bush Press of Auckland
- Turner, B. 2003. *The Guide to Trout Fishing in Otago*. Otago Fish and Game Council
- Wells, N. Irvine, N. Duckwork, I. 2000. *Lonely Planet Cycling New Zealand Discover the world on two wheels*. Lonely Planet Pty Ltd.
- Williams, J. Niven, C. Turner, P. 2000. *Lonely Planet New Zealand. Aotearoa – land of the long white cloud*, 10th edition. Lonely Planets Pty Ltd.
- Young, D. Foster, B. 1986. *New Zealand's Living Water Faces of the River*. TVNZ Publishing

Texts without reference to recreation in the catchment

- Alexander, L. 1986. *Outdoor Adventures in New Zealand*. Reed Methuen Publishers Ltd
- Anderson, G. 1999. *Fast Light Boats, A century of kiwi innovation* Te Papa Press
- Blair, D. 2003. *Confessions of a New Zealand Hunting Guide*. The Halcyon Press
- Blake, W. 1999. *Trappers dogs 'n' deer (and other critters)*. The Halcyon Press
- Bruce Banwell, D. 1966. *Wapiti in New Zealand*. A.H & A.W Reed Ltd
- Burton, R. Atkinson, M. 2002. *A Trampers guide to New Zealand's National Parks*. Reed Publishing (NZ) Ltd
- Chapman, C. 2003. *Dancing Rivers*, Halcyon Publishing Ltd
- Commission for the Environment. 1978. *Wild and Scenic Rivers Protection (An Appraisal)*
- Cuthbertson, K. 1974. *Pig Hunting in New Zealand*. A.H & A.W Reed Ltd
- Dench, A. 2000. *Extreme New Zealand, A thrill seekers guide*. New Holland
- DuFresne, J. 1982. *Tramping in New Zealand; Lonely Planet*. Lonely Planet Publications
- Dyne, S. 2004. *Hunter by Nature*. Reed Publishing (nz) Ltd
- Egarr, G. Egarr, J. Mackay J 1979. *64 New Zealand Rivers, A Scenic Evaluation*. NZ Canoeing Association
- Field, K. 1991. *The Master Hunters*. Penguin Books (NZ) Ltd
- Field, K. 1999. *Hunting with the Best: Kingsley Field talks with top New Zealand Hunters*. Reed Publishing (NZ) Ltd
- Forrester, R. Illingworth, E. 1973. *Hunting in New Zealand*. A.H & A.W Reed Ltd
- Groves, N. 2003. *South Island Weekends tramps*. Craig Potton Publishing
- Harker, P. Eunson, K. 1976. *Hunting with Harker*. A.H & A.W Reed Ltd
- Harris, L.M. 1973. *A Hunting Guide to Introduced Wild Animals of New Zealand*. A. R Shearer, Government printer, Wellington, New Zealand.

- Hill, L. Marshall, G. 1991. *Catching Trout*. Halcyon Press.
- Hirsch, W. 2002. *Hidden Trails, 21 private walking tracks in New Zealand, 2nd edition fully revised*. New Holland.
- Holden, P. 1983. *The Golden Years of Hunting in New Zealand*. Hodder & Stoughton Ltd.
- Holden, P. 1985. *New Zealand Hunters' Paradise*. Hodder & Stoughton Ltd.
- Holden, P. 1989. *Hunt South*. Hodder & Stoughton Ltd.
- Holden, P. 1990. *More Holden on Hunting*. Hodder & Stoughton Ltd.
- Holden, P. 1990. *Wild game: Hunting Game birds, Small and Feral Game in New Zealand*. Hodder & Stoughton Ltd.
- Holden, P. 1998. *New Zealand Hunter*. Hodder Moa Beckett Publishers Ltd
- Janes, C. 1998. *Possum on a Cold Tin Roof*. Reed Publishing (nz) Ltd
- Joll, G. 1968. *Big Game Hunting in New Zealand*. Whitcombe and Tombs Ltd
- Kennett, J. Mulheron, J. Carlyon, G. O'Neill, M. 1997. *Classic NZ Adventures 2nd Edition*. Compass Star Publications Ltd
- Lentle, R. Saxton, F. 1991. *Alpine Hunting in New Zealand*. David Bateman Ltd
- Lester, A. 2004. *A Bum in the Bush*. Reed Publishing (nz) Ltd
- Mackay, J. 1978. *Wild Rivers, Rafting and Canoeing Adventures in New Zealand*. Hodder and Stoughton (NOTES: Lakes Waitaki, Ohau, Pukaki, Tekapo and the Ahuririi River are mentioned under the NZ Rivers section, but they have no reference to recreational activities)
- Marshall, G. Hill, L. 1993. *Images of Silver: A guide to Back Country Fishing, The Ultimate Trout Fishing Experience*. The Halcyon Press
- McClunie, D. 2001. *Classic New Zealand Mountain Hunts*. The Halcyon Press
- McNeill, R. 1995. *Moirs Guide South*. Great Southern Lakes Press
- Mossman, S. 1998. *The Kiwi catch, how to catch New Zealand's favourite fish*. Reed Publishing (NZ) Ltd
- Nolan, T. 1975. *New Zealand Camping and Tramping Handbook*, Paul Hamlyn Ltd
- Orman, T. 1991. *Trout on a Nymph*. The Halcyon Press
- Orman, T. 1993. *21 Great New Zealand Trout Waters*. David Bateman
- Parker, B. 1992. *Game bird Hunting in New Zealand*. The Halcyon Press
- Readers Digest. *Motoring Guide to New Zealand; Readers Digest*. 1998
- Redgrave, T. 2002. *Going the Distance – women outdoors in New Zealand*. Tandem Press
- Running Rowing. *A brief history of the Canterbury Rowing Association*. 1902 – 2002
- Severinsen, K. 1993. *Tracks of the Hunter*. The Halcyon Press
- Sibly, L. Wilson, M. 2000. *4wd South Island – 107 off road adventures Volume 1*. Shoal Bay Press
- Sinclair, G. 1993. *New Zealand, A Wild Place to Play*. Halcyon Publishing Ltd

- Sinclair, R. 2004. *Route 6. A class South Island Bike Ride*. New Holland
- Thomas, G. 1997. *The Complete NZ Fisherman Saltwater and Freshwater Fishing*. David Bateman Ltd
- Thomas, G. 2001. *Trout Secrets – How to catch trout in New Zealand*. David Bateman
- Thomas, J. 1964. *Deer Shooting Days*. A.H & A.W Reed Ltd
- Toghill, J. 1983. *ANZ Sailing and Boating*. Beckett
- Wilson, J. 1984. *New Zealand Fishing Tips of the famous; Hundreds of tips, hints and inside information to help you catch more fish*. Harlen Publishing Ltd 1984