



14 August 2019

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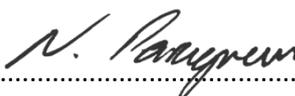
cc: Luggate Irrigation Company Limited and Lake McKay Station Limited
C/- WSP Opus
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Submission on Application No. RM18.345

This feedback is provided on behalf of the Otago Fish and Game Council (**Fish and Game**). For additional information please contact Nigel Paragreen using the details below.

Submitter Details

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General

- [1] Fish and Game is the statutory manager of sports fish and game bird resources within Otago. It holds functions and responsibilities set out in the Conservation Act (1987). Part of the organisation's function is to represent the interests and aspirations of anglers and hunters in the statutory planning process and to advocate the interests of the Council, including its interests in habitats. This submission is provided in accordance with this function.
- [2] As required by the Conservation Act (1987), Fish and Game has prepared a sports Fish and Game Management Plan for Otago¹, which has guided the development of this submission. This document describes the sports fish and game bird resources in the region and outlines issues, objectives and policies for management over the period. The document may be useful for decision makers to have regard to when considering this application.

¹ Otago Fish and Game Council. (2015). *Sports Fish and Game Management Plan for Otago Fish and Game Region 2015 - 2025*. Dunedin: Otago Fish and Game Council. A copy has been attached to this submission.
[Statutory managers of freshwater sports fish, game birds and their habitat](#)

- [3] Fish and Game submits in respect to the whole application, in which it **opposes**. Fish and Game seeks that the application be declined unless the following conditions are imposed:
- a. a 10 year term of consent;
 - b. the allocation is reduced to a level which will avoid further over-allocation and be split into reasonable supplementary allocation blocks where relevant;
 - c. allocations are set individually for each of the 4 takes;
 - d. the following residual flows be imposed:
 - i. LMS Alice burn: at least 46L/s;
 - ii. LMS Alice burn tributary: visual flow to confluence with Alice burn main stem;
 - iii. LIC Alice burn: visual flow to the confluence with the Luggate; and
 - iv. LIC Luggate: visual flow to the confluence with the Alice burn;
 - e. all takes are subject to the Luggate minimum flow for winter and summer;
 - f. the LIC take on the Luggate main stem is screened;
 - g. a non-lethal bywash structure is installed, with associated screen immediately after the point of bywash, so that spawning fish and juveniles could be returned to the Alice burn or Luggate main stem;
 - h. bywashing is restricted to that required to operate the fish screens and provide adequate habitat for trout in the race.
- [4] Fish and Game **does** wish to be heard in support of its submission.
- [5] Fish and Game **will** consider presenting a joint case at a hearing.
- [6] Fish and Game is **not** a trade competitor of the applicant.
- [7] Fish and Game **does** wish to be involved in any pre-hearing meeting that may be held for this application.
- [8] Fish and Game **does not** request that the local authority delegates its functions, powers, and duties to hear and decide the application to 1 or more hearings commissioners who are not members of the local authority.
- [9] Fish and Game **has** served a copy of its submission on the applicant.

Background on Luggate Creek

- [10] The Luggate Creek is a tributary of the upper Clutha catchment. The tributary supports populations of brown trout (*Salmo trutta*), rainbow trout (*Oncorhynchus mykiss*) and koaro (*Galaxias brevipinnis*). In 2006, as part of the minimum flow discussion, Fish and Game provided the following advice about the distribution and nature of trout in the catchment²:

Electric fishing surveys have demonstrated that the middle and lower reaches of Luggate Creek are important brown trout spawning grounds. The substrate is composed of gravels, cobbles and boulders which make ideal spawning and juvenile trout rearing habitat. Brown trout migrate upstream from the Clutha River to spawn in mid-April. By the end of July, most brown trout spawning activity has finished. The

² Otago Regional Council. (2006). *Management Flows for Aquatic Ecosystems in Luggate Creek*. Dunedin: Otago Regional Council.

eggs lie in the gravels for approximately one month and take a further 30-40 days until they fully develop into fry. Rainbow trout also spawn in the lower and middle reaches of Luggate Creek. Spawning runs begin in July and peak in September. The critical rainbow trout spawning period finishes at the end of December, by which time the rainbow eggs have developed into fry. Rainbow trout are also present in the upper river. Luggate Creek provides important juvenile recruitment to the Upper Clutha River system which is a nationally important trout fishery. To protect juvenile habitat and ensure that migrating juvenile trout are able to reach the main-stem of the Clutha River, it is essential that the flow level of this stream is protected during drought periods.

- [11] As a general statement, trout fisheries in a river main stem or lake are supported by a wide network of tributaries which contribute water, habitat and food sources for the larger population. Trout migrate to spawn, so the spawning and juvenile rearing function of tributaries is critical to the ongoing survival and productivity of the overall fishery. The health of the wider fishery is dependent on the health of the tributaries which support it.
- [12] The wider fishery in this case is the upper Clutha, which is an impressively large and iconic river system. The catchment is a powerhouse for angling which supports nearly of all angling effort in the Otago region. Being migratory species, brown and rainbow trout who return to Luggate Creek to spawn or were raised in Luggate Creek have the potential to move between many larger fisheries. To what degree they do is largely unknown though.
- [13] The table below cites angler effort figures from National Angler Surveys³ and significance as identified in the Sports Fish and Game Management Plan⁴ for major rivers and lakes in the upper Clutha area that are directly up and downstream of Luggate Creek. These are fisheries where it is reasonable to suggest that Luggate Creek plays a supporting role. These fisheries made up between 26% - 40% of the total angling pressure in Otago during the years surveyed.

Waterbody	Fishery Name	Significance	National Angler Survey Result (angler days)			
			2014/2015	2007/2008	2001/2002	1994/1994
Very large rivers	upper Clutha / Mata-Au	National	6,670 ± 1,330	20,900 ± 3,220	20,160 ± 2,760	11,440 ± 2,130
Large lakes	Lake Wanaka	National	22,410 ± 3,180	39,070 ± 5,710	25,270 ± 2,310	25,530 ± 2,370
	Lake Dunstan	National	17,080 ± 2,120	26,030 ± 2,800	19,480 ± 2,910	22,250 ± 1,750
<i>Total angler days in Otago</i>			<i>180,860 ± 8,330</i>	<i>215,430 ± 9,370</i>	<i>218,710 ± 8,660</i>	<i>182,870 ± 6,470</i>
<i>Total, as a percent of total angler days in Otago</i>			<i>25.52%</i>	<i>39.92%</i>	<i>29.68%</i>	<i>32.38%</i>

Table 1: information on fisheries likely supported by Luggate Creek

Note: Luggate Creek itself is too small as a fishery to be surveyed as part of the National Angler Survey

- [14] Because of the importance and use of fisheries supported by Luggate Creek, the health of the creek itself and the ecosystem function it is able to provide is incredibly important. Fish and Game submits that decision makers should consider the value of the wider fisheries supported

³ Unwin, M. J. (2016). *Angler Usage of New Zealand Lake and River Fisheries*. Christchurch: National Institute of Water and Atmospheric Research.

⁴ *Sports Fish and Game Management Plan*. Ibid.

by Luggate Creek when considering this application. Adverse effects felt in the Luggate will likely ripple out to the wider fishery.

- [15] Unfortunately, despite the significance of the Luggate, Schedule 1A of the Regional Plan: Water for Otago (**RPW**) does not recognise trout habitat, trout juvenile rearing habitat or trout spawning habitat values. This is a clear oversight.

Minimum flow

- [16] In 2009 a decision on the minimum flow and primary allocation for Luggate Creek was handed down. This provided for a minimum flow, to be measured at the SH6 Bridge monitoring site, of 180L/s from November – April and 500L/s from May – October. A primary allocation was set at 500L/s. No specific supplementary minimum flow or allocation was set, meaning the default supplementary allocation method is used in this catchment.
- [17] An instream flow incremental methodology to model fish habitat was undertaken to support the decision⁵. This recommended a minimum flow of 300L/s in summer and 500L/s in winter to provide for koaro and juvenile trout communities. However, it seems that the parties involved reached the 180L/s minimum flow recommended to decision makers by viewing the stream at a certain flow, agreeing it looked good enough and measuring the flow on that day.
- [18] While Fish and Game was involved in this process at the time, it no longer considers that this process was appropriate. Firstly, the decision sets the summer flow well below the habitat recommendation. The degree of separation between the two begs the question as to whether eyeballing a certain flow on the ground is a sound methodology. Secondly, the science of setting ecological flows and allocations has progressed significantly since that time and it is now considered best practise to consider more than just modelled habitat. The capacity for invertebrate production is often considered as a food source for aquatic life.
- [19] These advances have led to greater justification for more precautionary flows and allocations⁶. Hayes *et al.* undertook a review of the current science and recommend that:

“Minimum flows that are within 80–90% of naturalised MALF and low primary allocation limits of up to 10–20% of the [7-day mean annual low flow] MALF are likely to be precautionary. These ranges are likely to provide high to moderate levels of protection, maintaining natural structure and function of ecosystems or result in measurable, but not large, changes in structure and minimal changes in function. Higher allocation, up to 30% of MALF as recommended in the proposed Draft National Environment Standard for Flows and Water levels for rivers with mean flow < 5 m³/s, might be justifiable when flow variability is such that flows are not held at the minimum flow for prolonged periods (i.e. weeks to months)”⁷.

- [20] However, the current minimum flow and allocation, assuming the 550L/s MALF identified in the 2006 report, is just 32.73% and 90.91% respectively.
- [21] Because of this, Fish and Game considers the minimum flow to be too low to meet modern policy requirements, especially for a stream that supports such significant fisheries. This is problematic as the application heavily relies upon the minimum flow to protect environmental

⁵ *Management Flows for Aquatic Ecosystems in Luggate Creek*. Ibid.

⁶ Hayes, J., Hay, J., Gabriellsson, R., Goodwin, E., Jellyman, P., Booker, D., . . . Thompson, M. (2018). *Review of the rationale for assessing fish flow requirements and setting ecological flow and allocation limits for them in New Zealand - with particular reference to trout*. Nelson: Cawthron Institute

⁷ Hayes *et al.* Ibid.

values, as this may not be the case. The minimum flow decision is nearly 10 years old already and is expected that the minimum flow will be re-considered with the review of the RPW, to be notified in 2025⁸. As such, the heavy reliance on the out of date minimum flow in this context of change introduces a degree of uncertainty to the application.

- [22] As an aside, Fish and Game encourages the decision makers to read the executive summary of the Hayes *et al.*⁹ paper, which is attached. It provides an excellent overview of tools used to set ecological flows and allocations and the ecological consequences of those decisions.

Application details

- [23] During consultation, Fish and Game staff have met or talked with representatives from the Luggate Irrigation Company (**LIC**) and Lake McKay Station (**LMS**) on numerous occasions. This includes the site visit and meetings described in the application. It also includes emails and phone calls where the application was discussed between the parties. During this consultation, Fish and Game's feedback has been that:

- a. it would like to see a higher proportion of water retain in the creek, via a reduced primary allocation and the provision of residual flows;
- b. information to achieve the above is lacking for the Alice Burn and Fish and Game had requested information on naturalised flows at the point of take;
- c. that it is difficult to set residual flows on the LIC takes as inflows are entirely dependent on residual flows from the above water take, Criffle Water Limited (**CWL**), which are currently in a limited notified process which neither the applicant nor Fish and Game are a part of; and
- d. that Fish and Game considers the minimum flow to be too low and this will need to be resolved in a separate process when the RPW is reviewed.

- [24] At the last discussion, Fish and Game staff spoke with Colin Harvey and agreed to wait and see how the ORC would respond to repeated requests from both parties to overturn the poor notification decision which left them out of the CWL process. During this call, Fish and Game was also notified of changes to the application to reduce the amount of water taken at low flows. Fish and Game is appreciative that this change has been made to the application.

- [25] Given the delays that have occurred while trying to unravel that poor notification decision, it is understandable that the applicant has chosen to push ahead to limited notification. However, this does mean that point c above will remain an issue.

- [26] Table 4 and Appendix 1 of the application provide an excellent summary of the activities which are being proposed. In addition to this, key points for the application are:

- a. a term of 35 years;
- b. all allocations are for the primary block;
- c. allocations for each take will be combined into a company total on each consent;
- d. the allocation from Tin Hut Creek will be surrendered; and

⁸ Otago Regional Council. (2019, January 29). *Progressive Implementation Programme*. Retrieved August 10, 2019, from Otago Regional Council: <https://www.orc.govt.nz/managing-our-environment/water/water-quality-targets/progressive-implementation-programme>

⁹ Hayes *et al.* Ibid.

- e. LIC bywashes water which is abstracted but not used.

Hydrology of Luggate Creek and the effect of abstraction

[27] What is not highlighted in the application is the amount of water available for abstraction during low flows. The table below has gathered information from the CWL application and NIWA hydrological modelling¹⁰ to determine the inflows just above each intake. This is compared to the allocation requested at each site, and the maximum combined allocation that will be allowed to be abstracted under the consent, as issued.

Take point	Naturalised inflows	Inflows after takes upstream	Allocation from Appendix 1	Max abstraction from application
LIC Luggate	207L/s	50L/s	56L/s	193L/s
LIC Alice burn	124L/s	22L/s*	136L/s	
LMS Alice burn	92L/s	92L/s	170L/s	
LMS Alice burn trib	10L/s	10L/s		

Table 2: inflows at MALF and proposed allocation

* The combined total for the LMS takes upstream of the Alice burn can abstract the river dry but a residual flow equating to a visual flow is proposed past the take. Inflows will recharge the creek from this point and they have been calculated as naturalised inflows at the point of take minus naturalised inflows at both LMS takes. Whatever residual is passed past the LMS takes will be added to this but cannot be quantified. The flow requirement for a visual residual flow need not be large, so this inherent error will likely not have a significant impact on the analysis.

[28] Expressed as a percentage of inflows, the above table becomes:

Take point	Naturalised inflows	Inflows after takes upstream	Allocation from Appendix 1	Max abstraction from application
LIC Luggate	207L/s	50L/s	120%	386%
LIC Alice burn	124L/s	22L/s*	618%	877%
LMS Alice burn	92L/s	92L/s	184%	
LMS Alice burn trib	10L/s	10L/s	1700%	

Table 3: inflows at MALF and proposed allocation as a percentage of inflows after takes upstream

* note same as in Table 2

[29] When considering the proposed allocation, it's important to consider not just the total figure but the pattern of use. As a generalisation, flood or border-dyke irrigation methods take large amounts of water inconsistently, when it is available. By contrast, spray irrigation methods require a lower amount of water in total but stable supply throughout the irrigation season. As a result, investing water saved from a switch to spray irrigation into additional irrigation areas can create a situation where the amount of water consistently required is much higher than under a smaller footprint of flood or border-dyke systems – even if the maximum rate of

¹⁰ Booker, D. J., & Whitehead, A. L. (2017). NZ River Maps: An interactive online tool for mapping predicted freshwater variables across New Zealand. Christchurch: NIWA. Retrieved from <https://shiny.niwa.co.nz/nzrivermaps/>

abstraction remains the same. The impact on the stream is that more water is being abstracted more often, leading to consistently less habitat for aquatic life.

- [30] This pattern can be seen in Appendix 2 of the application. At the start of the recording period, the use is well below the 193L/s proposed by the applicant, except for a short period of measurement error. However, in subsequent years the rate of abstraction trends upwards in line with the narrative of development in section 3.4 of the application.
- [31] It is also important to understand that the LIC abstracts water which is not used and simply bywashed back to the stream after a distance. There are benefits to this, such as enabling higher flows in races to provide habitat for spawning and juvenile trout. This will be discussed later in the submission.
- [32] The significant downsides are that there is less water in the stream to provide habitat it becomes impossible to separate bywash from water used in the historical record. As a result, Fish and Game is not clear how the flow records in Appendix 2 of the application can be used to work out historical use, as per policy 6.4.2 of the RPW. The only information about the extent of bywash is when application states in section 3.4 that when flows in the race are larger than 150L/s, excess water is bywashed back to the creek.
- [33] Fish and Game submits that the applicant should not be granted water that was abstracted simply to bywash back to the creek.
- [34] The photo below shows bywash structure, which can be diverted from the LIC race, after the two takes have been combined. As identified in the application, there is no fish screen to ensure fish are bywashed back to the stream. If they were, the drop would likely be lethal.



Figure 1: bywash structure for combined Luggate and Alice Burn water.

- [35] It does not appear that LMS has been bywashing to the same extent as LIC. However, the historic take record in Appendix 3 clearly shows that the rate of take is much lower than the 169L/s that has been applied for.
- [36] Fish and Game considers that it is inappropriate to grant the full allocation proposed in the consent for either LIC or LMS, as this would be granting water which has never been used. It will be discussed below how the grandfathering allocation system set up in the RPW does not give effect to the NPS-FM; however, the allocation proposed goes further still than

grandfathering and it is likely that it would result in more water more consistently abstracted from the stream than has been observed in the past.

- [37] The result of such a high proposed primary allocation is that the applicant will be able to abstract large amounts of water from the river when water is available. Between the applicants proposed primary allocation of 362L/s and CWL’s proposed primary allocation of 590L/s, the river could be brought down to the minimum flow at any stage when inflows are between 180L/s and 1,132L/s. For context, the modelled median flow below all takes (CWL, LMS & LIC) in the catchment is 964L/s. This means that aside from the minimum flow, there is no flow sharing with aquatic ecosystems until inflows are well above median flow.
- [38] Similarly, because the application proposes to combine the allocations for each of the two take points operated by each company, there is an even higher risk that all the water locally available at one site can be abstracted, provided abstraction is limited from another. This provides flexibility to the applicant at a risk to the environment. At these allocations and inflows, there is a clear risk of dewatering localised reaches.
- [39] At times, volume restrictions can be used to restrict the amount of time an abstractor can take large amounts of water. However, working backwards from the volumes proposed in the application to litres per second, if the take were operated 24/7, yields the following results:

Calculations using app volumes - bold is the volume stated in app						
L/year	L/month	L/day	L/hour	L/minute	L/second	% reduction from max
	<i>divide by 12</i>	<i>divide by 31</i>	<i>divide by 24</i>	<i>divide by 60</i>	<i>divide by 60</i>	<i>1-(L/s divided by 362)</i>
		31,277,000	1,303,208	21,720	362	0
	931,279,000	30,041,258	1,251,719	20,862	348	4%
4,761,024,000	396,752,000	12,798,452	533,269	8,888	148	59%

Table 4: volumes from application broken down to a consistent rate of take

- [40] Table 4 clearly demonstrates that the applicant could theoretically abstract at 362L/s constantly for 24 hours to meet the daily volume limit, at 348L/s constantly for 31 days to meet the monthly volume limit and at 148L/s constantly for 12 months to reach the annual limit. In other words, from full bore the applicant wouldn’t need to reduce their take at all to meet the daily limit, would need to reduce the take by 4% to meet the monthly limit and would need to reduce the take by 59% to meet the annual limit.
- [41] Clearly, the annual limit is the only one of the three which is a restricting factor. However, typically water is not used for irrigation during winter when there is adequate rainfall. The applicant currently requires stock water during winter and will also require additional water for domestic supply but the volumes for this are small. Appendix 3 clearly shows that LMS uses very little water in winter. This suggests that the annual restriction will have a very small impact as for 50% of the year very little water is used. Appendix 2 shows LIC using a large amount of water during winter – more than in summer for some years. Given that LIC take water and bywash it back to the creek when it is not used, it’s likely that this recorded use represents bywash rather than water used. If this is the case and the bywash were resolved, the annual volume limit would also have very little effect on the amount of time the applicant can take the maximum rate.
- [42] The applicant has clearly applied for much more water than is available at low flows and it can only be assumed that they have done so to harvest water or because they intend to harvest water in the future. Harvesting water when it is plentiful is preferential to relying on high allocations of MALF during low flows as water harvesting under supplementary blocks provides a 50/50 share with the environment. Harvesting water with a high primary allocation,

with very permissive volume limits as in the application, provides very little flow sharing with the environment – especially given the extremely low minimum flow set on the catchment.

- [43] Fish and Game considers that the proposed allocation and volume limits have potential to significantly alter the hydrology of the Luggate catchment. As a result, Fish and Game cannot support the application as a long term solution, deserving of a 35 year consent. In order to be a long term solution, the primary allocation and volume should be drastically reduced and replaced with a supplementary allocation, which will allow for flow sharing with the environment.

Ecology of Luggate Creek and the effect of abstraction

- [44] For management purposes, trout in the Luggate catchment can be divided into three populations.
- a. resident populations: consisting of rainbow trout in the gorge above the LIC take and below the CWL weir and brown trout observed in the CWL race and intake structure;
 - b. migratory populations: which consist of adults who migrate up from the upper Clutha and lakes to spawn from below the lower Luggate to above the LIC take and roughly 1km above the Alice burn confluence, before outmigrating; and
 - c. juveniles who hatch from redds left by spawning adults and use the waterways as a nursery before outmigrating.
- [45] The flow requirements for these populations vary. Resident populations require flow for adult trout habitat year round, which is often the highest flow requirement and provides for spawning and juvenile rearing to support these populations. Migratory spawning populations require high flows for passage and signals to move but typically do so in autumn, winter and spring when flows are high and abstraction demand is low. Juvenile populations using the creek as nursery habitat require good levels of flow to provide a multitude of cover, passage and food opportunities; although this is less than is required for adult resident populations.
- [46] As has been previously discussed, IFIM work for brown trout at various life stages has been completed for the catchment as part of the minimum flow. The flows set are lower than those recommended to provide adequate habitat for juvenile or adult brown trout during summer. Similarly, the minimum flows are well below the benchmarks for retaining ecological function suggested by Hayes *et al.*¹¹.
- [47] The minimum flow is set in the RPW and there is no scope to change it during this limited notification process. The significance here is that the minimum flow is set at a level which does not meet the recommendations for the provision of adequate long term habitat or food production during the irrigation season. As a result, there will be a resource restriction on populations if the flow is held at low flows for long periods of time. This is called flatlining. Because the allocation is so high and the volume limits so permissive, there is a clear potential for the abstraction to flatline the stream.
- [48] For resident populations, this may create a bottleneck during summer months as fish migrate downstream (if they're able) or die due to increased competition for limited resources. The same process is likely to occur for juvenile populations using the stream as a nursery. For them, early outmigration to larger waterbodies is likely to put them at a higher risk of increased predation. It could also be reasonably expected that resident koaro populations will be similarly squeezed for resources. The additional pressure they may face is increased

¹¹ Hayes *et al.* Ibid.

predation from trout as the reduction in physical space draws individuals closer together, increases competition for remaining cover and restricts the amount of invertebrate production (which is an alternative food source).

- [49] Adult migratory populations are less likely to be affected by abstraction as there is typically more water during the autumn, winter and spring months. There is cause for concern for rainbow trout outmigration thought, which can occur until December. At this time in the season, the water users in the catchment likely have the ability to flatline the flow at the minimum flow. It's unclear if this provides adequate cover or physical space for adult fish passage as this wasn't covered in the 2006 science report¹². In similar rainbow trout spawning streams nearby, such as the Lindis, extended low flows were found to significantly increase the rates of mortality for trout.

Residual flows

- [50] Given the close proximity of both the LIC takes to the minimum flow monitoring point, the minimum flow will be the main regulatory instrument. Therefore, the main purpose of a residual flow would be to ensure that the habitat directly downstream to the confluence is not dewatered. Theoretically, each take could dewater their respective reach if the minimum flow is being met by the other branch. Fish and Game submits that a visual surface flow from each LIC point of take to the confluence with the other respective branch would be sufficient as a residual.
- [51] Further up in the catchment, Fish and Game does not think a visual flow is appropriate for the LMS Alice burn take given the size of the stream at the point of take. The nature of the stream is likely to change from a large, healthy high country stream to a comparative trickle under this regime. While there is no fish life present, a reasonable residual will contribute to habitat for invertebrate populations, which are required to feed the high densities of fish downstream, and provide for the natural character of the stream.
- [52] Unfortunately, no work is presented as to why this residual flow is adequate to protect aquatic ecosystems in the Alice burn. It can be said that the high allocation and extremely minimal residual flow is the opposite to what is recommended by Hayes *et al.*¹³. This recommendation is based purely on MALF, so can be used in the absence of local ecological information or habitat modelling. A residual flow of 80% - 90% of MALF would be considered ideal, based off that review. Compared to a visual flow would may only be a couple of litres per second, even an arbitrary 50/50 split between the take and the environment would likely reduce the impact of the take. Fish and Game submits that the residual past the LIC Alice burn point of take should be at least 50% of MALF (46L/s).
- [53] With regard to the residual flow on the LMS Alice burn tributary, any numeric residual imposed would be within the measurement error for a flow recorder. Fish and Game considers that it is reasonable that a residual flow be imposed that ensures a surface water connection with the Alice burn main stem.
- [54] Fish and Game does concede that there is little supporting information for these conclusions. That is because no information has been presented by the applicant on how much water is required to sustain the ecology of the Alice burn near the confluence.
- [55] The application also makes an important point with regard to measuring the residual flow. While it is sympathetic to this issue, Fish and Game submits that water is a valuable part of

¹² *Management Flows for Aquatic Ecosystems in Luggate Creek*. Ibid.

¹³ Hayes *et al.* Ibid.

the applicants' business and the measurement of residuals should be considered a cost of doing business. It is not reasonable that the environment should be degraded to such an extent so that measurement of a residual flow can be done at minimal cost.

- [56] In summary, Fish and Game seeks residual flows equal to:
- a. LMS Alice burn: at least 46L/s
 - b. LMS Alice burn tributary: visual flow to confluence with Alice burn main stem
 - c. LIC Alice burn: visual flow to the confluence with the Luggate
 - d. LIC Luggate: visual flow to the confluence with the Alice burn

Species diversity

- [57] The application discusses in section 4.4 potential ways to increase populations of indigenous fish species. Fish and Game is eager to see increased diversity in the catchment. It regards the proposal by Aukaha to introduce eels alongside increased minimum flow as one which has merit. Fish and Game is the statutory management body for trout and expertise for managing the populations should be sought from it as a first port of call, alongside the Department of Conservation and Iwi. The alternative suggested by the applicants has not been discussed with Fish and Game by the applicants. If they had, it's likely staff would have advised against the suggested actions.
- [58] Removing the fish passage device at SH6 would not be effective in removing trout as passage is provided at other times in the year and resident populations exist within the catchment. The fish passage device simply improves passage from a poor state, not an absent state. Disregarding that practical point, excluding such a vital breeding population and spawning habitat will have ripple effects for the upper Clutha fishery, which should not be taken lightly. Fish and Game is open to discussions of like for like habitat swaps to improve diversity in the catchment. Removing trout from upper sections of the catchment for example, while improving habitat for all species in the lower sections through improved flows.
- [59] Additional discussion is required on this topic, especially around the IFIM work presented for long finned eel, and Fish and Game is open to participating in this discussion at a pre-hearing meeting.

Fish screens and spawning

- [60] Fish and Game agrees that fish screens are not required on the LMS takes, as they are situated high in the catchment where no fish have been observed.
- [61] As noted above and in the application, the LIC infrastructure for the Alice burn take provides quality spawning habitat for trout which Fish and Game has observed being used by wild trout populations for spawning. The race management regime described to Fish and Game staff is such that the substrate is not cleared and the bank vegetation is not removed. While this undoubtedly means the race carries less water, it does provide excellent habitat for spawning and juvenile rearing. As identified in the application, there is benefit in retaining this function.
- [62] Unfortunately, the current setup of the infrastructure creates a high risk for mortality as there is no screen to ensure fish cannot carry on further into the irrigation infrastructure. In addition, the bywash structure is perched high above Luggate Creek, creating a series of cascading waterfalls that is likely to be fatal to fish who attempt to traverse it.

- [63] When Fish and Game staff visited the site it was observed that the spawning value of the LIC Luggate take race was not as high as in the Luggate mainstem. It would be preferable to exclude fish from this race to encourage spawning in the main stem.
- [64] Wording which Fish and Game would prefer to be used for fish screening on a condition of consent is provided in Appendix 1 and Appendix 2 of this submission.
- [65] Figures 1, 2 and 3 show critical parts of the LIC infrastructure.
- [66] The application proposes that a fish screen be placed near the bywash structure to enable spawning access to the races. Fish and Game supports this concept provided the following changes were made to the proposal:
- the LIC take on the Luggate main stem were screened;
 - a non-lethal bywash structure is installed, with associated screen immediately after the point of bywash, so that spawning fish and juveniles could be returned to the Alice burn or Luggate main stem;
 - The requested residual flow for the LIC Alice burn take is imposed; and
 - bywashing be restricted to that required to operate the fish screens and provide adequate habitat for trout in the race.



Figure 2: LIC pipe taking Alice burn water over the Luggate and combining it with the LIC Luggate Creek race.



Figure 3: LIC race taking water from the Alice Burn. The Alice burn take is ~10m upstream of this point in the race. A bywash provides an opportunity for the water to return to the Alice Burn before the confluence with the Luggate mainstem.

Legislative and policy considerations

- [67] Fish and Game considers that the following policy documents should be had regard to in assessing this application:
- a. the Resource Management Act (1991);
 - b. the National Policy Statement for Freshwater Management 2014 (amended 2017) (**NPS-FM**);
 - c. The Regional Policy Statement, both proposed (**pRPS**) and operational (**RPS**);
 - d. the Regional Plan: Water for Otago (**RPW**);
 - e. the Kai Tahu ki Otago Natural Resource Management Plan 2005; and
 - f. the Sports Fish and Game Bird Management Plan for Otago 2015-2025.
- [68] However, Fish and Game submits that the RPS and RPW, which were both written decades ago do not give effect to the provisions of the NPS-FM, which was first released in 2011. These older documents do not require decision makers to safeguard life supporting capacity; define and phase out over-allocation; and provide for economic well-being within limits, as in the NPS-FM, but rather to maintain or enhance values through grandfathering existing allocations.
- [69] In addition, Chapter 3 of the pRPS, which is most relevant to this application, is still subject to court proceedings and therefore is not operative.
- [70] As a result of this, Fish and Game submits that significant weight should be given to the objectives of the NPS-FM when considering this application. The associated policies within this document can also be considered; however, many have until 2030 to be implemented in Otago.

- [71] A central question when having regard to the NPS-FM objectives in relation to this consent is how will life supporting capacity be safeguarded? In some cases this is clear, for example one aspect of life supporting capacity would be safeguarded if Fish and Game's fish screening advice is adopted. A properly designed fish screen will prevent harm and mortality.
- [72] Life supporting capacity for water quantity is often more difficult. It is suggested that life supporting capacity is safeguarded at the status quo because there is evidence of life being present. Fish and Game does not accept this simplistic analysis. The *capacity* aspect of life supporting capacity infers that a decision maker must understand the maximum amount of life that can be supported by the ecosystem before they make a decision as to when that capacity is safeguarded. Otherwise, the existence of any life in a given stream would be evidence of life supporting capacity being safeguarded. As such, Fish and Game submits that the effects of the allocation should be considered against the ecological productivity of the Luggate catchment without the influence of the activities described application, *ceteris paribus*.
- [73] When considered through this lens, the application has an ability to flatline the creek at the minimum flow and/or dewater localised sections for extended periods of time. It has been discussed above that the minimum flow does not provide adequate flows for aquatic species and keeping flows at this level for extended periods is likely to cause adverse effects for the aquatic populations present.
- [74] The scale of this effect is difficult to discuss because the applicant has not provided any information on this. With proposed allocations that range from 120% to 1700% of inflows at the respective points of take, it's clear that we are a long way off the 10% - 20% or even 30% allocation recommended by Hayes *et al.*¹⁴. In addition to this, it does not appear that the abstraction is restricted too greatly by the volume limits, meaning for much of the irrigation season the river can be held at minimum and residual flows for long periods of time.
- [75] Based on this, it's difficult to think that the life supporting capacity compared with the proposed activity is safeguarded, compared to if the activity were not present. While life clearly still survives in the catchment under the current regime, there is a significant potential for bottlenecks in aquatic habitat and access to resources for aquatic species. It is likely that the catchment is operating at a shadow of its ecological productive capacity.
- [76] Effectively having regard to the NPS-FM is particularly important when it comes to defining and phasing out over-allocation. By 2030, the Otago Regional Council (**ORC**) will be required to identify over-allocation and set in place a mechanism to phase it out. Currently, the RPW has no definition of over-allocation. The definition in the NPS-FM is closely linked to Freshwater Objectives, for which there are currently none in the Clutha or Luggate Creek catchments. However, the ORC has committed to implement the NPS-FM via a plan change to be notified in 2025¹⁵ and Freshwater Objectives are expected to be set then.
- [77] It's hard for Fish and Game to imagine that these takes would not be considered over-allocated at the point of take. If granted as applied for, the consents would enable the applicant to abstract well over 100% of available low flows and flatline waterbodies in the catchment at their minimum and residual flows for considerable time within the year.
- [78] In addition to this, the trend towards a consistent increase in the rate of abstraction as development occurs will likely mean that in future the waterbodies will likely be impacted at a higher level than previously experienced. Fish and Game does not consider this outcome to

¹⁴ Hayes *et al.* Ibid.

¹⁵ *Progressive Implementation Programme.* Ibid.

be consistent with Objective B2 of the NPS-FM, which directs regional councils to avoid further over-allocation.

- [79] In this context, the applicant has applied for a consent term of 35 years. This will mean that during the term of the consent, if issued, the ORC will be deciding if takes like these would be considered over-allocated and will set in place a mechanism to phase out over-allocation. However, Fish and Game is concerned that a future review of consent conditions to phase out over-allocation may frustrate the consent.
- [80] In light of this uncertainty, Fish and Game submits that the consent term should be set no higher than 10 years. This timeframe would mean that the consent will be re-applied for in 2031, 6 years after the notification of a revised RPW which will give effect to the NPS-FM and set in place the required information to assess over-allocation. It would also allow the applicants time to scope out alternative water sources so that a transition to a more sustainable supply, should this be necessary.
- [81] A similar position on consent term in light of regulatory uncertainty was recommended by a recent review into the ORC's consenting function by Maw and Daysh¹⁶. The authors seriously questioned the use of 25 and 35 year consents for surface water abstraction and recommended that "... the ORC should show caution in terms of issuing water permits and discharge permits for such lengthy terms.", among other things.

Alternatives

- [82] Fish and Game notes that the Big River and Umbers blocks are estimated to require about 146L/s from the Luggate catchment. This equates to roughly 40% of the total requested allocation. However, both these blocks are located adjacent to the Clutha and water could be sourced from there.
- [83] Given the extremely high allocations requested in the Luggate, sourcing water from the Clutha instead appears to be a sensible alternative. If this were done, it would return a significant portion of water back to Luggate Creek and may assist to reduce over-allocation.
- [84] Fish and Game has a strong preference for this alternative to be taken up. It is illogical that a small, sensitive water body bear such large adverse effects when water will be delivered to paddocks which are directly adjacent to a large water body which can handle such an abstraction without measurable impacts.

Conclusion

- [85] Fish and Game considers that this activity has a significant impact in a valuable catchment. As written, Fish and Game does not see the activity in the application as a long-term solution and opposes the application. For this reason Fish and Game requests that the application be declined.
- [86] If a consent were to be issued, Fish and Game requests that conditions regarding the following be imposed:
- a. a 10 year term of consent;

¹⁶ Maw, P., & Daysh, S. (2019). *Consents Function Review: A report prepared for the Otago Regional*. Dunedin: Otago Regional Council.

- b. the allocation is reduced to a level which will avoid further over-allocation and be split into reasonable supplementary allocation blocks where relevant;
- c. allocations are set individually for each of the 4 takes;
- d. the following residual flows be imposed:
 - i. LMS Alice burn: at least 46L/s;
 - ii. LMS Alice burn tributary: visual flow to confluence with Alice burn main stem;
 - iii. LIC Alice burn: visual flow to the confluence with the Luggate; and
 - iv. LIC Luggate: visual flow to the confluence with the Alice burn;
- e. all takes be subject to the Luggate minimum flow for winter and summer;
- f. the LIC take on the Luggate main stem be screened;
- g. a non-lethal bywash structure, with associated screen immediately after the point of bywash, so that spawning fish and juveniles could be returned to the Alice burn or Luggate main stem;
- h. bywashing is restricted to that required to operate the fish screens and provide adequate habitat for trout in the race.

Appendix 1 – Proposed fish screen condition for the LIC take on the Luggate mainstem

Fish screen provisions

- a. The intakes must be screened so as to minimize harm to and prevent entrainment of salmonids and galaxiids 30mm or greater in length.
- b. The fish screen must be designed in accordance with Appendix 2 of this consent.
- c. Before installation of any fish screen, the consent holder must submit a report to the Consent Authority containing the design plans and specifications for the screen and its installation and the operation and maintenance plan for the screen, together with a letter from a person experienced in freshwater ecology and fish screening techniques certifying that the screen meets the requirements of clauses (a) and (b) of this condition.
- d. Within 12 months of fish screen installation a certificate must be provided to the Consent Authority, by a person with experience in freshwater ecology and fish screening techniques, to certify that the design plans and operation and maintenance plan for the fish screen meet the performance criteria as specified in clauses (a) and (b) of this condition and that the fish screen has been installed in accordance with the details provided to the Consent Authority in accordance with clause (c) of this condition.
 - i. The intake structures and fish screens must be operated in accordance with the operation and maintenance plan established by clauses 4(c) and (d);
 - ii. Fish screens and intake structures must be regularly inspected and maintained in good working order at all times; and
 - iii. A record must be kept of all inspections and maintenance carried out and provided to the Consent Authority on request.

Consent note:

In conjunction with a number of stakeholder groups, good practice guidelines have been developed for fish screening ('Fish Screening: good practice guidelines for Canterbury' NIWA 2007). A copy of this report can be requested from Canterbury Regional Council or found at the following

[*Statutory managers of freshwater sports fish, game birds and their habitat*](#)

Otago Fish & Game Council

Cnr Harrow & Hanover Sts, PO Box 76, Dunedin, New Zealand. P: (03) 477 9076 E: otago@fishandgame.org.nz

www.fishandgame.org.nz

link: <http://www.doc.govt.nz/Documents/conservation/native-animals/Fish/fish-passage/fish-screen-guidelines.pdf> to help in ensuring fish screens are designed, installed and operated to include the features identified in Appendix 2.

Appendix 2: Design of Fish Screens

The fish screen must be designed with the following features:

- a. The site is located as close to the river source as possible to minimise exposure of fish to the fish screen structure, and minimise the length of stream affected while providing the best possible conditions for (b) - (e) below;
- b. The approach velocity is slow enough (generally less than 0.12 m/s) to allow fish to escape entrainment (being sucked through or washed over the screen) or impingement (being squashed or rubbed against the screen).
- c. Water velocity across (or past) the screen ("sweep velocity") is greater than the approach velocity (b) and is sufficient to sweep the fish past the intake;
- d. An effective bypass system is provided that is easily accessible to entrained fish, and fish are taken away from the intake and back into the source channel, or into water which provides the fish with unimpeded passage back into the source channel;
- e. Screening material (mesh, profile bars or other) on the screen needs to have a smooth surface and openings that prevent any damage to fish coming into contact with the screening material; and
- f. For the purposes of measurement and compliance, the approach velocity is considered to be the velocity present three inches [7.62cm] in front of, and perpendicular to the screen face.



SPORTS FISH AND GAME MANAGEMENT PLAN FOR
OTAGO FISH AND GAME REGION 2015-2025

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“in the interests of anglers and hunters”

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PART I BACKGROUND AND RESOURCE SUMMARY

1. How To Use This Plan

The Sports Fish and Game Management Plan for Otago Fish and Game Region ('the plan') provides a framework for the management of Otago's sports fish and game bird resources. The plan has a ten year horizon and is both strategic, in outlining issues and providing long term organisational outcomes, and operational in outlining management objectives and policies..

Part I provides background information on the plan and explains the role and responsibilities of Otago Fish and Game Council ('the Council'). The Council is one of twelve Fish & Game Councils (FGCs) established under the Conservation Act 1987 for the management of sports fish and game resources within defined regions. A thirteenth council, the New Zealand Fish and Game Council (NZFGC), coordinates the twelve FGCs and provides national advocacy.

Part II of the plan is divided into sections based largely on the functional areas currently used for FGC annual planning and reporting. This part of the plan lists the issues identified through the plan development process and the policy responses to them.

1.1 Operation of Plan

This plan was made operative on 18/05/2015 and will remain in effect until such time as it is reviewed, which should be not later than 10 years from the date of its approval.

1.2 Plan Review

The plan will be reviewed in ten years from the date of its approval by the Minister of Conservation unless it requires amendment sooner. Plan reviews are provided for under Section 17M of the Conservation Act 1987.

2. Introduction

This plan is prepared in accordance with section 17L of the Conservation Act 1987 (the Act) which requires the Council in its plan preparation:

- To have regard to the sustainability of sports fish and game birds in the area to which the plan relates; and
- To have regard to the impact that the management proposed in the plan is likely to have on other natural resources and other users of the habitat concerned; and
- To include such provisions as may be necessary to maximise the recreational opportunities for anglers and hunters.

In attaining these objectives, to be cognisant of the wider social and economic space in which outdoor recreation sits.

The procedure for the preparation of the plan is set out in Section 17M of the Act. The legal status of the Council and the context within which it operates is described below:

2.1 Conservation Act 1987

The Council is established under section 26P of the Conservation Act 1987 as a body corporate. Its functions are detailed in Section 26Q of the Act.

The general function of the Council is to... 'manage, maintain and enhance the sports fish and game resource in the recreational interests of anglers and hunters. Particular functions include :

- assess and monitor sports fish and game populations.
- assess and monitor angler and hunter success and satisfaction.
- assess and monitor the condition and trend of ecosystems as habitats for sports fish and game.
- maintain and improve access to sports fish and game resources.
- maintain and improve hatchery breeding programmes for restocking fish and game habitats where necessary
- provide information on sports fish and game and promote angling and hunting.
- ensure compliance with angling and hunting conditions and promote ethical standards
- represent the interests and aspirations of anglers and hunters in statutory planning processes, including advocating for their interests in habitats.
- implement Fish and Game national policies

The Council's responsibilities for management of fish and game resources cover the whole of the Otago Fish and Game Region (refer Appendix 2, Map of Otago Region), and are not limited to public conservation lands and waters.

Regulations can be made under sections 48 and 48A of the Conservation Act which relate to fish and game management. Current regulations include the Fish and Game Council Elections Regulations 1990.

The Freshwater Fisheries Regulations 1983 are made under the Fisheries Act 1983, but apply mainly to the Conservation Act 1987. Broadly they cover sports fish and licencing, protecting of marked fish, canning, storage and smoking of fish, ensuring that fish passage is maintained, the use of electric fishing machines, and the management and authorisation of fishing competitions. Schedule 1 of the Regulations lists the species of fish in New Zealand waters legally declared to be sports fish, and thus governed by Fish and Game Councils (Appendix 1.).

In addition, section 26ZL of the Act enables the Director General of Conservation, at the request of the Council, to declare restrictions on fishing including conditions controlling entry to specified waters and prohibiting fishing by notice in newspapers circulating in the area concerned.

The Council is composed of twelve councillors elected from whole season fishing and hunting licenceholders in triennial elections conducted by postal ballot. The Council appoints one of its members to the NZFGC.

The NZFGC's primary role is to represent nationally the interests of anglers and hunters and co-ordinate the activities of the regional FGCs. Supporting functions are to:

- develop national policies for the carrying out of its functions for sports fish and game in consultation with regional Fish and Game Councils
- advise the Minister of Conservation on issues relating to sports fish and game.
- participate in the development of research programmes for the management of sports fish and game.
- advocate in the interests of sports fish and game management.
- report to Fish and Game Councils on issues affecting sports fish and game management.
- co-ordinate the production of the annual Angler's Notice and Game Gazette
- advise the Minister of Conservation on sports fish and game licences and their fees having regard to the recommendations of with Fish and Game Councils.

There are 12 defined Fish and Game Regions in New Zealand. Their boundaries are described in the New Zealand Gazette (NZ Government, 1990). The 12 regional Fish and Game Councils and the New Zealand Council operate collectively under the brand name Fish & Game New Zealand. The 13 Councils are independent public entities and funds are redistributed between Councils to meet national and regional needs by way of a levy and grant system. Fish and Game funding is derived almost exclusively from licence sales, and the use of that funding and the role carried out by Councils across the country has a substantial benefit to the wider public beyond anglers and hunters.

The relationship of the plan to other Conservation Act policies and plans is defined in Section 17L of the Act. These provisions require that nothing in any sports fish and game management plan 'shall derogate' from any provisions of the Act or any other Act, any policy approved under the Act or any other Act, any Department of Conservation (DOC) conservation management strategy, conservation management plan, or freshwater fisheries management plan. DOC plans must 'have regard' to existing sports fish and game management plans.

Section 4 of the Conservation Act 1987 governs the Council's relationship with Ngai Tahu. It is discussed below in 4.1 'Relationship with Ngai Tahu.'

The Act also defines "freshwater" in section 2 as extending 500 metres offshore from the low tide mouth of any stream or river, which effectively means that Council's jurisdiction for sports fish extends 500 metres offshore in those locations.

2.2 Wildlife Act 1953

The Wildlife Act 1953 includes provisions relating to game bird management which:

- enable the Minister of Conservation to declare open seasons for game and the conditions controlling the taking of game.
- allow the Director-General of the Department of Conservation to authorise the Council to take game for certain purposes.
- describe the powers of rangers.
- define wildlife species declared to be 'game' in the First Schedule to the Act and thus governed by Fish and Game Councils (Appendix 1)

In addition, the Act allows for the making of regulations including the Wildlife Regulations 1955.

3. Wider Legal Context

Management of sports fish and game bird resources occurs within a legal context defined by a number of key statutes described below:

3.1 Resource Management Act 1991

The Resource Management Act 1991 (the RMA) is the primary statute in New Zealand for resource management and planning. It places a strong emphasis on matters relevant to the habitat protection and access functions of Fish and Game Councils. It also provides linkages between statutory plans and opportunities for FGCs to have input into resource planning across regional and territorial local authorities.

Section 5 of the RMA describes the purpose of the RMA as being to promote the sustainable management of natural and physical resources. It defines sustainable management in a qualified way that requires the safeguarding of the life supporting capacity of ecosystems and the management of adverse effects on the environment where resource use occurs.

Section 6 outlines 'Matters of National Importance', requiring persons exercising powers and functions under the RMA to recognise and provide for priority matters. Those relevant to fish and game management are as follows:

- a) The preservation of the natural character of the coastal environment (including the coastal marine area), wetlands, and lakes and rivers and their margins, and the protection of them from inappropriate subdivision, use, and development:
- b) The protection of outstanding natural features and landscapes from inappropriate subdivision, use, and development:
- c) The protection of areas of significant vegetation and significant habitats of indigenous fauna:
- d) The maintenance and enhancement of public access to and along the coastal marine areas, lakes, and rivers.

Section 7, 'Other Matters' list other priority matters. Those of relevance to sports fish and game management objectives are:

- (c) The maintenance and enhancement of amenity values:
- (d) Intrinsic values of ecosystems:
- (f) Maintenance and enhancement of the quality of the environment:
- (h) The protection of the habitat of trout and salmon.

Other elements of Part II of the RMA relate to the priority placed by the Act on Maori cultural matters in sections 6(e), 7(a) and 8.

Sports Fish and Game Management Plans are linked to regional and district council policy and plan development through sections 61, 66, and 74 of the RMA. These sections require regional and

district councils to 'have regard' to management plans and strategies prepared under other Acts in the preparation of policy statements and plans.

Other RMA provisions include Part 9 water conservation order application procedures which may be used where outstanding amenity or intrinsic values are present in waterways.

3.2 Biosecurity Act 1993

The Biosecurity Act includes provisions on the humanitarian treatment of animals and the control of pests which can impact on Council's management activities. It also controls the introduction of new species into New Zealand.

3.3 Local Government Act 1974

Navigational Safety Bylaws are developed by territorial local authorities under the provisions of the Local Government Act 1974. These regulations control recreational boating and allow the setting of speed limits on inland waterways.

Part 21 of the Local Government Act 1974 described local authority responsibilities for the maintenance and accessibility of local roads along waterways, including unformed legal road. Section 342 and Schedule 10 cover the temporary closure of public roads and the procedure for the legal stopping of a road.

3.4 Crown Pastoral Land Act 1998

The Crown Pastoral Land Act establishes procedures for changing the tenure of Crown pastoral lease lands in the South Island high country.

3.5 National Parks Act 1980

National Parks are managed in accordance with the National Parks Act 1980. Mt Aspiring National Park is an important park in Otago for conservation and recreation and contains a number of important trout fisheries.

3.6 Reserves Act 1977

The Reserves Act is the statute under which much of the Crown's wetland reserve land is managed. The Council is able to be appointed to carry out day to day control and management of reserves, particularly Government Purpose Reserves for Wildlife Management.

The Council has been declared to be a local authority under section 2 of the Act to enable it to exercise the powers and functions of a local authority under this Act (NZ Government, 2001). Also, the Council is recognised as a covenanting body under this Act.

3.7 Local Government Official Information and Meetings Act 1987

The Council is subject to the Local Government Official Information and Meetings Act 1987. Council meetings are open to the public and must be advertised. All business must be transacted in open meeting unless it meets criteria defined in the Act.

3.8 Ngai Tahu Claims Settlement Act 1998

The Act appoints Te Runanga o Ngai Tahu (TRONT) as a statutory advisor to the Council. TRONT may provide advice on the harvest of native game birds and the preparation of those parts of sports fish and game management plans which relate to native game birds. The Council must have particular regard to that advice.

Native game birds are defined in the Act as:

- Maunu/Parera or Grey Duck
- Pakura/Pukeko or Pukeko
- Putakitaki or Paradise Shelduck
- Tete or Shoveller.

The Act also details waters within Otago Fish and Game Region with which Ngai Tahu has cultural associations. These associations are formalised in the Act by “Statutory Acknowledgements” or “Deeds of Recognition” when they relate to public conservation land. The waters concerned are:

- Kuramea or Catlins Lake
- Lake Hawea
- Lake Wanaka
- Mata-au or Clutha River
- Pomahaka River
- TeTauraka Poti or Merton Tidal Arm
- Te Wairere or Lake Dunstan
- Whakatipu-wai-Maori or Lake Wakatipu

3.9 Public Finance Act 1989

The Council is subject to the provisions of the Public Finance Act 1989. It is audited annually by the auditors appointed by the Office of the Auditor General and must produce an annual report including a statement of objectives and a comparative statement of service performance. The report must be presented to a publicly advertised annual general meeting and to Parliament. The Council is a Public Entity in terms of the Act.

3.10 Walking Access Act 2008

The Walking Access Act 2008 established the New Zealand Walking Access Commission, which has the objectives of providing the New Zealand public with “free, certain, enduring, and practical walking access to the outdoors”. Specific responsibilities of the Commission include placing a priority on negotiating access over private land to parts of rivers and lakes where there is not already walking access, and to sports fish and game resources (s11, Walking Access Act, 2008). These responsibilities align closely with the responsibilities and roles of Fish and Game Councils for access under the Conservation Act 1987. As such, the Otago Fish and Game Council will work closely with the

Commission and its regional field advisors in identifying mutual priority areas for access that require focus and resourcing.

3.11 Public Works Act 1981

Section 45 of the Public Works Act 1981 allows local authorities to lease or license any land held for a road, including adjacent unformed legal road, to adjacent landowners for activities such as grazing.

3.10 Relationship with Ngai Tahu

Ngai Tahu is the iwi with manawhenua for the Otago rohe (region). Ngai Tahu has established a tribal structure -Te Runanga O Ngai Tahu (TRONT) which is made up of eighteen Papatipu Rununga. Each runanga has a defined takiwa (area). The runanga and whanau with influence in the Otago Fish and game region are:

- Te Runanga o Otakou
- Te Runaka o Hukanui
- South Otago Runanga
- Kati Huirapa Runanga Ki Puketeraki
- Te Whanau o Otokia
- Moturata Taieri Whanau
- Te Runanga o Moeraki.

Collectively, the papatipu runanga for Otago are referred to as Kai Tahu ki Otago. Kāi Tahu ki Otago has established a natural resource management consultancy; Kāi Tahu ki Otago Ltd. Kāi Tahu ki Otago Ltd facilitates consultation with Kāi Tahu ki Otago on environmental matters within Otago.

Section 4 of the Conservation Act 1987 states that: ‘this Act shall be so interpreted and administered as to give effect to the principles of the Treaty of Waitangi’. This is the strongest Treaty clause within New Zealand law, and contrasts to that of the Resource Management Act which requires decision-makers to “take into account the principles of the Treaty of Waitangi” (s8, RMA 1991) This places an obligation on FGCs to act, where appropriate, in accordance with Treaty principles and to decide how they are to be weighed in any particular management situation. Any decision, however, must always be consistent with the Council’s other statutory requirements.

In addition the 1997 Deed of Settlement between the Crown and Ngai Tahu and the subsequent Ngai Tahu Claims Settlement Act 1998 places further obligations on the Council, particularly in respect of native game birds.

The principles of the Treaty of Waitangi are evolving concepts arising from court decisions, most notably found in *NZ Maori Council v Attorney General* (1987).

These principles are listed in the Kai Tahu ki Otago Natural Resource Management Plan 2005 (NRMP) as:

- The principle of the Government’s right to govern
- The principle of tribal rangatiratanga/self regulation
- The principle of partnership
- The principle of active participation in decision-making
- The principle of active protection
- The principle of redress for past grievances.

Those of particular importance for the Council in its dealings with Ngai Tahu are:

To act in good faith (principle of partnership)

This is based on the present legal interpretation of the Treaty of Waitangi that suggests the Crown

and its agents and Maori are obliged to act towards each other 'reasonably and with the utmost good faith'. This includes an interest in each others' well-being and welfare.

To consult (principle of active participation in decision-making)

Consultation between the Council and Ngai Tahu, represented in Otago by Kai Tahu ki Otago should occur on matters of potential common interest. These may include matters arising from the Ngai Tahu Deed of Settlement. Consultation is itself legally defined through precedents set through decisions of the Court. The procedure for the preparation of sports fish and game management plans requires the Council to give notice of any draft plan to Ngai Tahu. Issues and objectives for the Council's relationship with Ngai Tahu are included in this plan.

Otago Fish and Game will seek comment from the relevant rūnanga or whānau rōpū, preferably through Kai Tahu Ki Otago, when any action or policy may have a potential impact on native biodiversity, including habitat, distribution of populations, and spawning areas.

The NRMP expresses Kāi Tahu ki Otago values, knowledge and perspectives on natural resource and environmental management issues. The NRMP provides a framework for consultation with Kāi Tahu ki Otago" on resource management but is not considered a substitute for direct consultation. The NRMP is a 'relevant planning document recognised by an iwi authority' affected by a district or regional plans in terms of sections 66 and 74 of the RMA. The Council will use the NRMP as a reference source prior to undertaking consultation with local runanga and whanau where required.

The Council recognises the priority placed on Maori cultural values in Part II of the RMA:

- Section 6 - Matters of National Importance
(e) The relationship of Maori and their culture and traditions with their ancestral lands, water, sites, waahi tapu and other taonga
- Section 7 - Other Matters
(a) Kaitiakitanga
- Section 8 - Treaty of Waitangi

3.11 Relationship with the Department of Conservation (DOC)

The Council's relationship with DOC is one of liaison between two agencies with responsibilities under the Conservation Act 1987. There is some overlap in functions due to section 6 (ab) of the Conservation Act which gives DOC the task of preserving so far as is practical "all indigenous freshwater fisheries and protect[ing] recreational freshwater fisheries and freshwater fish habitats". This includes freshwater sports fisheries and habitats. While DOC is active in the fisheries/freshwater habitat conservation area, the relationship is complementary where water resource allocation, planning, and aquatic habitat issues are concerned. Otago Fish and Game's responsibilities under s26 of the Act fit well with the Department of Conservation's powers to advocate for the conservation of natural and historic resources under s6(b) of the Act.

The Director General of the Department of Conservation or his nominee is entitled to attend and speak at Council meetings.

A Memorandum of Understanding (MoU) has been developed and adopted at a national level by DOC and the NZFGC to guide the working relationship of the two organisations and an MoU is being developed between DOC and the Otago Fish and Game Council.

3.12 Relationship with the Otago Regional Council

The Council's relationship with the Otago Regional Council (ORC) is multi-faceted. The Otago Fish and Game Council is a statutory agency, landowner, ratepayer, and often an affected party on resource consents and planning processes under the Resource Management Act 1991. The ORC have significant influence over sports fish and gamebird habitat through their river management functions, the establishment of regional policies and plans for water resources, and their decision-making role on resource consent applications. ORC functions and activities are of critical importance to the Council and so engagement with them is frequent and at all levels.

Freshwater ecosystems and fish and game resources only really have 'security of tenure' through RMA legislation, policy and plans. The Otago Fish and Game Council, manages sports fish and gamebird species, whilst the Otago Regional Council (for the most part) is the primary manager and regulator of their habitat.

3.13 Relationship with territorial local authorities

There are five territorial local authorities (TLAs) in the Otago Fish and Game Region. These are:

- The Dunedin City Council
- The Waitaki District Council (part of District)
- The Central Otago District Council
- The Clutha District Council
- The Queenstown Lakes District Council.

Council's primary relationship with the TLAs is through official processes under the Resource Management Act 1991 and the Local Government Acts 1974 and 2002.

3.14 Relationship with the New Zealand Walking Access Commission

The relationship between the Otago Fish and Game Council and the New Zealand Walking Access Commission and its field advisors is important as both organisations have a statutory responsibility for maintaining and improving access for outdoor recreation.

4 Resource Summary

The sports fish and game bird resources of Otago provide a spectrum of recreational opportunity for anglers and hunters from within the region, from elsewhere in New Zealand and from overseas. Sports fisheries and game bird populations represent a significant natural, self-sustaining resource of benefit to the regional community both in providing recreational amenity and from the economic activity arising from angling and hunting.

4.1 Otago Fish and Game Region

The Otago Fish and Game Region is some 32,000 square kilometres in area. It extends from Shag Point, on the east coast of the South Island, south to The Brothers Point in the Catlins area. The region runs inland to include the whole of both the Taieri and Clutha River catchments as well as a number of smaller coastal river catchments such as the Catlins, Tokomariro, Waikouaiti and Shag (Appendix 2.)

The Southern Lakes area is mountainous and dominated by three large glacial lakes: Wakatipu, Wanaka and Hawea. Their tributary rivers, draining relatively unmodified mountain catchments, support important backcountry fisheries.

Central Otago is both rugged and relatively arid. Many rivers in the area are adversely affected by abstraction for irrigation due to the historical deemed permit system of allocation and there are numerous reservoirs constructed for both irrigation storage and hydro electricity generation. As the original permitting system of mining rights or “deemed permits” for abstraction from these rivers is set to expire in 2021, most users in these Central Otago catchments will require resource consents if they are to continue to irrigate. The process for obtaining resource consents thus offers the best opportunity in over one hundred years to improve the instream environment of these rivers through better allocation. Water storage at times of high flow also offers an opportunity to reduce the pressure on rivers during times of low flow, however the natural character of rivers is heavily influenced by high flow events and it is most sustainable to only allocate a portion of flood or fresh flows for irrigation.

Coastal Otago is relatively wet and is dominated by the lower reaches of major rivers (the Clutha and the Taieri) and large lowland wetlands such as Lakes Waihola, Waipori and Tuakitoto and estuaries such as Kaikorai, Waikouaiti and Catlins. This part of the region supports the main habitat for mallard ducks.

South and West Otago are dominated by the catchments of the Pomahaka and Waipahi rivers, and their tributaries. These have traditionally been high valued for their brown trout fishery, with the Pomahaka River in recent times becoming known for its salmon run. Whilst the lowland country in these areas is intensively farmed, the hill country is either extensively farmed or in exotic forestry. Upland wetlands are a major feature of the Waipahi and Catlins catchments in particular. The wet soils and mole and tile drains that predominate in this part of Otago are problematic for nutrient leaching into rivers.

Many lowland rivers in Otago have suffered a marked deterioration in water quality resulting primarily from the effects of more intensive use of agricultural land, and as a result, the sports fisheries in these catchments are in decline. The primary contaminants are sediment, E-coli, phosphorus and nitrogen. Particular rivers of concern include the Shag, Taieri, Tokomairiro, Lower Clutha valley tributaries, the Waiwera, the Pomahaka catchment below Glenken, the Catlins River,

and the Manuherikia. Steps that should be taken to remedy this ongoing problem include the fencing off of waterways from intensive farmland, meeting on property nitrogen load limits and nutrient concentration limits as specified in the Otago Regional Water Plan, as well as the sensible design of agricultural systems based on the carrying capacity of the land and the catchment's receiving environment.

There are many opportunities available for profitable farming systems that reduce leaching, but these require sensible design and in some cases, capital investment. Scientific understanding of the issue will advance as well. The significance of the problem of deteriorating water quality is that good work in reducing leaching can be undone by others, which requires that system improvements must occur across all properties and in all catchments.

4.2 Sports Fish Populations

Sports fisheries in Otago are based on brown and rainbow trout, chinook salmon, brook char and perch.

Brown Trout (Salmo trutta)

Brown trout are the most widely distributed sports fish species in Otago, occurring in most rivers, streams and lakes. They were first introduced in 1864 and rapidly established wild self sustaining populations through a vigorous programme of hatchery liberations. They are an important component in the mixed species river and lake fisheries in Central Otago and Southern Lakes.

As well as river and lake resident brown trout there are migratory or sea-run populations in coastal rivers, notably the Shag, Waikouaiti, Leith, Taieri, Clutha and Pomahaka. Sea-run trout move from the ocean into rivers and move upstream to spawn. The eggs, buried in riverbed gravels, develop and hatch and the juvenile trout migrate downstream to take up residence in the sea where they grow to maturity. There is a need to further understand the behaviour and lifecycle of sea-run trout and to look to how the resource could be enhanced. Internationally, sea-run fisheries are sought after and are of substantial value to anglers.

Brown trout populations have declined in abundance as waterways have been modified, particularly in coastal waterways, through the combined impacts of river channel modification, point source and non-point source pollution and water abstraction. Lowland lakes, such as Lake Waipori have also shown a marked deterioration in fishery quality over time, most probably caused by accelerated enrichment and infilling by silt. The Lower Taieri River has improved since most point source discharges from wastewater treatment plants have been removed but nitrogen and phosphorus discharges from agricultural land remain an issue.

Fisheries in the mid Clutha have been adversely impacted by fluctuations in flow due to the operation of the Roxburgh hydroelectric dam although the extent of fluctuating flows has been moderated with the renewal of the resource consents to operate the hydroelectric scheme. The Lower Clutha fishery and river remains in good health. In the Maniototo reach of the upper Taieri the trophy trout fishery has diminished as a consequence of river channel modification.

Irrigation and water storage projects support valued brown trout fisheries which have established in Fraser, Poolburn, Manorburn, Falls and Loganburn reservoirs and in Lakes Dunstan, Mahinerangi and Onslow.

Rainbow trout (Oncorhynchus mykiss)

Rainbow trout have a more restricted distribution than brown trout with fisheries primarily centred on Lakes Wakatipu, Wanaka, Hawea and the recently constructed Lake Dunstan and their tributary rivers and in Falls Dam reservoir. There are discrete populations in Manorburn reservoir and a declining population in Lake Mahinerangi. They also occur in Tomahawk Lagoon, Dunedin City reservoirs and smaller reservoirs in the Maniototo and Manuherikia areas as a result of hatchery restocking.

The premier rainbow trout fisheries in Otago are the lake tributaries such as the Hunter, Greenstone, Caples, Lochy, and Young Rivers and Dingle Burn. These backcountry fisheries require a backcountry licence endorsement on a fishing license, and the Greenstone also has a controlled fishery operating in January and February of each year, to ensure that fishery quality is maintained and the high demand for its angling opportunities is allocated fairly amongst anglers.

Chinook Salmon (Oncorhynchus tshawytscha)

Chinook salmon were successfully introduced into Otago shortly after the turn of the century and established a significant wild run in the Clutha catchment with mature adults making their way upstream from the sea to major lake tributaries such as the Hunter and Matukituki Rivers to spawn. The historic annual run was estimated at between 20-30,000 returning fish by Jellyman (1989). One estimate of the peak run is as high as 50,000 (James and Dungey 2000)

The completion of the Roxburgh Hydro Dam in 1956 effectively stopped upstream salmon migration and the run rapidly diminished to a small percentage of its former size. Fish ladders were considered by the New Zealand Electricity Department at the time of planning for the dam, but were ruled out due to cost and practicality. The 1951-1952 report of the Otago Acclimatisation Society reports "some dams are so high that no scheme is possible, and the cost would cost about £50,000 per dam for a possible solution: and, pretty bluntly, that no Government would spent such an amount of money"¹

However, as a result of Contact Energy's new resource consents to operate their hydroelectric generation assets on the Clutha River, the company is required to undertake a programme of fishery impact mitigation in the Lower Clutha River (defined as the river below the Roxburgh Dam). This includes the objective of restoring a run of 5000 returning adult salmon to the lower river.

Salmon are caught over the full length of the Lower Clutha River from Roxburgh dam to the sea and in some tributaries. The residual run of salmon upriver from the sea has been recently estimated to be less than 500 fish per annum, many of which are caught by anglers immediately below the dam wall. Some salmon spawn in the river downstream of the dam but the significance of this spawning to the maintenance of the run is uncertain because of the damaging impacts of fluctuating flows from the power station and discharges of silt from the Roxburgh Dam reservoir.

Land-locked populations of salmon occur in Lakes Wanaka, Hawea and Wakatipu where they form an important component of the anglers catch. Although the size is relatively small these fish are readily caught. They spawn and rear in tributary streams such as Diamond Creek at the head of Lake Wakatipu but their spawning areas are not well defined.

¹ Annual Report of the Otago Acclimatisation Society, 1951-1952, pg 19.

There is an annual seaward migration of salmon from these three lakes, particularly Lake Hawea. These fish move into the Clutha River and downstream through Lakes Dunstan and Roxburgh where they provide a seasonal angling opportunity. Some manage to pass both Clyde and Roxburgh Dams on their passage to the sea and are so contribute to the returning sea run. There is a strong need to further understand the behaviour of landlocked salmon, their lifecycle, and the contribution that they make to downstream populations.

Minor runs of salmon also occur in the Leith Stream and the Taieri River. Upstream migration of salmon and trout in the Leith is restricted by channelised reaches and concrete flumes above the University, but recent works have alleviated problems in most places.

There is an historical run of salmon in the Taieri dating back many years. This run was been the subject of an NZ Salmon Anglers Association enhancement project in the late 1990s . The Council contributed to the project with financial grants, technical advice and field support.

Commercial ocean ranching of salmon was undertaken at Careys Creek north of Dunedin, at Kaitangata, and at Newhaven, near Owaka during the 1980's and early 1990's. While none of these operations proved commercially viable, all three provided additional salmon angling opportunities through salmon runs enhanced by smolt releases

The NZ Salmon Anglers Association currently operates a put and take salmon fishery in Otago Harbour but this is independent of the Council's management activities because the harbour lies outside the Otago Fish and Game Region. The Council has permitted smolt releases into Leith Stream as part of the NZSAA harbour salmon fishery enhancement programme.

Brook Char (Salvelinus fontinalis)

Brook char were introduced into Otago in the late 19th and early 20th century. Wild populations have established themselves in headwater tributary streams, particularly the Manuherikia and Nevis rivers but they offer little angling opportunity because of their small size. Their restricted distribution is due to competition with brown trout.

One discrete fishable population occurs in Munro's Dam near Lake Mahinerangi, adding to the diversity of angling within the region. The species offers opportunities for put-and-take fisheries where there is no potential conflict with native species.

Perch (Perca fluviatilis)

Perch commonly occur in lowland coastal waters such as Lakes Waipori, Waihola, Tuakitoto, and the Taieri and Clutha Rivers. Notable populations are found also in Lake Hayes and Lake Mahinerangi. Perch are underrated as a sports fish but have an enthusiastic following amongst some anglers. Little is known about perch population trends, and work may need to be undertaken to better understand population dynamics.

4.3 Game Bird Populations

The game bird resource in Otago is comprised of five species of waterfowl, one rail, and three upland game species. All the upland game species and three waterfowl species have been introduced. Upland game species are essentially confined to the drier and semi arid scrub areas of Central Otago and to the east of the Southern Lakes area. This includes areas around Ettrick, Roxburgh, Alexandra, Clyde, Cromwell, Queenstown, St Bathans and Wanaka, Naseby and Patearoa. The best habitat is in the Alexandra, Cromwell and Tarras areas.

Mallard (Anas platyrhynchos)

Mallards were first introduced in Otago in 1869 from England and were widely liberated well into the 1900s. The species slowly established and was put on the game licence in 1919. In the 1940s mallards of North American origin were also liberated in Otago. Over the next 20 years mallard abundance increased and they are now by far the most common waterfowl species.

Mallards have hybridised widely with grey duck so much so that the mallard/grey duck population is best described as a mallard-grey hybrid complex (sometimes referred to as a 'greylard').

Mallards are especially common in agricultural areas with large wetlands, particularly along the coast. They inhabit rivers, natural wetlands, farm ponds, ditches and reservoirs. The species is only occasionally seen in remote hill country areas.

Populations regularly fluctuate dependant on the success of annual reproduction. A major population regulator is duckling survival. This tends to be strongly influenced by the abundance and quality of habitat for females and brood rearing habitat which has been shown to be linked to winter and spring rainfall. Mallards comprise the majority (at about 75% of the waterfowl harvested).

Black Swan (Cygnus atratus)

Black swan were introduced into Otago in the 1860s and were liberated at several locations in the district. The species established well and hunting commenced in 1932. There is some evidence that black swan also reached New Zealand from Australia by themselves in the 1860s (Williams,1981).

Birds from Otago and Southland may be a single population unit with annual movements between regions for moulting and breeding. The Otago/Southland population is relatively static but has declined slightly since 2000 to around 5000. Coastal wetlands and estuaries are the major habitats as well as the upper Taieri Wetlands. There is also a population of black swans on Lake Dunstan. The annual harvest is about 1% of the total waterfowl harvest.

Grey Duck (Anas s. superciliosa)

Grey ducks in Otago have been steadily declining throughout the region due to habitat loss and hybridisation with mallards. Recent research increasingly supports the view that mallards and greys are part of a common hybrid population. The annual harvest reported by hunters is less than 2% of the total annual waterfowl harvest. Grey duck are defined as native game birds in the Ngai Tahu Claims Settlement Act 1998.

Paradise Shelduck (Tadorna variegata)

Paradise shelduck are an endemic species that were common prior to European settlement but have also adapted well to an agricultural environment. Farm development has provided improved feeding opportunities with new pasture and increased brood rearing areas with construction of stock water ponds. Hunter harvest is also increasing with annual harvest estimated at about 20% of the total annual waterfowl harvest. Paradise shelduck are defined as native game birds in the Ngai Tahu Claims Settlement Act 1998.

Otago Fish and Game conduct annual paradise shelduck surveys to ascertain numbers and maintain knowledge of trends in their population. The population has ranged between 15,000 and 21,000 over the last 15 years.

Australasian Shoveler (Anas rhynchotis)

This native spoonbilled species is common in fertile lowland wetlands however numbers may have declined from historical times due to wetland drainage. The annual harvest rate is variable with harvest representing between 2.0% and 5.0% of the total annual waterfowl harvest. Shoveler are defined as native game birds in the Ngai Tahu Claims Settlement Act 1998.

Pukeko (Porphyrio melanotis)

Pukeko are a rail species which were once numerous in coastal areas and in some inland locations with wetland habitat. Their numbers are thought to have declined due to land development. Today Pukeko are still present through most of the coastal part of the region and in South and West Otago in lowland swamps and wetland areas and rough agricultural land that has suitable cover. The Otago hunting season for pukeko is presently closed because of concern about low numbers but the population has remained relatively low despite a lack of harvest. Pukeko are defined as native game birds in the Ngai Tahu Claims Settlement Act 1998

California quail (Lophortyx californicus)

California quail were first introduced to Otago in 1868 and there were numerous releases throughout the region over the next few decades until the early 1940s. They peaked in abundance in Central Otago during the 1930s and 40s. Since that time numbers have declined. Today the species is still common throughout Central Otago and in the Strath Taieri and Shag Valleys.

The annual harvest of California quail varies widely depending on breeding success but is commonly about 1% of game harvested.

Chukar (Alectoris chukar)

Chukar partridge were first released in Central Otago in 1920 and the species spread widely throughout the Central Otago and Lakes districts hill country where they were liberated. The population peaked in the 1940s and began to decline noticeably after that. This is perceived to be associated with the commencement of widespread aerial rabbit poisoning, oversowing and topdressing in their high country habitat. Chukar are now scarce with only small coveys remaining at higher altitude. The reported annual harvest of chukar has been negligible for a number of years, but it is expected that a small unreported harvest still occurs.

Pheasant (Phasianus colchicus)

The first pheasants were liberated in Otago in 1865. Liberations continued on a small but widespread scale until the mid 1940s. The birds initially established but soon declined and in spite of continued attempts wild pheasant populations did not establish successfully. In 1947 a change in emphasis saw large numbers of pheasants reared and released specifically for the gun. While popular, the releases ceased in the mid 1970s as the activity was not considered cost-effective. Today there are still a few residual wild pheasants in Otago but no hunting of any significance. Some landholders rear and release pheasants as a hobby activity and several commercial game bird hunting preserves have operated on private land in Otago using artificially reared pheasants released for the gun. At present only two preserves are operational.

Other Species of Interest to Hunters

Whilst the Canada goose (*Branta canadensis*) is no longer listed as a gamebird on Schedule 1 of the Wildlife Act 1953, it is still valued as a game bird by many hunters and recreational hunting can assist in population control.

Grey teal (*Anas gracilis*) are presently listed as absolutely protected wildlife but they are common in Otago and there is interest in the prospect of re-designating them as 'game' on Schedule 1 of the Wildlife Act 1953.

4.4 Resource Use

At present Otago issues approximately 20,000 fishing licences and 4500 game licences annually. Trends in fishing licence sales for Otago show the following:

- (a) An increase in license sales
- (b) Rapid population growth in the Queenstown Lakes District
- (c) An increase in tourist and visitor fishing in the Queenstown Lakes District

Otago's population is currently 193,803 people, of whom 75% live in Dunedin and Mosgiel.

Angler effort has been estimated from the 2007 national angler survey (Unwin and Brown 2007). A new survey will be conducted in the 2014-2015 season. Total annual angler effort has been determined at 224,942 angler visits per annum within Otago. This shows a continued increase from 1994 when the National Angler Survey began, with 182,869 angler days counted. The results show angler use is concentrated on the major lakes (Wakatipu, Wanaka, Hawea and Dunstan), Central Otago reservoirs and some reaches of major rivers such as the Taieri and the Clutha. The stocked Dunedin reservoir fisheries such as the Southern Reservoir are also increasing in use. Lowland rain-

fed rivers, such as the Shag, Waikouaiti, Tokomariro, Lower Taieri, Pomahaka, and Waipahi have all registered a decline in use, most likely due to declining water and habitat quality.

The trends in angler use also show increasing pressure on backcountry fisheries (including Greenstone, Hunter, Caples, Lochy, Nevis, , Hunter, Upper Manuherikia, Young and Wilkin Rivers, Dingle Burn and Dunstan Creek) to the extent that the sustainability of the recreational opportunity afforded by these backcountry waters as remote backcountry or 'wilderness' fisheries remains a significant management consideration.

Seasonal movement of anglers from centres of population both within and outside Otago to the Lakes/Central Otago area results in high levels of use over peak holiday periods. The deterioration in the habitat quality of coastal waters close to Dunedin, Mosgiel and Balclutha appears to have resulted in declines in fishery values and use.

As a response to the angling interest within urban areas, put-and-take fisheries have been established in close proximity to population centres, with the most recent fishery being established at Lake Tewa near Queenstown. These waters are restocked on an annual basis with hatchery raised fish as they have little or no natural spawning and recruitment.

It should be stated that all user groups put pressure on a fishery – both recreational and guided anglers.

Game license sales have shown a steady increase over the past 10 years from 3514 full season licenses sold in 2003 to 4636 licenses sold in all categories in 2013.

Waterfowl hunting effort has been estimated through the annual game harvest survey at approximately 17,000 hunter visits per annum. Survey methods do not presently allow an assessment of hunting pressure by habitat area but much of the region's waterfowl hunting occurs in coastal Otago on large wetlands such as Lakes Waihola, Waipori and Tuakitoto and the lower reaches of major rivers. There is considerable hunting pressure on farm ponds over opening weekend throughout the region. Upland game hunting has a small but enthusiastic following in Central Otago.

4.5 Sports Fish and Game Resources in Otago

Sports fish and game resources is the overall term used to describe the combination of populations of sports fish and game bird species and the habitats that they live in. The sports fish and game bird habitats of Otago are listed in Appendix 4. Assessments of the significance of fish and game resources need to cover habitat values, fish and game population characteristics, and fishing and hunting amenity and attributes (usually managed within a recreational opportunity spectrum). Significance may change over time in light of things like increasing user participation, changes in the distribution of Otago's human population, changes in attitudes towards angling, hunting, and wild harvest, and changes in recreational settings or fish/game habitat values. Habitat values and settings may improve or deteriorate due to external impacts from resource use activities, such as the intensification of agriculture, hydroelectric development and adjacent subdivision.

The following components have been incorporated into this significance assessment:

- Existing published reports or articles.
- Recognition of the fishery or game bird resource in law (such as water conservation orders), regional plans, or other statutory documents

- Angler use, as reported in the 7-yearly national angler survey, conducted by NIWA on behalf of the New Zealand Fish and Game Council.
- The recreational opportunity spectrum for the fishery or game bird resource
- Surveyed angler perceptions of the attributes of the fishery, such as the 1979 and 2013 angler attribute surveys.
- Geographical location.
- Underlying land status and recreational opportunity setting of the resource.

Appendix 5 contains further detail about the methodology used to assess significance.

4.6 Angling and Hunting Recreational Opportunity Spectrum for Otago

To assist planning and management a recreational opportunity spectrum (ROS) has been developed for angling and hunting in Otago. This draws on ROS theory outlined in the Otago Conservation Management Strategy (2003) and recreation planning literature (e.g. Clark & Stankey, 1982, Taylor, P.C. DOC 1993, DOC 2003). The ROS recognises the diversity of recreational angling and hunting opportunities within the region and classifies them within a spectrum based on key characteristics, primarily recreational settings:

Key Characteristics:

a) **Settings** - the combination of social physical, biological and managerial conditions that give value to a place. Six setting attributes have been identified namely:

1. access into and within the area
2. other non-recreational resource uses and their compatibility
3. on-site management
4. social interaction (user density);
5. level of regimentation (regulations)
6. acceptable level of visitor impacts.

b) **Activities** – the specific things people do: fly fish, hunt upland game, troll from a boat etc. It is important to identify potential users, their expectations and the style of activity in which they participate.

c) **Experiences** - the combination of activities (chosen by users) and the settings (managed as far as possible) result in experiences including challenge, risk, solitude, and companionship.

A recreational opportunity is defined as... ‘a chance for a person to participate in a specific recreational activity in a specific setting in order to realise a predictable recreational experience’.

The Council’s long term aim is to maintain (or enhance) the range, quality and extent of angling and hunting opportunity in Otago to meet the preferences of individual users and provide the widest achievement of desired experiences. To achieve this aim the Council requires in some cases a better understanding of recreational user preferences and needs to actively manage settings for user experiences.

The following represents an opportunity spectrum based on five broad categories: Urban, Rural, Natural, Backcountry and Remote.

Urban

Setting is within or adjacent to urban area

Duration of activity is relatively short

Access is easy by road and travel is short

User encounter rates are relatively high

Water is man-made or highly modified

Fishery may be stocked

Experience is characterised by open space but within a built or modified environment.

Rural

Setting is rural and modified by farming activity

Duration of activity may be short or long

Access is relatively easy by road and duration of activity is commonly up to a day

User levels can be high and encounter rates are moderate

Fishable water area is extensive

Hunting opportunity for waterfowl is extensive.

Experience is characterised by feelings of being away from urban areas

Experience is associated with companionship or family recreation activities, such as swimming.

A variety of fishing methods are employed

Catch rates and size of fish are average.

Natural

Setting is not greatly modified and unmodified remnants are common

Duration of activity is usually longer and commonly over 4 hours

Access is easy by road, track or boat and travel distance is relatively long

Location is usually distant from centres of population

Use is commonly associated with camping, swimming, and the use of huts or holiday houses

User encounter rates are moderate

Water is little modified and catch rates/size of fish are average or better

Fishable water area is extensive

Game-bird hunting opportunity is less extensive but more diverse (including upland game)

Experience is characterised by scenic beauty and is commonly associated with family activities such as boating, picnicking, and walking.

Backcountry

Setting is largely unmodified natural landscape and human intrusion is limited

Duration of activity is usually longer and commonly over 4 hours

Access is by gravel road, walking track, boat or aircraft and travel distance is relatively long

Location is usually distant from centres of population

Use is commonly associated with camping, swimming, and the use of huts or holiday houses

User encounter rates are low

Water is little modified and catch rates/size of fish are average or better and can include trophy trout

Fishable water area is limited

Game-bird hunting opportunity is very limited

Experience is characterised by scenic beauty and feelings of solitude and is commonly associated with activities such as tramping and camping

Access methods can impact on the experience of others.

Remote

Setting is natural landscape with very little human intrusion

Duration of activity is usually long and involves more than a day

Access is by foot, aircraft or jet boat and travel distance is long

Location is remote from centres of population

Use is commonly associated with camping, tramping and hunting

User encounter rates are low

Water is clear and size of fish is larger than average

Fishable water area is limited and pressure sensitive

Experience is characterised by scenic beauty and feelings of peace and solitude

Access methods can impact on the experience of others.

4.7 Significance Grading

The following criteria have been considered in determining the significance of fish and game habitats, fisheries and hunting areas within Otago as outlined in Sections 5.6 and 5.7.

The significance of a fishery or game resource is not the same as the quality or value of that resource. For example a locally significant fishery can be high, medium or low quality or value depending on its condition, character or specific fishery characteristics or attributes.

A habitat, fishery or hunting population/area needs to meet one or more of the criteria to be graded as nationally regionally or locally significant.

4.7.1 Nationally significant

- Habitat, fishery or hunting area is recognised as outstanding in a Water Conservation Order; or of high significance in a decision from a public process or in a published technical report or statutory plan.
- Backcountry fishery in an area designated as an outstanding natural landscape in a district plan or within public conservation land and recognised as outstanding in national terms.
- Fishery sustaining 5,000 or more angler visits/year
- Hunting area sustaining more than 500 hunter visits per year
- Habitat, fishery or hunting area with more than one exceptional attributes as determined by formal angler or hunter surveys.
- Wetland habitat of 400 hectares in area or more.
- High level of use by international anglers
- High level of use by resident anglers from outside Otago
- Fishery or hunting area has significant attributes identified by survey or community consultation.
- Habitat that provides spawning, breeding, rearing areas for a nationally significant fishery or game habitat.
- Habitat that provides a migratory pathway or corridor for a nationally significant fishery or game habitat.

4.7.2 Regionally significant

- Habitat, fishery or hunting area is recognised as regionally important in a decision from a public process or in a published technical report or statutory plan.

- Backcountry fishery in an area designated as an outstanding natural landscape in a district plan or within public conservation land'
- Fishery sustaining between 2000-5000 angler visits per year
- Hunting area sustaining between 150 to 500 hunter visits per year
- Habitat, fishery or hunting area with at least one exceptional attribute as determined by formal angler or hunter surveys.
- Wetland habitat over 40 to 400 hectares in area
- Noticeable level of use by international anglers
- Noticeable level of use by resident anglers from outside Otago
- Degraded habitat with potential for restoration to meet one or more of the above criteria
- Fishery or hunting area has significant attributes identified by survey or community consultation.
- Habitats that provide spawning, breeding, rearing areas for a regionally significant fishery or game habitat
- Habitat that provides a migratory pathway or corridor for a regionally significant fishery or game habitat.

4.7.3 Locally significant

- Habitat, fishery or hunting area is recognised in surveys including NIWA National Anglers' Survey, in a decision from a public process or in a published technical report or statutory plan
- Fishery sustaining up to 2000 angler visits/year
- Hunting area sustaining up to 150 hunter visits per year
- Habitat fishery or hunting area that is close to a centre of population (within 45 minutes drive)
- Degraded habitat with potential for restoration to meet one or more of the above criteria
- Fishery or hunting area has significant attributes identified by survey or community consultation.
- Habitats that provide spawning, breeding, rearing areas for a locally significant fishery or game habitat
- Habitat that provides a migratory pathway or corridor for a locally significant fishery or game habitat.

4.7.4 Review of significance

Habitat significance may be reviewed or amended in the light of new information and any changes that results will be incorporated into the plan by way of section 17M (3) of the Conservation Act 1987.

PART II FISH AND GAME MANAGEMENT ISSUES AND POLICY RESPONSES

Part II of the plan is divided into sections based on the functional areas currently used for Council annual planning and reporting. It details the issues identified through the plan development process and the policy responses to them.

'Outcomes' describe the future aim or goal, in a way that allows one to envisage future possibilities, both positive and negative. These outcomes are standard within second generation conservation planning documents written under the Conservation Act 1987 and the Conservation General Policy 2005.

'Issues' identified under each section describe the current situations which require active management - the "Where are we?" of the planning process.

'Objectives' give weight to the outcomes, describing more succinctly "Where we want to go" in terms of the future or the desired result.

'Policies' have been developed which describe in more specific terms the course of action intended to achieve the desired result or "How we are going to get there". Milestones for all functional areas are then specified jointly at the end of the plan.

The plan will be implemented progressively by assigning staff resources and funds to specific projects within each annual plan. A timetable for implementation of key action is included in section 12.

5 Species Management

In almost all cases sports fish and game species within the region are based on wild self-sustaining populations.

The principle underlying harvest management is that a wild population will produce each year a surplus above that required to replace natural mortality. That surplus can be harvested on a sustainable basis where all other factors, such as water quality and quantity, are more or less stable. The difficulty lies in identifying the threshold between sustainable harvest and unsustainable harvest given both the elasticity and dynamics of any given population, and then reflecting this in angling and hunting regulations, given the difficulty in obtaining information about population trends. Regulations need to take a precautionary approach to avoid over harvest.

5.1 Outcome

Throughout Otago publicly owned and managed fish and game resources are thriving within natural habitats and areas. Wild fish and game resources maintain a population which produces sufficient numbers for a self-sustaining annual harvest in the long term. Brown and rainbow trout continue to provide the mainstay of fishing opportunity in Otago, but the salmon run on the Clutha and Pomahaka Rivers is now increasing towards 5000 returning adult fish due to Contact Energy's Lower Clutha River mitigation programme. Put and take fisheries continue to be stocked to the benefit of novice and urban anglers. Wild fish and game species are valued by the community for the recreational opportunity that they provide, for the potential to harvest them for food, and as part of Otago's natural heritage.

5.2 Issues

- 5.2.1 There is a statutory requirement to manage sports fish and game to ensure species and population sustainability. There is an ongoing need for information on sports fish and game populations dynamics and factors affecting their abundance, including harvest, as well as a precautionary approach to their management. Declines in water quality and quantity may also lead to declines in fish habitat value and fishery productivity. As such, there is a need to demonstrate a cautious management approach in light of any perceived decline in fisheries.
- 5.2.2 Sports fish and game management activities may impact on other resources or resource users and these external effects need to be carefully assessed. For example the extension of the range of sports fish into areas where unmodified populations of native fish occur may put native fish conservation values at risk. There are also opportunities for co-operation with other freshwater fisheries agencies over management initiatives. Also there are concerns amongst landholders that game birds can impact on crops and pasture in some circumstances.
- 5.2.3 There is a demand amongst anglers and hunters for a diverse range of recreational opportunities. There is also an interest in the extension of sports fish or game status to species currently occurring in Otago which have a high reproductive capacity (e.g. grey teal). Anglers are interested in the enhancement of existing seasonal salmon runs in Otago, particularly in the Lower Clutha and Taieri Rivers and in the Water of Leith.
- 5.2.4 There is increasing interest in commercial activities based on sports fish and game resources through the provision of services to anglers and hunters. For example there is continuing interest in angling and hunting guiding and in the establishment of hunting preserves. The construction of backcountry lodges and the provision of access services such as aircraft transportation have the potential to affect the quality of angling and hunting experience and may lead to capacity pressures or the partial capture of sports fishing and game hunting opportunity through restrictions on access. The exclusive capture of publicly owned and managed fish and game resources is an issue that Otago Fish and Game takes seriously and will strongly oppose, including using legal means if necessary.
- 5.2.5 There is a risk of cementing in place fishing competitions that have a commercial focus or which are unsustainable in terms of their harvest rate.
- 5.2.6 Otago Fish and Game continue to maintain a relationship with landholders over their management of Canada geese because they continue to offer hunting opportunities for

licenceholding waterfowl hunters despite the species no longer being defined as game under the Wildlife Act.

- 5.2.7 There are continuing concerns amongst hunters about the non-target primary and secondary impacts of 1080 pest control operations on upland game generally and a desire to see poisoning practices adjusted to minimise potential effects on bird life.
- 5.2.8 The introduction of new organisms into waters where they do not presently exist has the potential to adversely impact on sports fisheries and their habitats. Two examples are the accidental introduction of didymo has had significant adverse effects in some locations in Otago and the past proposed introduction of grass carp into Lake Dunstan for weed control.
- 5.2.9 There is a continued need for Fish and Game to adopt evidence based decision making for actions involving sports fish and gamebird resources. This includes sustaining and undertaking a systematic approach to scientific investigation of fisheries and habitats and the creation of mechanisms and processes to share and disseminate these findings.

5.3 Objectives

Species management

- 5.3.1 To manage sports fisheries and game resources having regard to sustainability to meet the interests and recreational needs of present and future generations of anglers and hunters.
- 5.3.2 To primarily focus sports fisheries management on wild, self sustaining fish populations.
- 5.3.3 To optimise angling and hunting opportunity and maintain or improve the recreational fishing opportunity spectrum available in Otago.
- 5.3.4 To manage sports fisheries and game populations in Otago within their existing ranges except where a risk assessment shows there is no significant effect from extending the distribution on indigenous biodiversity and Kāi Tahu values. Consultation with interested parties, including Te Rūnanga o Ngāi Tahu, Kāi Tahu ki Otago and DOC, will be undertaken as part of the process for approval under the Freshwater Fisheries Regulations 1983 and similar laws.
- 5.3.5 To manage liberations of sports fish so that new sports fisheries will not be created where there are likely to be significant adverse effects on rare or threatened indigenous fish species, including non-migratory galaxiid.
- 5.3.6 To have regard to the effects of fish and game management activities on other natural resources and resource users.
- 5.3.7 To cooperate with other freshwater fisheries agencies over freshwater fisheries conservation and habitat protection.
- 5.3.8 To protect Otago's sports fisheries from the adverse effects of releases of other exotic freshwater fish or other unwanted organisms

5.3.9 To maximise salmon angling opportunity in Otago by supporting efforts to enhance the wild self-sustaining salmon fishery in the Taieri River and by seeking run restoration for in the Clutha in mitigation of adverse impacts on natural runs resulting from hydro development.

Commercial use

5.3.10 To manage commercial activity relating to sports fish and game ways that avoid or minimise adverse effects on angling and hunting and ensures a reasonable contribution to fish and game management costs.

5.3.11 To define clearly Council's jurisdiction over sports fish and game resources where commercial interests encroach on the interests of anglers and hunters.

Game bird conflict

5.3.12 To minimise conflict between game birds and agricultural production.

5.3.13 To control game bird populations primarily through hunter harvest during gazetted game seasons.

5.3.14 To maintain a residual liaison between farmers and Otago Fish and Game over Canada goose issues.

Hatchery and restocking

5.3.15 To restock fisheries only where:

- a) the benefits are measurable and bear a reasonable relationship to costs.
- b) there is a strategic benefit in doing so.
- c) there is no significant adverse effect on other natural resources or the users of those resources.
- d) to expand the range of harvest opportunities.
- e) to direct harvest pressure to where it can be sustained and managed.

5.4 Policies

Species management

5.4.1 Achieve sustainability through the following approach:

- a) Ensure that the sustainability of the resource has precedence over utilisation (i.e., utilisation will be dependent on sustainability).
- b) In the absence of reliable information or in the face of uncertain information, a precautionary approach will be adopted in managing fish populations.
- c) Management decisions will be based on the best available information.
- d) The absence of information will not be used as a reason for failing to adopt management measures.

5.4.2 Establish and maintain an inventory of sports fish and game resources in Otago including:

- a) classification of individual sports fisheries and game habitats to allow management based on significance, key characteristics and the recreational opportunity provided within a spectrum.
- b) defined spawning grounds and characteristics
- c) links to water quality and quantity information
- d) links between fish and game data and place, space, and time (i.e. a geospatial database)

5.4.3 Prioritise sports fish and game species management activities through:

- a) population trend monitoring
- b) angler and hunter harvest and opinion surveys
- c) identification of species management threats and opportunities
- d) assessments of the effectiveness of species management activities.

5.4.4 Manage game bird populations in order to provide a level of abundance and distribution acceptable to hunters while taking account of the effects of game birds on other resource users.

5.4.5 Protect the significant sports fishing characteristics of Otago's remote and backcountry fisheries.

5.4.6 Actively manage the risks of fish or game projects which extend the range of sports fish or game species within the region.

5.4.7 Prohibit sports fish liberation in waters where the creation of new sports fisheries would significantly impact on rare or threatened indigenous fish species, including non-migratory galaxiid.

- 5.4.8 Respond appropriately to reports of adverse effects arising from fish and game management projects on other natural resources or resource users. This may include discussions with landholders and/or their representatives.
- 5.4.9 Actively liaise with the Ministry of Primary Industries, the Department of Conservation and Kai Tahu Ki Otago over freshwater fisheries management issues and protection of freshwater habitats.
- 5.4.10 Liaise with anglers and angling organisations over salmon fishery monitoring and management issues.
- 5.4.11 Support the enhancement of salmon fisheries in the Leith, Taieri, Clutha and Pomahaka Rivers by supporting enhancement projects.
- 5.4.12 Maintain a current and historical database of sports fish and game species and their population trends.
- 5.4.13 Undertake research on migratory sports fish.

Commercial use

- 5.4.14 Monitor and/or manage commercial uses of sports fish and game birds to maintain licence holder access and sporting opportunities. Commercial uses that require monitoring include:
 - a) angling and hunting guiding
 - b) angling and hunting competitions for direct or indirect commercial gain to ensure that they meet the aims of this plan and that the harvest is consistent with the long term management ambition for the specific fishery
 - c) sports fish displays
 - d) hunting and game preservesand, where possible, to recover costs of monitoring and management.

- 5.4.15 Oppose the establishment of fish farms licenced under the Fish Farming Regulations 1983 where fish-out ponds are proposed as a primary activity.

Game bird conflict

- 5.4.16 Assist landholders to manage situations where there is conflict between game birds and agricultural production.
- 5.4.17 Liaise with landowners where necessary over Canada geese issues
- 5.4.18 Improve the skills of hunters in hunting for individual game species with potential to cause nuisance.

Hatchery and restocking

- 5.4.19 Use hatchery restocking to extend the spectrum of angling opportunity in Otago to include accessible put-and-take sports fish fisheries close to urban populations.
- 5.4.20 Investigate alternative hatchery sites and the potential raising of other species, such as brown trout, in order to maintain hatchery capacity if needed.
- 5.4.21 Oppose any releases of exotic freshwater fish which pose a risk to sports fisheries or their habitats.
- 5.4.22 Support efforts to prevent accidental transmission of unwanted aquatic organisms under the Biosecurity Act 1993 into Otago or between waters in Otago
- 5.4.23 Support hatchery releases of salmon into the Clutha to restore sea run salmon stocks in the Lower Clutha with a first preference for use of smolts reared from Clutha salmon brood stock in Clutha catchment water.

6 Habitat Protection & Management

The distribution and abundance of fish and game species is largely related to the quality and extent of fish and game habitats. The Otago Fish and Game Council has a broad range of responsibilities under section 26Q of the Conservation Act 1987. These include:

- To manage, maintain, and enhance the sports fish and gamebird resource
- to monitor the condition and trend of ecosystems as habitats for sports fish and game
- to maintain and improve access
- to maintain hatchery and breeding programmes, where required for stocking or restocking the sports fisheries and game habitat
- to undertake such works as may be necessary to maintain and enhance the habitat of sports fish and game (subject to appropriate approvals)
- to promote recreation based on sports fish and game
- to advocate for the interests of the Council, including its interests in habitats.

As such, the protection, maintenance and enhancement of rivers, streams, lakes and wetlands as habitats and ecosystems is vitally important in the maintenance of fish and waterfowl resources. The maintenance and enhancement of water quality, water quantity, water flow and water level regimes, and natural habitat characteristics (for example channel variability and riparian cover) are essential requirements.

The same holds true for upland game habitats, but they are a more difficult proposition in terms of habitat management because habitat components can include weed pests. In addition intensification in land-use and animal pest control activities, appears to have adverse effects on quail and chukar habitat productivity.

Community use of land and other resources for productive purposes often has adverse impacts on fish and game habitats.

Major impacts may result from:

- intensification of land use including forestry, dairying, mining and urban development
- nutrient and sediment discharges to waterways and non-point source pollution
- flood control works in rivers and streams
- wetland drainage and modification of wetland vegetation through activities such as mob stocking, water storage reservoir construction and abstraction for irrigation
- the damming of rivers and lakes
- Introduction of unwanted organisms such as didymo (*Didymosphenia geminata*) and other aquatic pests.

The Council recognises that for the greater part habitat protection must be achieved through advocacy because the control and management of water and land resources lies with private interests or other statutory agencies. Under common law, water is assumed to be owned by no person. There are many ways to approach advocacy for habitat, and some of these are outlined below:

- the RMA resource consent application process
- district and regional policy and plan development and reviews under the RMA
- development of legislation affecting resource management

- the pastoral lease tenure review process under the Crown Pastoral Lands Act 1998
- policies, plans and strategies developed under other Acts
- raising public awareness
- participating in catchment committees and other strategic groups
- alternative ways of securing sufficient water to maintain and enhance fisheries.

The protection of habitat through direct purchase is liable to remain a relatively minor Council activity, restricted to the acquisition of smaller wetland areas for development as game habitats and hunting areas.

A key strategy in the Council's advocacy activities will be the development of co-operative relationships with agencies and stakeholders with an interest in habitat, particularly the Otago Regional Council, Department of Conservation, Ngai Tahu, Arai Te Uru Eel Management Committee, landcare groups, Federated Farmers, the University of Otago, Crown Research Institutes, and other scientific conservation, recreation and community groups.

6.1 Outcome

Water quality ranges between good and excellent in Otago rivers, lakes and wetlands. River flows and lake or wetland water levels combine with the natural characteristics of waterways to support natural ecosystems functioning at a level that supports productive and diverse fish and game populations. Rivers are swimmable, fishable, and safe for food gathering. Otago's wetlands are improving in terms of quality, diversity and species productivity and the overall area of wetlands is expanding, underpinned by the regional focus on protection of regionally significant and other smaller wetlands, as well as an active programme of wetland creation on private land. Degraded headwater wetlands have been restored and contribute to maintenance of summer low flows in catchments downstream. Overall, rivers and wetlands are highly valued by the public for their intrinsic qualities and amenity values.

6.2 Issues

Issues affecting fish and game habitats are significant and complex, and with limited resources available, Otago Fish and Game needs to prioritise catchments for research and monitoring.

Fish and game habitats in Otago are currently affected by a broad range of resource and land use activities causing incremental declines in habitat quality and extent. Trends of particular concern include the loss or degradation of river and wetlands ecosystems, and accelerated enrichment of rivers and lakes with non-point source pollutants including silt.

6.2.1 Non-point source pollution and sediment is a serious issue affecting water and habitat quality. Of particular concern are the more intensive agricultural land uses, particularly unconstrained and poorly managed dairying and intensive sheep and beef operations.

6.2.2 Wetlands in Otago have been lost or degraded through accelerated eutrophication, sedimentation, drainage, damage from stock, and vegetation modification. Sedimentation primarily comes from the human or animal disturbance of soil without adequate buffers to trap the sediment between the land use activity and the waterway.

- 6.2.3 River management activities have degraded fish and game habitats in the past and may degrade or enhance habitats and associated recreational amenity in the future depending upon the management regime employed. Management of riparian areas on waterways is of major strategic importance in the protection and enhancement of fish and game habitats and recreational amenity.
- 6.2.4 Development of rivers for the generation of hydro electricity or water storage for irrigation has the potential to seriously impact on rivers, river fisheries and angling opportunity in Otago, but well-designed water storage schemes have the potential to improve water storage, reduce run of river irrigation takes, and increase downstream flows in rivers. Existing hydro-electric dams at Hawea outlet, Roxburgh, Clyde, Mahinerangi, Teviot and Paerau have ongoing effects on fish and game resources and associated recreational use. Dams and weirs block fish passage both up and down stream and flows fluctuate unnaturally downstream from dams.
- 6.2.5 These multiple stressors on waterways are exacerbated by the many and often conflicting systems for resource administration that exist, such as different types of resource consent, subsequent minimum flow provisions, and differing interpretations on existing resource consents. There is an urgent need for a holistic consideration of catchments.
- 6.2.6 The spread of didymo and other aquatic pests (such as lagarosiphon) has also had a major impact on fisheries, and for didymo no effective eradication methods exist.
- 6.2.7 Some rivers in Otago are fully or over allocated in terms of water abstraction for out of stream uses, resulting in degradation of aquatic habitats. Examples include the Shag, Manuherikia, Cardrona and Lindis Rivers and the Sowburn, Pigburn and Kyeburn. Mining privileges in Central Otago give owners secure property rights over water, however these expire in 2021. In several cases their use for irrigation has serious adverse effects on aquatic ecosystems in some river reaches and their existence constrains sustainable water resource management.
- 6.2.8 The transition from mining privileges to RMA resource consents poses significant challenges to Otago Fish and Game and Otago Regional Council for some Central Otago catchments. A strategic and hands on approach to managing water allocation in these catchments if instream values are to be satisfactorily restored.
- 6.2.9 Climate change may alter the hydrological patterns across Otago and consideration for the effects of climate change needs to be built into decision making.
- 6.2.10 Some hydro generation and irrigation reservoirs in Otago provide important angling amenity. Examples include Lake Dunstan, Lake Onslow, Falls Dam, Poolburn Dam, Manorburn Dam, and Loganburn Dam. There are active proposals to increase the height of both Falls Dam and the Loganburn Dam.
- 6.2.11 There is a demand amongst anglers and hunters, and within the community, to restore degraded fish and game habitats and to create new habitats, especially close to centres of population.
- 6.2.12 Development and management of wetland reserves is undertaken to protect, restore or enhance habitat values by maintaining or increasing habitat diversity. Management of

hunting in reserves or on other wetlands is undertaken in ways which minimise effects on habitat quality.

- 6.2.13 Weed and pest species present in Otago may not always have adverse impacts on fish and game habitats. For example *Largarosiphon* in Lake Dunstan plays an important role in lake productivity and so underpins the trout fishery.
- 6.2.14 Tenure change in the South Island high country may have adverse or beneficial effects on fish and game habitats, populations and public access and use depending upon the outcomes of pastoral lease tenure reviews.
- 6.2.15 Mining and gravel extraction adjacent to or within waterways can have serious adverse impacts on fishery values if not managed closely and under appropriate consent conditions.
- 6.2.16 Access opportunities to waterways can be lost through incremental changes, such as subdivision, the loss of accessways such as unformed legal roads, and changes in landholder values.
- 6.2.17 The restoration of lowland fisheries offers an opportunity to better balance harvest pressure across the Otago Fish and Game Region.
- 6.2.18 The Upper Clutha fishery is experiencing increasing pressure as a result of increasing population and increasing angler pressure, in part from deterioration in lowland fisheries. The health of the fishery needs to be carefully monitored and recommendations made on future management regimes.

6.3 Objectives

- 6.3.1 To protect, maintain and enhance the quality and extent of fish and game habitats in Otago as a priority, with advocacy as the primary tool.
- 6.3.2 To restore or create fish and game habitat where the opportunity arises and it is practical to do so.
- 6.3.3 To actively promote targets for habitat quality and quantity, and where necessary, actively defend these targets.
- 6.3.4 To develop and implement higher level policy on the management of South Island Sea Run Salmon.

6.4 Policies

- 6.4.1 Priority is to be given to achieving outcomes through RMA planning processes and focussing in the first instance on habitat areas identified as nationally or regionally significant in section 5.6 and 5.7 of this plan or those at risk from a specific threat.
- 6.4.2 Promote the protection, maintenance and enhancement of habitats through either public processes and public advocacy including:
 - a) resource consent application processes
 - b) regional and district policy and plan development
 - c) pastoral lease tenure reviews

- d) legislation and policy development under other Acts.
 - e) Department of Conservation conservation planning processes
 - f) Department of Conservation concession application processes
- 6.4.3 Maintain co-operative working relationships with the Department of Conservation, Kai Tahu ki Otago, Otago Regional Council, District Councils, the Clutha Fisheries Trust, Universities, conservation and recreation NGOs, community groups and resource user groups including Federated Farmers via liaison, formal and informal meetings, and working groups for information sharing.
- 6.4.4 Undertake a coordination role with other like-minded groups when engaged in similar work and where requested.
- 6.4.5 Develop a complete inventory of fish and game habitats within Otago based on a systematic ongoing assessment of fish and game resources and use including information on amenity value, ecosystem trend, habitat quality, population trends and desired outcome for individual habitats.
- 6.4.6 Promote community awareness of habitat issues and encourage support for environmental management benefiting fish and game habitats through:
- a) liaison with agencies and community groups
 - b) media releases and advocacy.
- 6.4.7 Protect fish and game habitats, particularly wetlands, by way of:
- a) purchase of discrete habitat areas
 - b) promotion of public (Crown or local body) reserve establishment
 - c) securing Council management authority for public reserve areas
 - d) negotiation of covenants over freehold land by negotiation to maintain or improve ecosystems and/or sports fish and gamebird resources.
 - e) inclusion of protective mechanisms in the regional water plan
 - f) water conservation order applications
- Priority will depend on the value of the habitat concerned, present or future risks to habitat values, the practicality of protection, and opportunity for protection.
- 6.4.8 Press for appropriate action by agencies directly responsible where non-compliance with resource management, conservation or other laws, and plans and policies written under these laws is detected.
- 6.4.9 Give priority to the monitoring and management of fish habitats within Otago which have the highest levels of angler participation and so underpin licence sales and revenue generation.
- 6.4.10 Actively encourage projects by community groups that protect, maintain or enhance fish and game habitats.
- 6.4.11 Develop the potential of Council owned or managed wetlands as habitats and as hunting areas and contribute generally to improved wetland management in Otago.

- 6.4.12 Advocate and support the restoration of headwater wetlands where they have been damaged or drained in the past.
- 6.4.13 Actively encourage landholders to create or enhance habitat and to understand the many benefits from such enhancement including the benefits to downstream water quality.
- 6.4.14 When advocating the Council's interest in habitats, undertake a holistic assessment of the catchments ecosystem values and needs.
- 6.4.15 Undertake specific advocacy with landholders for the identification of wetlands and water yield areas (tussock grasslands and herbfields) and assess the possibility and mechanisms for restoration where possible due to the downstream ecosystem services that these areas provide.
- 6.4.16 Seek restoration and enhancement of salmon spawning and rearing areas and runs in the Lower Clutha catchment and the Water of Leith.
- 6.4.17 Protect fish and game habitats and amenity values of rivers, streams and lakes in Otago by way of:
- a) involvement in consent and permission processes
 - b) involvement in the development of RMA policies and plan changes.
 - c) applications for water conservation orders
 - d) involvement in collaborative community based processes.
- 6.4.18 To ensure that water quality standards and flow regimes reflect the requirements of healthy and productive sports fish and game populations and the different stages in their life cycles.
- 6.4.19 Place a priority on resolving over allocation issues in Central Otago rivers relating to deemed permits in order to restore habitats for sports fish. The potential of on-farm water storage should be considered in resolving over-allocation issues.

7 Angler and Hunter Participation

This functional area has two important components:

- a) participation in the recreational activities of angling and hunting, and
- b) participation in fish and game management as key stakeholders in Otago's fish and game resources.

There is a need to assess user satisfaction in both respects.

7.1 Outcomes

7.1.1 Access - Free, certain, enduring, and practical public access is available to all fish and game resources in Otago and information on this access is readily available to anglers and hunters from a variety of sources. The value of public access to waterways, wetlands, and other fish and game resources is well understood and protected by local authorities and other agencies responsible for land, water and public recreation. The value of providing access for possible future recreational needs is also understood by all agencies with responsibilities for managing public access ways. Otago Fish and Game continues to advocate for public access where needed, recognising the interests of the rural community. Formed and unformed legal roads remain as the 'gold standard' for public access and the Council places a first preference on their retention or establishment in order to meet access requirements.

7.1.2 Participation – The Otago community and visitors to the region have ready access to a balanced range of fishing and hunting licences through convenient sales channels utilizing new technology. Fishing and hunting opportunities enjoyed by licence holders are diverse and high quality. Anglers and hunters are well informed on fish and game management issues and actively contribute by standing as candidates or voting in Council elections or supporting promotional or advocacy initiatives.

7.2 Issues

7.2.1 There is a demand for clear and simple angling and hunting regulations and anglers and hunters want liberalisation of method and season restrictions. Angling and hunting methods must cater for all including the young and the elderly. Regulations must also be backed up by scientific research of the fishery or game bird population, and the precautionary principle needs to be applied where the science is not clear.

7.2.2 There is a demand for more licence category flexibility to meet the needs of specific end users as well as support for nationally inter-available licences at equitable fees². Anglers and hunters want value for their licence money.

7.2.3 Participation levels, user density and methods of angler access are impacting on the quality of recreational experience in some circumstances such as in 'backcountry' and 'remote'

¹Inter-available licenses mean regional licenses that are available in a nationwide system. The Conservation Act 1987 only makes fishing licenses available on a regional basis.

fisheries where wilderness values are important. Problems with fisheries at this end of the recreational opportunity spectrum require active management to avoid conflicts between users over user densities or modes of access (eg aircraft or jet boats).

7.2.4 There is a demand for more detailed information on the physical access available to fish and game resources in Otago and a demand for more detailed information on how to hunt and fish.

7.2.5 Public access to fish and game resources is becoming progressively more restricted due to changing attitudes within the community resulting from:

- a) closer settlement and intensification of land use
- b) concern over health and safety requirements
- c) a hardening of attitude towards private property rights and concerns about security
- d) A liberalisation of DOC policies governing commercial concessions, particularly aircraft landings in backcountry and remote fisheries.
- e) increased awareness of commercial opportunities.

7.2.6 Secure practical public access to fish and game resources via road reserves, marginal strips and esplanade reserves is important but sometimes it is difficult to identify on the ground. Secure public access to rivers, lakes and wetlands and hunting areas is lacking in many areas of Otago. Many landholders acknowledge the security that they gain from granting access to responsible anglers and hunters who can keep landholders informed about issues on their property.

There has been a hardening of attitudes towards property rights, which has affected access to public fish and game resources.

7.2.7 Non-resident anglers and hunters are perceived to be gaining access to angling and hunting without contributing equitably to management of the resource. A non-resident fishing license, at a fee 1.3 times greater than the regular full season adult fishing license has been introduced.

7.2.8 Fishing competitions require management because:

- a) they have the potential to focus angling pressure in specific locations, leading to potential impacts on fish stocks and normal patterns of angling; and
- b) they can be commercial in nature and can generate revenue for the organisers.

Those operating fishing competitions need to explain the overall rationale for the competition in order for its sustainability and contribution to Council objectives to be assessed prior to its approval.

7.3 Objectives

Participation and behaviour

- 7.3.1 To encourage angler and hunter ethics and have anglers and hunters recognised as responsible resource users and good neighbours.
- 7.3.2 To minimise and simplify regulations controlling angling and hunting so that they do not become an impediment to participation, but not at the expense of precautionary management.
- 7.3.3 To manage fishing competitions in order to maximise benefits, minimise adverse impacts and to ensure there is an equitable contribution to fish and game management from any revenue generated.
- 7.3.4 To foster greater awareness of and participation in conservation initiatives amongst anglers and hunters.
- 7.3.5 To utilise new technology, including mobile technology to promote understanding and participation amongst fish and game license holders.
- 7.3.6 To manage potential conflicts between recreational users over modes of access and methods.

Access and recreation

- 7.3.7 To maintain and improve secure public access to rivers, lakes and wetlands and land areas supporting fish and game resources.
- 7.3.8 To recognise the impact that access, particularly informal access arrangements, can have on landowners and their farming operations, and to negotiate access arrangements as far as possible.
- 7.3.9 To maintain and improve public access opportunities across private land as far as practicable.
- 7.3.10 To set limits on angler or hunter use of fisheries and hunting areas where pressure of use threatens or adversely affects the quality of recreational experience and to actively manage those areas for their key characteristics.
- 7.3.11 To keep anglers and hunters informed over access to fish and game resources and angling and hunting techniques.

7.3.12 To protect those elements of the public estate with importance to angling and hunting, particularly:

- a) marginal strips,
- b) esplanade reserves, esplanade strips and access strips
- c) recreation and conservation reserve land
- d) formed and unformed roads
- e) any government or local body owned land with value for angling and hunting, access, or fish and game habitat.

Licencing

7.3.13 To provide a range of licence categories that meet the needs of specific end users in terms of both coverage and affordability.

7.3.14 To provide licence purchase options to meet the needs of all clients.

Democracy

7.3.15 To facilitate angler and hunter participation in fish and game management.

7.4 Policies

Participation and behaviour

7.4.1 Promote angler and hunter codes of conduct for fish and game resource use and access.

7.4.2 Review annually angling and hunting conditions and assess them for their relevance, clarity and simplicity.

7.4.3 Liaise with other regions over the annual review of angling and hunting conditions and to seek consistency between regions.

7.4.4 Seek outcomes in RMA plans and other statutory plans that manage conflicts between recreational users over matters including modes of access, compatibility of activities and user densities.

Fishing competitions

7.4.5 Approve fishing competitions in Otago on waters other than those supporting pressure sensitive fisheries where.

- a) the sustainability of fish stocks is not threatened and/or
- b) there is no significant impact on angling opportunity

subject to the fees set out in clause 57F of the Freshwater Fisheries Regulations 1983.

7.4.6 Apply revenue gained from competitions to³:

- a) facilities which benefit anglers,
- b) activities which promote angling and/or enhance angling opportunities,
- c) activities which promote or assist fish habitat conservation

7.4.7 Approve competitions subject to conditions and fees in accordance with policies 8.4.4 where:

- a) The competition is held in conjunction with, or as part of, a 'take-a-kid-fishing' or family fishing day.
- b) The competition is a minor angling club competition without significant prizes or entry fee.
- c) The competition is community based, aims to promote an area rather than a commercial business, and benefits sports fisheries management.
- d) the event is consistent with the Council's fisheries management philosophy, competition conditions and rental are agreed to the Council's satisfaction and the Freshwater Fisheries Regulations 1983.

³ Refer Conservation Act 1987, Sec. 26ZK, and Freshwater Fisheries Regulations 1983, Sec.57A to 57F]

- 7.4.8 Encourage organisers of fishing events to place less emphasis on “heaviest bag” type competitions in order to promote sustainability.

Access and Recreation

- 7.4.9 Establish where necessary controlling mechanisms for access to, and use of, fisheries within defined carrying capacities.
- 7.4.10 Manage and advocate for appropriate social carrying capacities to protect pressure sensitive remote or backcountry fisheries and to manage within those capacities to preserve high quality recreational experiences and the spectrum of fishing and hunting opportunity in Otago.
- 7.4.11 Provide accurate information to anglers and hunters on access to fish and game resources and angling and hunting techniques. Access information should be prepared in consultation with landowners and their representatives.
- 7.4.12 Participate in public processes relating to public land acquisitions and disposals including tenure reviews, reserving of marginal strips, subdivisions and road stopping or taking to provide for public access, recreation and fish and game habitats.
- 7.4.13 Contribute to a register of secure public access ways to and along rivers, lakes and wetlands and to upland hunting areas, such as that operated by the NZ Walking Access Commission.
- 7.4.14 Establish access-ways across private land to fish and game resources through negotiation with landholders, and particularly when land use is changing or intensifying. A variety of options exist for negotiation, including legal easements and access covenants, through to informal marked accessways.
- 7.4.15 Advocate to maintain the existing unformed legal road network in Otago where this provides secure access to fish and game resources and agree to road stopping only where:
- a) There is no impact on present or future public access
 - b) An alternative ‘like for like’ road access alternative is offered

- 7.4.16 Undertake awareness programmes to educate anglers and hunters about access issues.
- 7.4.17 Investigate methods of reducing angler conflict across pressure sensitive fisheries, including modern management techniques such as rotational closure.
- 7.4.18 Actively engage with territorial local authorities on policy for formed and unformed legal roads and other accessways.
- 7.4.19 Coordinate recreational and access advocacy groups where necessary.
- 7.4.20 Work with the Walking Access Commission and its regional field advisors in establishing and maintaining public access to fish and game-bird resources.

Licencing

- 7.4.21 Regularly review the range of licences offered and where necessary or desirable develop and promote new options.
- 7.4.22 Maintain and improve licence purchase options.
- 7.4.23 Provide supporting information for licence sales.
- 7.4.24 Support the co-ordination of licensing arrangements nationally and actively seek improvements in line with the expectations of the regional users.

Democracy

- 7.4.25 Encourage licenceholder participation in Council elections as voters and candidates.
- 7.4.26 Ensure Council activities and processes are open and accessible to encourage maximum angler and hunter participation.

8. Public Interface

8.1 Outcome

Waterways are seen by the public as the arteries of the land, with a healthy rivers or streams being a sign of healthy land use. Similarly, wetlands are valued for both their recreational hunting opportunities and for their role in filtering water from land use and maintaining wildlife biodiversity. Anglers, hunters, and the general community value introduced sports fish and gamebird species for the recreation and harvest that they provide, as well as seeing them as barometers of ecological health. The user pays, user says democratically accountable fish and game system continues to be promoted and endorsed by New Zealanders as an effective model for the management of public fish and game resources.

8.2 Issues

- 8.2.1 The Council will be most effective in its advocacy for fish and game resources and angler and hunter interests where it has community support. The public needs to be kept informed and have a high level of awareness of the Council's work and the wider benefits arising from it. The Council also faces risks where the wider community does not have a good understanding of recreational harvesting and its importance in community recreation. An example is the risk arising from anti-hunting groups arguing for restrictions or prohibitions on hunting.
- 8.2.2 The effectiveness of advocacy and public awareness within Otago also depends on the collective efforts of the other 12 regional Fish and Game Councils and particularly the national advocacy efforts of the New Zealand Fish and Game Council.
- 8.2.3 The achievement of fish and game management objectives will be assisted by developing and maintaining positive working relationships with all sectors of the community.
- 8.2.4 Due to its statutory requirement to as an advocate for freshwater habitat, the Council may from time to time find itself engaged in potentially unpopular advocacy. This is likely to be most contentious when the advocacy involves the setting or recognition of limits on economic growth. Currently, the most contested issue is in the setting of limits to protect water quality and appropriate natural flows, but other areas are likely to emerge as economic activity arrives at further physical and biological limits. One area likely to become controversial is the issue of mining on public conservation land, another is the further drainage of wetlands to create pasture.
- 8.2.5 The methods by which the Council communicates with licenceholders and the public is also changing. Online tools of communication, such as websites and email, are becoming more important as the readership rate of traditional tools, such as newspapers and physical mail is dropping. The same applies with the shift to cellular phones. The Council needs to maintain both physical and electronic forms of communication, but slowly shift as demographics shift to electronic communication where possible.

- 8.2.6 Licence sales agencies and rangers play an important role in the public perceptions of the organisation as do rangers. They are often the everyday face of Fish and Game.
- 8.2.7 A functional working relationship with resource users is necessary to achieve fish and game management objectives. Important sector groups include farmers, miners, foresters, tourism interests and power companies.

8.3 Objectives

- 8.3.1 To project a positive public image as a regional organisation involved in environmental and natural resource management and to be perceived as professional, accessible, responsive, friendly, fair and community based.
- 8.3.2 To ensure the public has a good understanding of the wider benefits of the Council's work, the issues facing fish and game resources and the case for recreational harvesting.
- 8.3.3 To support the national advocacy efforts of the New Zealand Fish & Game Council and the collective advocacy and public awareness efforts of other Fish and Game Councils.
- 8.3.4 To develop and maintain positive working relationships with groups within the community, especially Te Runanga O Ngai Tahu and Kai Tahu ki Otago, local bodies, resource user groups, politicians, conservation and recreation groups and government departments.

8.4 Policies

- 8.4.1 Educate and inform anglers and hunters so that they can in turn inform the community about fish and game management issues.
- 8.4.2 Promote and explain the Council's role and its activities to the public through the media.
- 8.4.3 Liaise with groups within the community involved in environmental protection or resource management, especially Ngai Tahu, local bodies, resource user groups, politicians, conservation and recreation groups and government departments.
- 8.4.4 Liaise with primary industry representatives, such as Federated Farmers.
- 8.4.5 Keep opinion leaders within the community informed of fish and game issues.
- 8.4.6 Liaise closely with the New Zealand Fish and Game Council and other regional Fish and Game Councils over the co-ordination of public awareness activities and advocacy.
- 8.4.7 Work co-operatively with other community groups where there is a mutual benefit in doing so.
- 8.4.8 Advocate the Council's position on legislation, policy and/or development proposals affecting fish and game resources, their use or public access.
- 8.4.9 Promote public appreciation of sports fish and game birds as a natural resource and their recreational use by anglers and hunters.
- 8.4.10 Complete and implement the Memorandum of Understanding between the Department of Conservation and the Council.

9 Administration and Statutory Servicing

The Fish and Game management system is based on twelve regional Fish and Game Councils and the New Zealand Fish & Game Council and is described in section 2.1 above. Funding of all Councils is linked through a national budget system which includes the setting of levies and payment of grants to redistribute revenue between all 13 Councils.

Fish and Game is effectively a co-management system involving a delegation of management responsibility for fish and game resources from Government to elected anglers and hunters within regional communities. As such communication, openness, accountability, accessibility to the decision-making process and the fostering of participatory democracy are important elements of the system. This system, with some changes, has effectively been in operation in New Zealand for 150 years, and has proven to be a sound, well supported and cost-effective model for the management of these resources.

The Council is elected from nominated adult whole season licence holders in triennial elections. Holders of Otago adult whole season licences can enrol to vote and take part in those elections as voters or as candidates for Council.

Otago Fish and Game Council is a Public Entity. It reports annually to Parliament and the Minister of Conservation and presents its annual report to a publicly advertised annual general meeting. The Council governs fish and game management in the Otago Fish and Game Region.

9.1 Outcome

Fish and Game continues to prudentially manage its finances and resources, mindful of the basis on which all of its income is derived. The categories, availability and affordability of licenses are reviewed in a timely manner, designed to both ensure that the fish and game system receives adequate funding and also to ensure that anglers and hunters pay a fair price for licenses, to further encourage the growth of the sport. Council staff and rangers continue to be grounded in the community and provide positive, helpful, and professional advice to all who seek it, consistent with Fish and Game's unique role.

9.2 Issues

- 9.2.1 Fish and game management must be transparent, accountable, accessible and responsive. The accessibility is important as the Council is seen as part of the community, rather than as a more remote centrally controlled agency. This aspect is vital to continued acceptance and success. Furthermore some anglers and hunters want to have the opportunity to actively participate in fish and game management and particularly to participate in the review of angling and hunting licence conditions.
- 9.2.2 Fish and Game Councils all derive the revenue they need to operate from licence sales. To a large extent the sale of licences in Otago is related to the quality and extent of fish and game resources within the region. Otago's fish and game resources are the natural capital the Council is charged with maintaining. The recreational use of the resources and the harvest of fish and game is the return provided on that natural capital.

- 9.2.3 As a levy paying region Otago needs to:
- a) optimise its licence sales to balance use pressure for lower fees and more flexibility within the license system with the need to generate income;
 - b) financially support the fish and game system, and ;
 - c) as a priority protect the region's fish and game resources and adequately service its client base on behalf of the 'owners', Otago licenceholders.
- 9.2.4 The Council is confronted with a substantial workload across a range of functional areas yet the fish and game system is resource short and is liable to remain so. It must manage its assets carefully.
- 9.2.5 In Otago, the Council has limited staff and financial resources to cover its workload in promoting angling and hunting, in managing fish and game resources and in responding to the very substantial resource management workload within the region. To an extent this resourcing issue can be addressed by internal co-operation particularly with neighbouring regions. Fish and game management cannot afford to be bureaucratic or unfocused.
- 9.2.6 The Council operates in a regional community which supports it through the purchase of licences.

9.3 Objectives

- 9.3.1 To establish and maintain governance and management arrangements which allow for efficient and effective use of Council resources including staff.
- 9.3.2 To ensure Council meetings and other Council processes are open and accessible to licenceholders and the public.
- 9.3.3 To ensure the Council is adequately resourced to protect the fish and game resources on which licence sales are based and to support existing clients.
- 9.3.4 To cooperate actively with other Fish and Game Councils and the New Zealand Fish and Game Council and to ensure the latter is fully informed on the views and aspirations of anglers and hunters in Otago.
- 9.3.5 To support local businesses in the purchase of goods and services.

9.4 Policies

- 9.4.1 Assess the cost effectiveness of Council activities where possible.
- 9.4.2 Routinely supply the media with Council agendas, reports and media releases to keep them informed of Council activities.
- 9.4.3 Invite anglers and hunters, and Ngai Tahu to participate in Anglers Notice and Game Gazette reviews.
- 9.4.4 Seek a review of the fish and game financial allocation process.

- 9.4.5 Support local businesses in the purchase of goods and services unless there is a significant saving or benefit in not doing so.
- 9.4.6 Liaise closely with other Fish and Game Councils and the NZFGC over fish and game matters and resource sharing.
- 9.4.7 Actively co-operate with neighbouring Councils in the sharing of information and resources.
- 9.4.8 Manage the Council's assets prudently.

10 Compliance

Compliance activities are more than law enforcement and prosecutions. The Council is committed to actively encouraging public and licenceholder understanding, acceptance and belief in a legal code of practice that will be self-reinforcing.

10.1 Outcome

There is a high level of compliance with and acceptance of the need for fishing and game hunting regulations applying to Otago. Compliant anglers and hunters continue to support the Council and its rangers in ensuring that non-compliance is kept to a minimum. Anglers and hunters themselves, and license agents, are educated to provide information to their peers about fish and game regulations to further boost compliance. Regulations are reviewed to ensure that they remain accurate and appropriate.

10.2 Issues

- 10.2.1 Management of sports fish and game bird populations requires ongoing compliance monitoring at levels which provide an effective deterrent. Compliance monitoring requires active co-ordination and support because concentrated compliance monitoring activities can cause irritation to law abiding anglers and hunters.
- 10.2.2 Non-compliance with resource management laws and plans can cause damage to fish and game habitats. Licenceholders expect that compliance with laws controlling angling and hunting will be strictly enforced. However prosecution of offences through the courts is costly and results are variable.

10.3 Objectives

- 10.3.1 To be perceived as professional, consistent, fair and reasonable in carrying out compliance monitoring and enforcement activities relating to fish and game laws, regulations and conditions.
- 10.3.2 To maintain and manage an effective compliance monitoring and enforcement capability based on staff and voluntary Fish & Game rangers.
- 10.3.3 To secure action by the statutory agency directly responsible for offences under other legislation which adversely affect fish and game resources.
- 10.3.4 To have a minimum of 95% compliance with fish and game rules by anglers and hunters.
- 10.3.5 To have majority community support for Council compliance activities including legal action.

10.4 Policies

- 10.4.1 Support staff and voluntary rangers involved in compliance monitoring by providing appropriate training, equipment, information, and support.
- 10.4.2 Liaise with other agencies involved in natural resource compliance monitoring and enforcement including Ngai Tahu.
- 10.4.3 Encourage appropriate action by Otago Regional Council over resource use offences affecting sports fish and game resources

11 Plan Implementation

The Sports Fish and Gamebird Management Plan for Otago is implemented through the Council's annual planning process. The life of the plan is ten years from the date of approval, at which time it will become due for review. However, part or the entire plan may be reviewed and amended at any time should the Council consider it necessary to do so. Plan reviews must be conducted in accordance with Section 17M(5) of the Conservation Act 1987.

11.1 Target Dates for Key Actions

The plan will be progressively implemented over its ten-year life and each year the Council will review priorities depending on the circumstances at the time. Successive annual work plans will detail the relative allocation of efforts and funds to the implementation of the plan in each financial year within the overall directions set by the Plan.

Many actions requiring implementation through annual plans are routine and will arise annually or at regular intervals. Others identified below with their target completion date have been identified as key actions or projects which will move fish and game management forward a significant step.

11.1.1 Key actions to be completed by the end of the second year after plan approval include:

- 11.1.1.1 Memorandum of Understanding signed off between the Otago Fish and Game Council and the Department of Conservation.
- 11.1.1.2 Memorandum of Understanding signed off between the Otago Fish and Game Council and the Otago Regional Council on RMA resource consent processing and affected party determinations.
- 11.1.1.3 All publishable fish and game resource information, survey results and reports to be available online.
- 11.1.1.4 The health of the Upper Clutha fishery reviewed and subject of a report.
- 11.1.1.5 Status of Otago's lowland fisheries reviewed and subject of a report.

11.2.1 Key actions to be completed by the end of the fifth year after plan approval include:

- 11.2.1.1 The health of the Upper Fraser river fishery and subject of a report.
- 11.2.1.2 The Otago Fish and Game Region habitat resource inventory is complete and updated regularly.
- 11.2.1.3 Ranger distribution is reviewed to take into account areas of greatest need and pressure.
- 11.2.1.4 Public awareness of matters affecting fish and game resources is high and results in good outcomes in regional and district public processes.

- 11.2.1.5 A rivercare group or similar structure is established to achieve a better understanding and management of the Pomahaka and Waipahi Rivers, with the aim to achieve an improvement in water quality and restore this regionally important fishery.
- 11.2.1.6 The riverine environment and riparian margins of the Bengier Burn are restored and protected and supports salmon spawning and rearing in the lower Clutha as well as other aquatic life.
- 11.2.1.7 A report on the landlocked salmon fishery of the southern lakes and its contribution to the sea run salmon fishery is produced and disseminated.
- 11.2.1.8 The lower Clutha salmon run is significantly enhanced as a result of Contact Energy's lower Clutha mitigation programme with smolts being reared in a local hatchery from returning adult salmon.

11.1.3 Key actions to be completed by the end of the seventh year after plan approval include:

- 11.1.3.1 Catchment wide habitat projects are completed in the Manuherikia valley in conjunction with plans to increase irrigation and intensify land use thereby protecting aquatic habitats for sports fish and game and other aquatic life and securing and enhancing the recreational amenity of the river system.
- 11.1.3.2 A minimum of 40% turnout of enrolled licence-holders is achieved in Otago Fish and Game Council elections.
- 11.1.3.3 Poolburn Reservoir is retained as the largest stillwater brown trout fishery of Otago and its key characteristics are protected.
- 11.1.3.4 Minimum or residual flows are established for all Otago rivers that maintain or restore aquatic ecosystems to a healthy and productive state so that sports fish and game populations flourish.

APPENDIX 1. LEGAL STATUS OF FISH & GAME SPECIES

Freshwater Fisheries Regulations 1983, First Schedule:

Brown trout
Rainbow trout
American brook trout or char
Lake trout or char
Atlantic salmon
Quinnat or chinook salmon
Sockeye salmon
Perch
Tench
Rudd (found or taken in the Auckland Fish and Game Region)

and includes any hybrid and the young, fry, ova and spawn and any part of any such fish

Wildlife Act 1953, First Schedule :

Black swan
Chukar
Duck –
 Australasian shoveler
 Grey duck and any cross of that species with any other species, variety, or kind of duck
 Mallard duck and any cross of that species with any other species, variety, or kind of duck
 Paradise shelduck

Partridge –
 Grey partridge
 Red legged partridge

Pheasant
Pukeko
Quail –
 Bobwhite quail
 Brown quail
 California quail

APPENDIX 2. MAP: OTAGO FISH & GAME REGION

Otago Fish and Game Region



APPENDIX 3. OTAGO’S FISH AND GAME RESOURCES

The Otago Fish and Game Region’s waterways contains many discrete and interconnected freshwater sports fisheries supporting angler use. Similarly Otago’s waterways and wetlands collectively support valued populations of waterfowl and upland game birds are found in terrestrial habitats in dryer areas of Central Otago.

126 named sports fisheries have been identified through the National Anglers Survey (NAS) conducted by NIWA once every five to seven years. The NAS provides a reliable and comparable long term reference point for the use of sports fishery resources by anglers, but the number of fisheries in Otago is larger again than the number of named fisheries because fishing waters with very low response rates are not included in the survey results. Also over time, new fisheries can be created through pond and reservoir development and stocking or flow restoration, for example Lake Tewa at Jacks Point.

Therefore when considering the relative significance of sports fisheries within Otago it is important to recognise that there is a spectrum of significance from national to regional to local. That significance rating is not equivalent to fishery quality (or value). A locally significant fishery, for example, may be a high or low quality fishery or somewhere in between.

Significance criteria are included in the plan in Section 4 but assessments of quality need to take account of all available information on fishery characteristics and attributes.

<p><u>Major Lakes</u></p> <p>Lake Wakatipu Lake Wanaka Lake Hawea Lake Dunstan Lake Roxburgh</p>	<p><u>Backcountry Rivers</u></p> <p>Blue River Caples River Dart River Diamond Creek Dingle Burn Dunstan Creek Fraser River (upper reaches) Greenstone River Hunter River Lochy River Makarora River Manuherikia River (upper reaches) Matukituki River Minaret Burn Nevis River Rees River Routeburn Timaru Creek Pomahaka River (above Glenken) Upper Taieri River Von River Wilkin River Young River</p>
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<u>Rain-fed Rivers and Streams</u>	<u>Major Rivers</u>
Arrow River	Clutha River (upper)
Bannockburn	Clutha River (lower)
Boundary Creek	Taieri River
Camp Creek	Kawarau River
Cardrona River	
Catlins River	
Cluden Stream	
Deep Stream	
Dunstan Creek	
Fast Burn	
Fraser River (lower reaches)	
Hawea River	
Ida Burn	
Kaihiku River	
Kaihiku Stream	
Kaitangata Channel	
Kaiwera Stream	
Kye Burn	
Lee Stream	
Lindis River	
Logan Burn	
Maclennan River	
Manorburn	
Manuherikia (middle and lower reaches),	
Meggat Burn	
Owaka River	
Pleasant River	
Pomahaka River (middle and lower reaches)	
Poolburn	
Puerua River	
Shag River	
Silver Stream	
Staircase Creek	
Steele Creek	
Sutton Stream	
Tahakopa River	
Temple Burn	
Teviot River	
Three O'Clock Stream	
Tokomairiro River	
Tuapeka River	
Twelve Mile Creek	
Waikerikeri Creek	
Waikoikoi Creek	
Waikouaiti River	
Waipahi River	
Waipori River	
Waitahuna River	

<p>Waitati River Waiwera River Wye Creek</p>	
<p><u>Smaller Lakes</u></p> <p>Diamond Lake Glenorchy Lagoons Lake Dispute Lake Hayes Lake Johnson Lake Kirkpatrick Lake Luna Lake Reid* Lake Rere Lake Sylvan Moke Lake</p> <p>*Lake Reid drains into Diamond Creek which has backcountry characteristics</p>	<p><u>Ponds, Reservoirs, Dams & Urban Streams</u></p> <p>Blakleys Dam Butchers Dam Conroys Dam Coal Pit Dam Falls Dam Fraser Dam Hamiltons Dam Hoffmans Dam Hores Pond Kaikorai Stream Knights Dam Lake Mahinerangi Lake Onslow Lake Tewa Logan Burn Reservoir Lone Pine Dam MacAtamneys Head Pond Malones Dam Manorburn Reservoir Mathias Dam Phoenix Dam Poolburn Reservoir Rutherfords Dam Southern Reservoir Sullivans Dam Tomahawk Creek West Eweburn Dams Water of Leith</p>
<p><u>Coastal Wetlands and Estuaries</u></p> <p>Blueskin Bay Catlins Lake Kaikorai Lagoon Pleasant Estuary Waikouaiti Estuary Shag Estuary Tomahawk Lagoon Lake Tuakitoto Lake Waihola Lake Waipori</p>	

Major lakes

<u>Surveyed fisheries</u>	<u>Unsurveyed fisheries</u>
Lake Wanaka Lake Wakatipu Lake Hawea Lake Dunstan	None in this category

Description

Large multi-species fisheries offering lake-shore and boat fishing, principally trolling. Lake Wakatipu is identified as nationally important under the Kawarau Water Conservation Order. The quality of and natural range of water levels in Lake Wanaka are protected by the Lake Wanaka Preservation Act 1973. Lake Hawea was raised in the 1950s for hydroelectricity storage, but Contact Energy is required to manage shoreline stability under the conditions of its resource consent. Lake Dunstan is a more recent addition to the landscape, being created progressively from 1990s onwards as a result of the filling of the Clyde Dam, but it has quickly been valued and used for recreational activities, in the same way that the hydro lakes of the Waitaki Valley have become well utilised for recreation. Lake Dunstan's formation was at the expense of a highly valued reach of the upper Clutha River

These southern lakes are responsible for up to 50% of the region's angling use, based on National Angler Survey figures. Therefore, the importance of these four lakes in sustaining angling and licence numbers is high. These lakes have shown increasing use as the quality of river fishing has declined in some locations, notably as a result of the occurrence of didymo in adjacent waters.

Participation

Fishery	2002 Angler Survey	2007 Angler Survey	2015 Angler Survey	Change
Lake Dunstan	19872	26138		6,266
Lake Hawea	28155	22214		-5,941
Lake Wakatipu	17702	21481		3,779
Lake Wanaka	25268	39402		14,134

The only fishery to record a decline in angler usage during this period was Lake Hawea.

Availability

These lakes are all readily accessible to holiday centres (Queenstown, Arrowtown, Glenorchy, Hawea and Wanaka) and rural towns in Central Otago (Cromwell and Alexandra) and are some distance from Otago's main urban population in Dunedin/Mosgiel. The development of Lake Dunstan has spawned a number of subdivisions and land developments on its western side extending north from Cromwell. This is in part due to the recreational activities, including fishing, that the lake offers.

Risk

These lakes are all at low risk of over-harvest as long as spawning and rearing facilities are maintained and improved. Lake Dunstan is slightly vulnerable to habitat degradation such as

eutrophication but only with large scale land use intensification or poorly performing wastewater systems. With large scale irrigation schemes now proposed for the Hawea Flats and the Lindis/Tarras flats, there is more risk of nutrient overloading than previously. Important spawning tributaries to the Lake such as the Lindis are far more vulnerable however, with both low flows and decreasing water quality putting their contribution to the lake fishery at risk.

Lakes Hawea, Wanaka, and Wakatipu are at low risk of degradation, being large, deep and cold bodies of water surrounded by traditionally low intensity land use. However, flat land surrounding these lakes may increasingly be intensified as a result of tenure review and irrigation developments. The occurrence of 'lake snow' in Wanaka is a concern

Knowledge

Otago Fish and Game has access to good, up-to-date, and long term knowledge of fisheries use on these lakes through intermittent creel surveys. Different lakes appear to peak and trough at different times, although there appears to be more of a connection between Lakes Hawea and Wanaka than there is with Lake Wakatipu. The status of spawning areas within these lakes and trends in these spawning areas is not well known.

Access pamphlets have been prepared.

Backcountry Rivers

<u>Surveyed fisheries</u>	<u>Unsurveyed fisheries</u>
Caples	Fraser (above Fraser Dam, although the whole river is also surveyed)
Dart	
Dingle	
Dunstan Creek	Pomahaka (above Glenken, although the whole river is surveyed, and the Upper Pomahaka is likely to be a significant part of the total figures),
Greenstone	
Hunter	
Lochy	
Makarora	Manuherikia (above Falls Dam)
Matukituki	
Nevis	
Rees	
Routeburn	
Teviot	
Timaru Ck	
Taieri (above Kokonga)	
Von	
Wilkin	
Young	

Description

The Greenstone, Caples, Lochy, Nevis and Hunter Rivers are recognised as nationally significant trout fishing rivers. The Upper Pomahaka and Upper Taieri rivers are recognised as regionally significant trout fishing rivers. The Von, Dingle, Timaru Ck., Rees, Dart, Wilkin, Young and Makarora rivers are considered to be regionally significant. The upper Fraser, upper Manuherikia, Dunstan Creek and Routeburn rivers are considered to be locally significant .

Of these rivers, the Greenstone, Caples, Lochy, Young, Wilkin, Nevis, Dingle Burn and Hunter rivers are classified as backcountry fisheries and require a separate endorsement on licenses in order to fish them. A part of the Greenstone River (between the Slyburn confluence and the head) is further classified and regulated as a 'controlled fishery' from 1 February to 31 March each year, and fishing it during these times requires the booking of a section of river, known as a "beat". There are three beats on the river, with a section downstream open to fishing without a beat booking. Both of these measures were deemed necessary after substantial research in order to preserve the high quality/low user density of the fisheries. These regulations are contained within the annual Sports Fish Licenses, Fees, and Forms Notice.

Participation

Surveyed fisheries

Fishery	2002 Angler Survey	2007 Angler Survey	2015 Angler Survey	Change
Greenstone River	372	710		338
Caples River	225	679		454
Lochy River	262	258		-4
Von River	519	872		353
Matukituki River	531	494		-37
Hunter River	1629	1225		-404
Dingleburn	105	91		-14
Teviot River	325	102		-223
Dunstan Creek	40	360		320
Nevis River	250	106		-144
Dart River	39	254		215
Rees River	79	177		98
Routeburn	440	820		380
Timaru Creek	481	157		-324
Wilkin River	145	412		267
Makarora River		1865		1865
Young River	117	17		-100

Availability

Backcountry rivers are characterized by difficult physical access, which often involves either substantial walking or in some cases challenging 4WD access. In some especially remote fisheries, such as the Dingle or Hunter, some anglers opt for flying in, either by fixed wing or helicopter. The Greenstone River above the Slyburn is a controlled fishery during the months of February and March each year, in order to better manage the high demand for angling during this time. Three "beats", or sections of river, have been identified and marked, and can be booked for specific periods of time during the controlled fishery season.

Risk

The sustainability of high quality angling experiences due to over-use is the main risk in these fisheries. A similar concern is maintaining public access to these fisheries, as capture by adjacent landholders for associated commercial uses remains a problem. The introduction of the backcountry fishery definition and backcountry license endorsement has given Otago Fish and Game the ability to gain specific insight into the angling use patterns within these backcountry fisheries. This information will allow for more informed management responses in the future if sustainability concerns arise.

Aside from the risks presented by development proposals, all have the potential to suffer from recreational angling capacity pressures characterised by encounter rates that detract from the angling experience. The following risks have been identified for each of the legally defined backcountry rivers, as well as those having backcountry characteristics but not legally classed as such:

Greenstone – limited threats currently, but some potential exists for recreational conflict between anglers and trampers, if the existing track was to be re-routed nearer the river and/or if numbers increase. The threats of roading development in the Greenstone appear to have receded as well, but a renewed Caples/Greenstone gondola proposal would seriously threaten the landscape values and fishery within this valley.

Caples – Similar to the Greenstone, but with the possibility of angler-tramper conflict occurring from current proposals to increase the concessionaire party size limit in the Caples Valley from 7 to 15 (Draft Otago Conservation Management Strategy, 2013) and also to allow more landings for angler and hunter access.

Lochy – The Lochy lacks public access in parts, but due to its remoteness is unlikely to suffer from capacity pressures. Access issues may be able to be resolved through the tenure review process of surrounding pastoral lease land.

Von – With the upgrade of the Mavora – Mt Nicholas Road to 2WD status this fishery is seeing more use, and further monitoring of spawning and harvest may be required to assess its current sustainability. A potential threat to the amenity values of the Von fishery is the increase in traffic volumes that will come from any further interest in a new transportation link along the lines of the the proposed Mavora-Snowdon monorail. Passengers were to have been transported to the monorail's terminus in ATV vehicle via the Von River road.

Matukituki – There are concerns that the Matukituki has been adversely affected by land use intensification within the catchment including wetland drainage and stream channelization and that the rivers fishery values are being affected. The ramifications of any decline in the habitat values of the river are that it will affect the fishery in Lake Wanaka, as one of the largest tributaries feeding the lake.

Hunter – the biggest issue facing the Hunter fishery is access and recreational conflict. There is increasing use of the fishery by fly-in anglers, including guided anglers. Recent relaxation of aircraft landing controls by DOC is of concern. The issue of road access across the pastoral lease into the station is ongoing. Access has been available for anglers at the discretion of the landholder except during lambing but the recent dispute between QLDC and the leaseholder over the underlying status of the road remains unresolved. Recreational conflict between anglers and jet boat usage on the river has caused issues in the past and may do so again. One way of resolving this is through the Queenstown Lakes District plan review process but boat speed limit rules also need compliance monitoring

Dingle – the Dingle fishery currently faces few issues, with any likely issues to emerge being around friction between anglers who have walked in and those who have flown in.

Upper Pomahaka – the Upper Pomahaka, faces a number of issues. The first is water quality, which has traditionally been good but in recent years has been declining as a result of land use intensification. The National Angler Survey does not include a category for the Upper Pomahaka, so it

is hard to determine whether the usage in this river has declined since the survey began in 1994/1995, but as the overall river usage has declined from 6783 angler days to 4142 over close to a 20 year period..

Another issue relates to public access, particularly in the headwaters of the river on Hukarere station. Whilst there are marginal strips and legal roads along both sides of the river (and the river itself is public land), access overland to these strips, and in some cases, along the strips themselves, is impractical, non-existent or interrupted in many cases.

The Leithen Burn, a tributary of the Upper Pomahaka, is one of two major salmon spawning sites within the Clutha catchment. This site deserves further protection from both surrounding land use and water quality degradation.

The Upper Fraser River, above the Fraser Dam behind Earnsclough Flats has had a reputation for being a good fishery, however, alluvial mining in the upper catchment prior to 2000 and siltation of Fraser Dam reservoir are thought to be the cause of a decline in fishery values. There is a lack of information on fishery values in the river.

The Nevis River supports a nationally outstanding trout fishery within a highly natural setting. It was threatened by proposals to dam the river in order to generate electricity but an amendment to the National Water Conservation (Kawarau) Order 1997 has prohibited dams on the river. Land development within the Nevis valley following tenure review of pastoral leases may pose some risk to the river and its setting

The Upper Taieri River has undergone a revival in fishing activity in recent years, with numbers of anglers increasing from 3659 in 2002/2003 to 4054 in 2007/2008. The Upper Taieri river also supports spawning in the main stem and tributary streams including the Kye Burn, Logan Burn and Sow Burn. The issues affecting this river include over-allocation in the side streams feeding it, affecting spawning and recruitment, pugging and damage to river banks, and the possibility of water quality degradation if land use intensification is not closely managed in the Upper Taieri catchment .

The Dart River has consistently turbid waters, and does not receive much angling use. Its long term threats are unknown.

The Rees River fishery has undergone a decline and recovery in angler use from 293 angler days in 1993/1994, to 129 in 2001/2002, and then rising to 177 in 2007/2008. As the usage is low, the reasons behind the decline and subsequent recovery are probably more related to angler use patterns than any underlying change in the fishery.

The fishable reaches of the lower Routeburn (below the gorge) have shown a marked increase in angler use, rising from 86 angler days in 2002 to 820 in 2008. This is a significant increase, and is probably related to the Sports Fish regulations that classify the fishery as a fly-only catch and release river because of its limited stocks of fish present and the beneficial effects of stock retention by comparison with harvest.

The Timaru River has seen a spike and decline in angler use numbers, rising from 169 in 1993/1994 to 481 in 2002/2003, and then falling to the 2008 level of 157. This is likely to be more reflective of small sample size and angler use patterns than any underlying change in the condition of the fishery.

The angling use patterns for the Upper Manuherikia are not known as this reach of the river is not surveyed as a discrete unit, but will be a portion of the 2064 angler days spent on the whole river.

The Upper Manuherikia is defined as the river above Falls Dam, which forms a discrete fishery as a result of the damming. The main threats within this fishery currently are the potential for lignite mining on the surrounding land (a threat which may be diminishing), which is Crown land but kept outside of the Oteake Conservation Park at the time of its creation, and also proposals to raise Falls Dam which could affect near-lake spawning sites and flood a section of the mainstem river.

Dunstan Creek has undergone a rise in use, recording 40 angler days in 2002/2003 and 320 angler days in 2007/2008. This indicates a productive fishery but also hints at displacement of anglers from lower down in the catchment. The main threats to this fishery is the over-allocation of water to irrigation, and the security of the fishery in the future depends on ensuring that deemed permits in the catchment are renegotiated with appropriate residual and minimum flows.

The Wilkin River has undergone a rise from 192 angler days in 1993/1994 to the current level of 412. The valley below the Mt Aspiring National Park boundary is currently grazed extensively, but this appears to have little impact on the fishery. Occasional conflict between jet boats and anglers is likely to be the main issue in this river. River bank instability has been an issue in the past

The Young River only recorded 17 angler days in 2007/2008, which is well down on the peak usage in 2002/2003 of 145 angler days. This may be related to a natural fluctuation in population or a flood event disturbing the fishery. Access to this fishery has improved with the construction of a track on the true right of the Makarora valley linking the bridge across the Makarora at the Blue Pools with the Young Valley, where previously access required fording the river, or a boat. It is still a long walk with fishing gear though, and few anglers probably undertake this. There has been a significant land slip in a branch of the the upper valley in recent years causing the formation of a small lake which seems to have become a stable feature

The Makarora River itself has undergone a steady increase in fishing use from 1457 in 1993/1994 to 1865 in 2007/2008. Threats to this river are few and the water quality within it is currently excellent.

Rainfed Rivers

<u>Surveyed fisheries</u>	<u>Unsurveyed fisheries</u>
Arrow River	Bannock Nurn
Catlins River	Boundary Creek
Deep Stream	Camp Creek
Diamond Creek	Catlins River
Fraser River	Cluden Stream
Hawea River	Deep Creek
Kawarau River	Dunstan Creek
Lee Stream	Fast Burn
Leith River	Ida Burn
Lindis River	Kaihiku River
Logan Burn Reservoir	Kaihiku Stream
Manuherikia River	Kaitangata Channel
Owaka River	Kaiwera Stream
Pomahaka River	Kye Burn
Shag River	Lee Stream
Tahakopa River	Leith River
Teviot River	Maclennan River
Tokomariro River	Manorburn
Waikouaiti River	Meggat Burn

Waipahi River	Pleasant River
Waipori River	Poolburn
Waitati River	Puerua River
Waiwera River	Silver Stream
	Staircase Creek
	Steele Creek
	Sutton Stream
	Tahakopa River
	Temple Burn
	Three O'Clock Stream
	Timaru River
	Tuapeka River
	Twelve Mile Creek
	Waikerikeri Creek
	Waikoikoi Creek
	Waitahuna River
	Waitati River
	Wye Creek

Description

Identified as Regionally Significant: Pomahaka, Waipahi, Shag, Manuherikia, Diamond Creek

Otherwise these rivers are considered as locally significant fisheries.

Participation

<u>Fishery</u>	<u>2002 Angler Survey</u>	<u>2007 Angler Survey</u>	<u>2015 Angler Survey</u>	<u>Change</u>
Shag River	1698	802		-896
Waikouaiti River	1357	1236		-121
Waitati River	130	1012		882
Tokomariro River	4089	519		-3570
Waipahi River	1815	919		-896
Catlins River	913	1492		579
Owaka River	191	1085		894
Tahakopa River	720	55		-665
Teviot River	325	160		-165
Waiwera River	315	119		-196
Logan Burn Reservoir	4276	2868		-1408
Lindis River	147	332		185
Manuherikia River	5269	2074		-3195
Lee Stream	55	154		99
Deep Stream	344	213		-131
Hawea River	4969	834		-4135
Diamond Creek	380	578		198
Arrow River	207 (in 1994/95)	347		140
Fraser River	529	1380		851
Pomahaka River	6004	4142		-1862
Kawarau River	1698	1930		232

Availability

Good distribution, readily accessible, particularly with landholder co-operation

Risk

Habitat degradation (non point source pollution, abstraction, channel modification, hydro development). Progressive restrictions on access, and the degradation of the angling experience and fishery values of some rivers, such as the Hawea River, due to the presence of didymo (*Didymosphenia geminata*)

Knowledge

Lack of fishery trend information. Superficial use/catch data

Major Rivers

Description

Big river fishing for brown and rainbow trout and sea run salmon in lower rivers

Nationally Significant: Upper Clutha

Regionally Significant: Taieri, Lower Clutha

Participation

<u>Fishery</u>	<u>2002 Angler Survey</u>	<u>2007 Angler Survey</u>	<u>2015 Angler Survey</u>	<u>Change</u>
Taieri River	11532	16358		4826
Upper Clutha	20155	22030		1,875
Lower Clutha	14447	12549		-1,898

Availability

Readily accessible in many reaches, but some serious access issues remain at the Clutha Mouth

Risk

Upper Clutha - Habitat degradation through land use intensification, and hydroelectricity flow regimes. The threat of hydroelectric development on the upper river has now diminished. The presence of didymo has degraded angling values throughout much of the upper river.

Lower Clutha - Habitat degradation through land use intensification, point source discharges, hydroelectricity flow regimes, silt discharges, bank stability and channel works (including gravel extraction).

Taieri. Habitat degradation through point and non-point source pollution, irrigation abstraction, channel management, reservoir construction, gravel extraction, and hydro flow regimes (in the upper river). The Upper Taieri also has a number of opportunities for substantial improvement to habitat values, including adjacent wetlands on the Taieri scroll plain.

Knowledge

Fair information base on angler use, some data on trends, superficial information base on habitat degradation, particularly lower river degradation and loss of fishery productivity.

Coastal Wetlands and Estuaries

Lakes Waihola
Lake Waipori
Lake Tuakitoto

Description

Identified as Nationally Significant for Wildlife/Hunting: Lake Waihola, Lake Waipori
Identified as Regionally Significant for Wildlife/ Hunting: Lake Tuakitoto, Tomahawk Lagoon
Identified as of local significance: Blueskin Bay, Catlins Lake, Kaikorai Lagoon, Shag Estuary, Waikouaiti Estuary

Availability

Close to centres of population, large accessible area by boat, restricted shore access

Risk

Habitat degradation: serious non-point source pollution and siltation

Knowledge

Fair hunter use/wildlife information, limited habitat trend info

Small Lakes

Surveyed fisheries

Moke Lake
Diamond Lake
Lake Hayes
Glenorchy Lagoons
Lake Dispute
Lake Johnson
Lake Kirkpatrick
Lake Luna
Lake Reid
Lake Rere
Lake Sylvan

Unsurveyed fisheries

None listed

Description

Mostly attractive smaller still water fisheries without serious risks and often close to smaller centres of population. Some have backcountry characteristics, such as Diamond Lake.

Participation

<u>Fishery</u>	<u>2002 Angler Survey</u>	<u>2007 Angler Survey</u>	<u>2015 Angler Survey</u>	<u>Change</u>
Moke Lake	365	1525		1160
Lake Hayes	1434	1544		110
Glenorchy Lagoons	Unrecorded	Unrecorded		

Lake Dispute	Unrecorded	Unrecorded		
Lake Johnson	79	171		92
Lake Kirkpatrick	70	27		-43
Lake Luna	Unrecorded	Unrecorded		
Lake Reid	Unrecorded	54		
Lake Rere	6	Unrecorded		
Lake Sylvan	Unrecorded	182		
Diamond Lake	519	472		-47

Availability

Readily accessible. Usable in bad weather conditions. Some restrictions on trolling.

Risk

No significant risks to lakes.

Knowledge

Tributary stream status unknown

Ponds, Reservoirs, Dams, and Urban Streams

Surveyed fisheries

Falls Dam
Fraser Dam
Manorburn Reservoir
Poolburn Reservoir
Lake Onslow
Lake Mahinerangi
Logan Burn Reservoir
Blakleys Dam
Butchers Dam
Conroys Dam
Coal Pit Dam
Hamiltons Dam
Hoffmans Dam
Hores Pond
Knights Dam
Lake Tewa
Leith Stream
Lone Pine Dam
MacAtamneys Head Pond
Mathias Dam
Phoenix Dam
Rutherfords Dam
Sullivans Dam
Southern Reservoir
Tomahawk Creek
West Eweburn Dam

Unsurveyed fisheries

Kaikorai Stream

Lake Tewa

Malones Dam

Description

These ponds, reservoirs, dams and urban streams cover a wide range of angling opportunities , from readily accessible urban environments through to remote locations. Reservoir fisheries can generally hold good stocks of fish without the effects of floods and flow variability (although the draining of reservoirs can be an issue) and they are often suitable for management as a put and take fishery.

Availability

Remote from centres of population and difficult to access in other than good weather conditions. Anglers huts at almost all fisheries.

Risk

Lake level fluctuations such as hydro operation regimes, irrigation demand regimes, some access issues). There have been serious declines in the quality of the fishery at Lake Mahinerangi, but the cause is unknown.

Knowledge

Most waters have some angler use/catch data but continuous records are lacking, assessment of habitat trends/impacts are lacking.

Participation

<u>Fishery</u>	<u>2002 Angler Survey</u>	<u>2007 Angler Survey</u>	<u>2013 Angler Survey</u>	<u>Change</u>
Falls Dam	132	193		61
Fraser Dam	529	1380		851
Manorburn Reservoir	529	3407		2878
Poolburn Reservoir	2810	3843		1033
Lake Onslow	3449	3423		-26
Lake Mahinerangi	4746	2163		-2583
Logan Burn Reservoir	4281	2868		-1413
Blakleys Dam	282	209		-73
Butchers Dam	204	618		414
Conroys Dam	83	401		318
Coal Pit Dam	763	98		-665
Hamiltons Dam	Unrecorded	Unrecorded		
Hoffmans Dam	280	Unrecorded		
Hores Pond	39	332		293
Knights Dam	70	Unrecorded		
Leith Stream	63	199		136
Lone Pine Dam	Unrecorded	Unrecorded		
MacAtamneys Head Pond	Unrecorded	281		
Mathias Dam	195	51		-144
Phoenix Dam	Unrecorded	Unrecorded		
Rutherfords Dam	125	26		-99
Sullivans Dam	2027	1233		-794
Southern Reservoir	1095	1034		-61

Tomahawk Lagoon	Unrecorded	317		
Tomahawk Creek	671	Unrecorded		
West Eweburn Dam	Unrecorded	638		

Availability

Readily accessible without excessive travel.
 Urban streams have potential to increase participation.

Risk

Ability to restock and dependence on hatchery operations
 Continued degradation in lower rivers and urban streams.
 Access across private land to ponds and reservoirs

Knowledge

Some creel survey results

Gamebird Resources

Waterfowl, upland game

Description

Large populations of mallard and paradise ducks form the mainstay of the hunting resource. Black swans, shoveler duck and upland game make up a relatively small contribution of the harvest.

Participation

~5000 including landholders (landholders hunting without purchasing licences under the landholders' privilege are estimated to number 1000)

Availability

Waterfowl hunting opportunity is not limiting participation but upland game hunting which is heavily dependant on hunter landholder relationships may be limited by hunting opportunity

Risk

Lack of hunter recruitment, skill development

Knowledge

Good knowledge of bird distribution and harvest

APPENDIX 4. RECREATIONAL OPPORTUNITY SPECTRUM

Classification of Angling and Hunting Opportunities in Otago within a Recreational Opportunity Spectrum

Categories	Waters: upper (U) middle (M) lower (L)	Setting: Urban Rural Natural Backcountry Remote	Activity: Fly (F), Spin (S), Troll (T) Hunt waterfowl(H)	Users: Local (L) Regional (R) National (N) International (I) Commercial (C) Juniors (J)
Major Lakes	Dunstan	Rural	F,S,B,T, H	L,R,N,I,C, J
	Hawea	Natural	F,S,B,T	L,R,N,I,C, J
	Wakatipu	Natural	F,S,B,T	L,R,N,I,C,J
	Wanaka	Natural	F,S,B,T	L,R,N,I,C, J
Backcountry Rivers		Remote <i>Backcountry endorsement required</i>	F	L,R,N,I,C,
	Caples	Backcountry	F,S,	L,R,N,I,C,
	Dart	Backcountry	F,S,B	L,R,N,I,C
	Diamond Creek	Remote <i>Backcountry endorsement required</i>	F,S	L,R,N,I,C,
	Dingle Burn	Backcountry	F,S,B	L,R,N,C,J
	Dunstan Creek	Backcountry	F,S,B	L,R,N,I,C
	Fraser (above Fraser Dam)	Remote <i>Backcountry endorsement required, controlled fishery during Feb-Mar.</i>	F	L,R,N,I,C,
	Greenstone	Remote, <i>Backcountry endorsement required</i>	F,S,B,	L,R,N,I,C,
	Hunter	Remote <i>Backcountry endorsement required for upper river.</i>	F (Catch & Release [C&R] -Upper)	L,R,N,I,C,
	Lochy	Backcountry	F,S	L,R,N,I,C,
	Makarora	Backcountry	F,S,B,	L,R,N,I,C
	Manuherikia (above Falls Dam)	Backcountry <i>Backcountry endorsement required</i>	F,S	L,R,N,I,C,
	Nevis	Backcountry/Remote	F,S,	L,R,N,I,C, J
	Rees	Backcountry	F (C&R)	L,R,N,I,C
Routeburn				

	Timaru Ck	Backcountry	F,S	L,R,N,I,C, J
	Upper Pomahaka	Backcountry	F,S,B	L,R,N,I,C,
	Upper Taieri	Backcountry Natural	F,S,B,H	L,R,N,I,C,
	Von	<i>Backcountry endorsement required</i>	F,S	L,R,N,I,C,
	Wilkin	Backcountry <i>endorsement required</i> Remote	F,S	L,R,N,I,C,
	Young	<i>Backcountry endorsement required</i>	F,S	L,R,N,I,C,
Rain-fed Rivers	Arrow	Rural	F,S,B	L,R,J
	Catlins River	Rural/Natural	F,S,B, H	L,R,J
	Deep Creek	Rural	F,S,B, H	L,J
	Hawea	Rural	F,S,B	L,R,J,C
	Kaihiku	Rural	F,S,B, H	L,R,J
	Lee Stream	Rural	F,S,B, H	L,J
	Lindis River	Rural	F,S,B	L,J
	Logan Burn	Rural	F,S,B,	L,J
	Maclennan River	Natural	F,S,B	L,J
	Manuherikia	Rural	F,S,B, H	L,R,J,C
	Owaka River	Rural	F,S,B, H	L,J
	Pomahaka (below Glenken)	Rural	F,S,B, H	L,R,J,C
	Shag	Rural	F,S,B,H	L,R,J
	Tahakopa River	Rural/Natural	F,S,B, H	L,J
	Tokomariro River	Rural	F,S,B, H	L,J
	Waikouaiti River	Rural	F,S,B, H	L,J
	Waipahi River	Rural	F,S,B, H	L,R,N,J
	Waitati River	Rural	F,S,B, H	L,J
	Waiwera River	Rural	F,S,B, H	L,J
Major Rivers	Clutha (Above Clyde Dam)	Rural/Natural	F,S,B, H	L,R,N,J,C
	Clutha (below Clyde Dam)	Rural	F,S,B, H	L,R,N,J,C
	Taieri	Rural	F,S,B, H	L,R,N,J,C
Reservoir Fisheries	Falls	Natural	F,S,B, T,H	L,R,N,J
	Fraser	Natural	F,S,B,T	L,R,N,J,C
	Logan Burn	Natural	F,S,B, T, H	L,R,C
	Mahinerangi	Rural	F,S,B, T,H	L,R,
	Manorburn	Natural	F,S,B,T	L,R,N,J,C
	Onslow	Natural	F,S,B,T	L,R,J,C
	Poolburn	Natural	F,S,B,T	L,R,N,J,C

**Coastal
Wetlands
and
Estuaries**

Blueskin Bay	Rural	F,S,B,T,H	L,J
Catlins Lake	Natural	F,S,B,T,H	L,R,J
Kaikorai Lagoon	Urban	Hw	L,J
Shag Estuary	Rural	F,S,B,H	L,R,J
Tuakitoto	Natural	F,S,B,T, H	L,R,N,J
Waihola	Natural	F,S,B,T, H	L,R,N,J
Waipori	Natural	F,S,B,T, H	L,R,N,J

**Other
Wetlands**

Glenorchy Lagoons	Natural	H	L,R,J
Takitakitoa	Natural	H	L,R,J
Tomahawk Lagoon	Urban	H	L,J
Upper Taieri Scroll Plain	Rural	F,S,B,H	L,R,C

Small Lakes

Butchers	Rural	F,S,B	L,R,N,J
Conroys	Rural	F,S,B	L,R,N,J
Diamond	Natural	F,S,T, H	L,R,N,J,C
Hayes	Rural	F,S,B	L,R,N,J
Johnson	Rural	F,S,B,T, H	L,R,N,J
Kirkpatrick	Rural	F,S,B	L,R,N,J,C
Moke	Natural	F,S,B,	L,R,N,J,C
Sylvan	Remote	F,S	L,R,N,J

**Ponds, Dams
& Urban
Streams**

Blakleys	Rural	F,S,B	L,R,J,C
Coal Pit	Rural	F,S,B	L,R,J
Hoffmans	Rural	F,S,B	L,R,J
Kaikorai Stream	Urban	F,S,B	L,J
Mathias	Rural	F,S,B	L,R,J,C
McAtamneys	Rural	F,S,B	L,R,J
Rutherfords	Rural	F,S,B	L,R,J,C
Southern	Urban	F,S	L,J
Sullivan	Natural	F,S	L,J
Tomahawk	Urban	F,S,B	L,J
Water of Leith	Urban	F,S,B	L,J

APPENDIX 5. SPORTS FISH AND GAMEBIRD RESOURCE SIGNIFICANCE

Multiple information sources are used to determine the significance of sports fish or gamebird resources. The highest significance rating determined in one source of information is the significance that applies to the fishery. These include:

Existing published reports or articles.

The primary source of published reports and articles on the significance of fisheries was published reports by Acclimatisation Societies or the Ministry of Fisheries Research Division in the 1980s. These reports contained detailed assessments of the significance of rivers, lakes and wetlands and their catchments.

Recognition of the fishery or gamebird resource in law

Law includes statutory instruments (formerly referred to as “regulations” such as national water conservation orders, former local water conservation notices (which have been since amalgamated with regional water plans), references to fishery and gamebird values within subordinate legislation such as regional policy and plans (in Otago, the regional policy statement and the regional water plan are the most important source of information), district plans, and also other documents such as Department of Conservation conservation management strategies and plans. Resource consents, particularly ‘global’ consents that deal with whole catchments or sub-catchments, may also contain reference to fishery and gamebird values.

Angler and hunter use

Angler use, as reported in the 7-yearly national angler survey, conducted by NIWA on behalf of the New Zealand Fish and Game Council. This survey has a dataset dating back to the mid 1990s.

Hunter use is reported primarily through the hunter diary scheme.

Angling and hunting recreational opportunity spectrum

The Otago Fish and Game region has an operative recreational opportunity spectrum which classifies fisheries and gamebird resources based on setting, type of activity, and type of user. Recreational opportunity spectra are used as a conservation management tool when there is a diverse range of recreational experiences within a region.

Angler perceptions

Anger perception surveys have been undertaken in New Zealand in 1978 and 2013 Unwin (2009, 2013; New Zealand Acclimatisation Societies, 1978). These are large-scale exercises which require participants to rank their experiences, perceptions and values of fishing in different rivers. The following criteria have been used:

- *Close to home* – (‘close to where you normally live’) This relates to travel distance to a fishery
- *Close to holiday location* – (‘close to where you live while on holiday’) This also relates to travel distance
- *Ease of access*
- *Large areas of fishable water*

- *Scenic beauty*
- *Wilderness character*
- *Anticipation of a good catch rate*
- *Anticipation of landing large fish*

Anglers are also asked to identify the “overall” value of a fishery on a 1-5 scale, based on the following criteria:

1. *This fishery can provide enjoyable angling, but is not exceptional;*
2. *This fishery often provides enjoyable angling, but is not exceptional;*
3. *This fishery consistently provides enjoyable angling;*
4. *This fishery provides a very enjoyable angling experience, and is one of my personal favourites;*
5. *This fishery provides an exceptional angling experience, and has few peers.*

Degraded Habitats and Populations

Where a fishery or hunting area or population has been degraded or has deteriorated over time because of identified or unidentified external factors its former significance status and potential for restoration deserve recognition. No fishery or game hunting area/population should be removed from a former status of nationally or regionally importance due to a human-induced decline in water quality or physical habitat. Instead, the appropriate response is to note the change and the reasons for the change in status and suggest remediation.

Habitat components of significance

Significance of fish or game habitats will include the following habitat considerations:

- the size or value of the fish or game population supported including for game, the proportion of a national population
- the importance to the life cycle requirements of a fishery or game population including spawning or breeding areas, areas for juvenile rearing
- role as migratory pathways or habitat corridors
- special characteristics of the habitats.

5.1 Nationally Significant Habitats

Please note that this list of rivers and lakes include their tributary streams in the catchment above the named river, lake, stream, or wetland because of the part they play in providing habitat areas for particular life stages of fish and game species.

Lakes Waihola and Waipori.

Nationally important wetland for both game habitat and as a recreational hunting area.

[Internal assessment by OFGC, Teirney et al 1984, p106]

Also considered national and internationally important for wildlife and fisheries

[DOC, 1993, DOC 1996, Davis 1997]

Recreational Opportunity Spectrum

Setting: natural,

Activities: fly, spin, bait, troll, hunt.

Users: local, regional, national user groups.

Lake Wanaka

A nationally important sports fishery

[Internal assessment by OFGC; Teirney et al 1984, p106, Hutchinson 1980]

Recreational Opportunity Spectrum

Setting: natural

Activities: fly, spin, bait, troll

Users: Local, regional, national, international, commercial, junior

Lake Wakatipu

A nationally important sports fishery

[Water Conservation (Kawarau) Order 1997, Internal assessment by OFGC; Teirney et al 1984, p106]

Recreational Opportunity Spectrum

Setting: natural

Activities: fly, spin, bait, troll

Users: Local, regional, national, international, commercial, junior.

Lake Hawea

A nationally important sports fishery

[Internal assessment by OFGC, Teirney et al 1984, p 106]

Recreational Opportunity Spectrum

Setting: natural

Activities: fly, spin, bait, troll

Users: Local, regional, national, international, commercial, junior

Lake Dunstan

A nationally important sports fishery

[Internal assessment by OFGC]

Recreational Opportunity Spectrum

Setting: rural

Activities: fly, spin, bait, troll, hunt

Users: Local, regional, national, international, commercial, junior

Greenstone River

A nationally important backcountry trout fishery

[Teirney et al 1984; Water Conservation (Kawarau) Order 1997, Jellyman and Graynoth 1994]

Also considered of national and international significance for outdoor recreation and conservation values [DOC 1996]

Recreational Opportunity Spectrum

Setting: remote

Activities: fly

Users: Local, regional, national, international, commercial

Hunter River

A nationally important backcountry trout fishery

[Teirney et al 1984, Jellyman and Graynoth 1994]

Recreational Opportunity Spectrum

Setting: remote

Users: fly, spin, bait

Local, regional, national, international, commercial

Caples River

A nationally important backcountry trout fishery

[Teirney et al 1984; Water Conservation (Kawarau) Order 1997, Jellyman and Graynoth 1994]

Also considered of national and international significance for outdoor recreation and conservation values [DOC 1996]

Recreational Opportunity Spectrum

Setting: remote

Activities: fly

Users: Local, regional, national, international, commercial

Lochy River

A nationally important backcountry trout fishery

[Teirney et al 1984; Water Conservation (Kawarau) Order 1997, Jellyman and Graynoth 1994]

Recreational Opportunity Spectrum

Setting: remote

Activities: fly, catch and release (upper Lochy)

Users: Local, regional, national, international, commercial

Nevis River

A nationally important backcountry trout fishery

[Water Conservation (Kawarau) Amendment Order 2013, Jellyman and Graynoth 1994]

Recreational Opportunity Spectrum

Setting: backcountry

Activities: fly, spin

Users: Local, regional, national, international, commercial

Diamond Lake, Reid Lake and Diamond Creek

(Reid Lake is sometimes known as Reids Lake)

A nationally important wildlife habitat, trout and salmon fishery and game hunting area. Diamond Lake is a wildlife management reserve and Diamond Creek is a significant salmon spawning ground. .

[Water Conservation (Kawarau) Order 1997, Wildlife Management Reserve, Schedule 9 of the Otago Regional Plan Water (WP)].

Recreational Opportunity Spectrum

Setting: backcountry

Activities: fly, spin, bait

Users: Local, regional, national, international, junior

Upper Clutha River

A nationally important recreational sports fishery, with particularly high angling values between the Lake Wanaka outlet and Cardrona River confluence.

[Teirney et al 1984, Teirney and Jowett 1990]

Recreational Opportunity Spectrum

Setting: rural

Activities: fly, spin, bait

Users: Local, regional, junior

5.2 Regionally Significant Habitats

Lake Tuakitoto

A regionally important wetland both as game habitat and as a recreational waterfowl hunting area.

[Local Water Conservation (Lake Tuakitoto) Notice 1991, NZ Gazette 1991, no. 126, p2745, Water Plan regionally significant wetland]

Also considered nationally important for wildlife and fisheries.

[DOC 1987, Davis 1987]

Recreational Opportunity Spectrum:

Setting: natural

Activities: fly, spin, bait, troll, hunt

Users: Local, regional, national, junior

Lower Clutha River

A regionally important area for sports fish, game and for angling and hunting

[Local Water Conservation (Pomahaka River and Tributaries and Lower Clutha River) Notice 1989, NZ Gazette 1989, No. 212, p6032, Hughey et al 1986]

Recreational Opportunity Spectrum

Setting: rural

Activities: fly, spin, bait, hunt

Users: Local, regional, national, junior, commercial

Taieri River

A regionally important area for sports fish, game and for angling and hunting

[Richardson 1984, Internal assessment by OFGC, Jellyman and Graynoth 1994]

Recreational Opportunity Spectrum

Setting: rural

Activities: fly, spin, bait, hunt

Users: Local, regional, national, junior, commercial

Pomahaka River

A regionally important brown trout fishery for both sea run and resident trout and as a game habitat and hunting area. The Upper Pomahaka River has backcountry characteristics.

[Local Water Conservation (Pomahaka River and Tributaries and Lower Clutha River) Notice 1989, NZ Gazette 1989, No. 212, p6032, Teirney et al 1984, Jellyman and Graynoth 1994, Teirney and Jowett 1990, WP Schedule 1A]

Recreational Opportunity Spectrum (middle and lower reaches, below Glenken)

Setting: rural

Activities: fly, spin, bait, hunt.

Uses: Local, regional, junior, commercial

Recreational Opportunity Spectrum (upper reaches, above Glenken)

Setting: backcountry

Activities: fly, spin, bait

Users: Local, regional, national, international, commercial

Upper Taieri Scroll Plain Wetlands

A regionally important wetland both for game and as a hunting area
[Internal assessment by OFGC; WP Schedule 9]

Recreational Opportunity Spectrum

Setting: rural

Activities: fly, spin, bait, hunt

Users: Local, regional, commercial

Waipahi River

A regionally important brown trout fishery

[Local Water Conservation (Pomahaka River and Tributaries and Lower Clutha River) Notice 1989, NZ Gazette 1989, No. 212, p6032, WP Schedule 1A]

Recreational Opportunity Spectrum

Setting: rural

Activities: fly, spin, bait, hunt

Users: Local, regional, national, junior

Kaikorai Estuary

A regionally important wetland both for game and as a hunting area
[Internal assessment by OFGC]

Recreational Opportunity Spectrum

Setting: urban

Activities: hunting

Users: Local, junior

Lake Mahinerangi.

A regionally important sports fishery

[Teirney et al 1984, p 106]

Recreational Opportunity Spectrum

Setting: rural

Activities: fly, spin, bait, troll, hunt

Users: Local, regional

Manorburn Reservoir

A regionally important sports fishery

[Teirney et al 1984, p 106]

Recreational Opportunity Spectrum

Setting: natural

Activities: fly, spin, bait, troll

Users: Local, regional, national, junior, commercial

Poolburn Reservoir

A regionally important sports fishery
[Teirney et al 1984, p 106]

Recreational Opportunity Spectrum
Setting: natural
Activities: fly, spin, bait, troll
Users: Local, regional, national, junior, commercial

Lake Onslow

A regionally important sports fishery
[Teirney et al 1984, p 106]

Recreational Opportunity Spectrum
Setting: natural
Activities: fly, spin, bait, troll
Users: Local, regional, junior, commercial

Lake Sylvan

Situated within Mt Aspiring National Park, and recognised by the National Water Conservation (Kawarau River) Order

Recreational Opportunity Spectrum
Setting: remote
Activities: fly, spin
Users: local, regional, national, junior

Loganburn Reservoir and Logan Burn

A regionally important sports fishery
[Teirney et al 1984, p 106]

Recreational Opportunity Spectrum
Setting: natural
Activities: fly, spin, bait, troll, hunt
Users: Local, regional, commercial

Dingle Burn

A regionally important backcountry trout fishery
[Jellyman and Graynoth 1994]

Recreational Opportunity Spectrum
Setting: remote
Activities: fly, spin
Users: Local, regional, national, international, commercial

Route Burn

A regionally important backcountry trout fishery
[Water Conservation (Kawarau) Order 1997, Jellyman and Graynoth 1994].

Recreational Opportunity Spectrum
Setting: natural
Activities: fly (catch and release)
Users: Local, regional, national, international, commercial

Lake Hayes

A regionally important trout fishery and wildlife habitat.
[Water Conservation (Kawarau) Order 1997, Teirney et al 1984, p 106, Wildlife Sanctuary]

Recreational Opportunity Spectrum
Setting: rural
Activities: fly, spin, bait
Users: Local, regional, national, junior

Hawea River

A regionally important trout fishery
[Internal assessment by OFGC, Unwin and Brown 1998]

Recreational Opportunity Spectrum
Setting: rural
Activities: fly, spin, bait
Users: Local, regional, junior, commercial

Manuherikia River

A regionally important trout fishery.
The upper reaches of this river have backcountry characteristics.
[Internal assessment by OFGC]

Recreational Opportunity Spectrum
Setting: rural, backcountry (for the upper river)
Activities: fly, spin, bait, hunt
Users: Local, regional, junior, commercial

Dunstan Creek

A regionally important trout fishery
[Internal assessment by OFGC]

Recreational Opportunity Spectrum
Setting: backcountry
Activities: fly, spin, bait, hunt
Users: Local, regional, national, junior, commercial

Shag River

A regionally important trout fishery

[Internal assessment by OFGC, Davis 1987, Teirney and Jowett 1990]

Recreational Opportunity Spectrum

Setting: rural

Activities: fly, spin, bait, hunt

Users: Local, regional, junior

Von River

A regionally important backcountry trout fishery

[Water Conservation (Kawarau) Order 1997, Jellyman and Graynoth 1994].

Recreational Opportunity Spectrum

Setting: backcountry

Activities: fly, spin

Users: local, regional, national, international, commercial

Lower Tokomariro River and adjacent wetlands

A regionally important wildlife habitat for game birds and protected species, also supports a brown trout fishery. This river has suffered from marked water quality deterioration in recent years.

[Internal assessment by OFGC, Otago Regional Council water quality report 2012]

Recreational Opportunity Spectrum

Setting: rural

Activities: fly, spin, bait, hunt

Users: local, junior

Glenorchy Lagoon

A regionally important wildlife habitat for game birds and protected species. .

[Internal assessment by OFGC, Wildlife Management Reserve Status, WP Schedule 9]

Recreational Opportunity Spectrum

Setting: natural

Activities: hunt

Users: local, regional, junior

Tomahawk Lagoon

A regionally important wildlife habitat for game birds and protected species, also supports a trout and perch fishery

[Internal assessment by OFGC]

Recreational Opportunity Spectrum

Setting: rural

Activities: hunt

Users: local, junior

Takitakitoa Wetland

A regionally important wildlife habitat for gamebirds and protected species.

[Otago Regional Water Plan: Schedule 9]

Recreational Opportunity Spectrum

Setting: natural

Activities: hunt

Users: local, regional, junior

5.3 Locally Significant Habitats

All sports fish and gamebird habitats that are not listed as nationally or regionally significant above should be considered as locally significant in the first instance in the absence of further information about the habitat.

Waikouaiti River

This river sits on the border between a locally and regionally significant fishery on the basis of angler use. Its key attributes include: a fishery composed of both sea run and river resident trout; the ability to catch trophy fish; its proximity to a large centre of population (Dunedin) and a growing local population. It is one of a few sizeable and fishable East Coast rivers between Dunedin and Oamaru is also a consideration (the other three are the Waianakarua, Kakanui and the Shag River).

Recreational Opportunity Spectrum

Setting: rural

Activities: fly, spin, bait, hunt

Users: local, junior

Waitati

Recreational Opportunity Spectrum

Setting: rural

Activities: fly, spin, bait, hunt

Users: local, junior

Catlins

Recreational Opportunity Spectrum

Setting: rural/natural

Activities: fly, spin, bait, hunt

Users: local, regional, junior

Owaka

Recreational Opportunity Spectrum

Setting: rural

Activities: fly, spin, bait, hunt

Users: local, junior

Tahakopa

Recreational Opportunity Spectrum
Setting: rural/natural
Activities: fly, spin, bait, hunt
Users: local, junior

Maclennan

Recreational Opportunity Spectrum
Setting: natural
Activities: fly, spin, bait
Users: local, junior

Waiwera

Recreational Opportunity Spectrum
Setting: rural
Activities: fly, spin, bait, hunt
Users: local, junior

Lee Stream

Recreational Opportunity Spectrum
Setting: rural
Activities: fly, spin, bait, hunt
Users: local, junior

Deep Stream

Recreational Opportunity Spectrum
Setting: rural
Activities: fly, spin, bait, hunt
Users: local, junior

Kaihiku Stream

Recreational Opportunity Spectrum
Setting: rural
Activities: fly, spin, bait, hunt
Users: local, regional, junior

Arrow River

Recreational Opportunity Spectrum
Setting: rural
Activities: fly, spin, bait
Users: local, regional, junior

Lake Johnson

Recreational Opportunity Spectrum

Setting: rural

Activities: fly, spin, bait, troll, hunt

Users: local, regional, national, junior

Moke Lake

Recreational Opportunity Spectrum

Setting: natural

Activities: fly, spin, bait

Users: local, regional, national, junior, commercial

Conroys Dam

Recreational Opportunity Spectrum

Setting: natural

Activities: fly, spin, bait

Users: local, regional, national, junior

Butchers Dam

Recreational Opportunity Spectrum

Setting: natural

Activities: fly, spin, bait

Users: local, regional, national, junior

Lake Kirkpatrick

Recreational Opportunity Spectrum

Setting: natural

Activities: fly, spin, bait

Users: local, regional, junior

Sullivans Dam

Recreational Opportunity Spectrum

Setting: natural

Activities: fly, spin

Users: local, junior

Southern Reservoir

Recreational Opportunity Spectrum

Setting: urban

Activities: fly, spin

Users: local, junior

Coal Pit Dam

Recreational Opportunity Spectrum

Setting: rural

Activities: fly, spin, bait

Users: local, regional, junior

Hoffmans Dam

Recreational Opportunity Spectrum

Setting: rural

Activities: fly, spin, bait

Users: local, regional, junior

Blakelys Dam

Recreational Opportunity Spectrum

Setting: rural

Activities: fly, spin, bait

Users: local, regional, junior, commercial

Rutherfords Dam

Recreational Opportunity Spectrum

Setting: rural

Activities: fly, spin, bait

Users: local, regional, junior, commercial

McAtamneys Head Pond/Dam

Recreational Opportunity Spectrum

Setting: rural

Activities: fly, spin, bait

Users: local, regional, junior

Mathias Dam

Recreational Opportunity Spectrum

Setting: rural

Activities: fly, spin, bait

Users: local, regional, junior, commercial

Kaikorai Lagoon

Recreational Opportunity Spectrum

Setting: urban

Activities: fly, spin, bait

Users: local, junior

Kaikorai Stream

Recreational Opportunity Spectrum

Setting: urban

Activities: fly, spin, bait

Users: local, junior

Water of Leith

Recreational Opportunity Spectrum

Setting: urban

Activities: fly, spin, bait

Users: local, junior

Blueskin Bay

Recreational Opportunity Spectrum

Setting: rural

Activities: fly, spin, bait, hunt

Users: local, junior

Catlins Lake

Recreational Opportunity Spectrum

Setting: natural

Activities: fly, spin, bait, hunt

Users: local, regional, junior

Shag Estuary

Recreational Opportunity Spectrum

Setting: rural

Activities: fly, spin, bait, hunt

Users: local, regional, junior

APPENDIX 6. WETLAND RESERVES OWNED OR MANAGED BY THE COUNCIL

Name	Location	Status	Owner	Area Ha.	Gazette Reference or Title Reference
Takitakitoa Wetland	Near Lower Taieri River below Waipori River confluence	Freehold title	F&G	40	Fee Simple, 1/1, Lot 1 Deposited Plan 300569 and Lot 1 Deposited Plan 301419 Fee Simple, 1/1, Allotment 23 Block A Taieri Maori Reserve Part Taieri Sec 24 Blk A Block
Toko Wetland: Davis	Lower Tokomariro Catchment	QE II Covenant, Freehold title	F&G	5	Fee Simple, 1/1, Lot 1 Deposited Plan 21009
Toko Wetland: Nobleburn	Lower Tokomariro Catchment	Freehold title	F&G	46	Fee Simple, 1/1, Part Lot 1 Deposited Plan 21008
Toko Wetland: City Forests Ltd	Lower Tokomariro Catchment	QE II Covenant,	City Forests Ltd	22.5	
Waitepeka Wetland	Adjacent to SH 82, Finegand, South Otago	Freehold title	F&G	35	Fee Simple, 1/1, Lot 3-4 Deposited Plan 22588
Finegand Lagoon	On lower Waitapeka Stream, near SH 82, Finegand, South Otago	Wildlife Refuge F&G Covenant	Private	15	17 Dec. 1959. No.78, p.1919
Waihola Wetland	Western margin, Lake Waihola	Wildlife Reserve	Crown	8.5	
Otokia Wetland	Adjacent to SH1 north		Otago Region	9	

	of Otokia Bridge on Lower Taieri		al Council		
Bendigo Wetland	Clutha Arm of Lake Dunstan, Central Otago	Pending Wildlife M'gement Reserve	Crown	153	
Little Hoopers Inlet	Northern margin of Hoopers Inlet, Otago Peninsula	Wildlife M'gement Reserve	Crown		
Inch Clutha Wetland	Adjacent Chickory Road, Inch Clutha, South Otago	Wildlife Mgement Reserve	Crown	17	15 April 1999, No.45, p1055

APPENDIX 7. PUT & TAKE STOCKING SCHEDULE

The following is the put-and-take fishery stocking schedule for Otago as at August 2013. All fish are sourced from the Otago Fish and Game Council hatchery at Macraes Flat.

Species	Age	Number PA	Release Date	Fishery
Rainbow	2	300	December	Sullivans Dam
Rainbow	2	800	December	Southern Reservoir
Rainbow	2	100	March	Tomahawk Lagoon
Rainbow	1	500	Oct	Rutherfords Dam
Rainbow	1	200	Oct	McAtamneys Head Pond
Rainbow	1	500	Oct	Blakleys Dam
Rainbow	1	100	Oct	Hamiltons Dam
Rainbow	1	300	Oct	Mathais Dam
Rainbow	1	1000	Oct	Butchers Dam
Rainbow	1	500	Oct	Lake Johnson
Rainbow	1	150	Oct	Coal Pit Dam
Rainbow	1	200	Oct	Nenthorn Dam
Rainbow	1	100	Oct	Perkins Pond
Rainbow	2	100	December	Earnsclough Pond
Rainbow	1	100	Oct	Island Block Ponds
Rainbow	2	100	Oct	Lake Tewa
Rainbow	1	300	Oct	Moke Lake

APPENDIX 8. APPROVAL



Office of Honourable Maggie Barry ONZM

MP for North Shore
Minister for Arts, Culture and Heritage
Minister of Conservation
Minister for Senior Citizens

12 APR 2015

6 MAY 2015

Monty Wright
Chairperson
Otago Fish and Game Council
PO Box 78
Dunedin 9054

Dear Monty

Thank you for your letter of 14 February 2015 enclosing the draft Sports Fish and Game Management Plan for Otago – 2015-2025.

I think it clearly sets out the council's management intentions for Otago, and gives due regard to the sustainability of sports fish and game in the region, the impact of the proposed management regime on the resources, and allows recreational anglers and hunters to maximise their opportunities.

Clearly, a great deal of work has gone into the development of the management plan and I congratulate all those who have contributed. In particular, please convey my appreciation to the Otago Fish and Game Council.

I have no comments of substance that I wish the council to consider. In accordance with section 17M(g) of the Conservation Act 1987, I hereby approve the Sports Fish and Game Management Plan for Otago.

Yours sincerely

Honourable Maggie Barry ONZM
Minister of Conservation

APPENDIX 9. REFERENCES

Barr, G.A.M., 1968, Summer Food and Feeding Habits of Trout (*Salmo trutta*, L.) and Perch (*Perca fluviatilis*, L.) in Lake Mahinerangi, BSc. Hons. Thesis, Zoology Department, Otago University, Dunedin.

Boustead, N., 1996, Examination of rainbow trout from tributaries of Lake Dunstan for whirling disease, NIWA Consultancy Report No: CFT60501, NIWA, Christchurch.

Cawthron Institute, 2002, Backcountry River Fisheries: Seminar Proceedings & Update of Research, Report No. 727, Cawthron Institute, Nelson.

Clutha Fisheries Trust, Undated, Lake Dunstan Creel Survey November 1992 – 1998, History and Reports, Clutha Fisheries Trust, Cromwell.

Davis, S., 1987, Wetlands of national importance to fisheries, NZ Freshwater Fisheries Report No. 90, MAFFish, Christchurch.

Department of Conservation, 1993, The New Zealand Recreation Opportunity Spectrum: Guidelines for Users, Published by the Department of Conservation with the support of the Hilary Commission, Wellington.

Department of Conservation, 1993, Lakes Waipori & Waihola Wetland: A Natural Resource Inventory, Department of Conservation, Otago.

Department of Conservation, 1996, Otago Conservation Management Strategy, Department of Conservation, Otago.

Dons, A., Watson, N. and Hamilton, D., 1988, Water Management in the Upper Taieri River, Otago, New Zealand, In: Waters in Society: Papers of the Fifth National IPENZ Water Conference, August, 1998, Dunedin

Graynoth, E., 1974, The Otago Trout Fishery, Fisheries, Technical Report No. 127, NZ Ministry of Agriculture and Fisheries, Wellington.

Graynoth, E., 1998, Lake Dunstan Trout Stocks December 1992 - May 1996, .NIWA Client Report No: CHC 98/4., NIWA, Christchurch.

Graynoth, E., 1996, Lake Dunstan fisheries survey November 1995, .NIWA Consultancy Report No: 60501, NIWA, Christchurch.

Graynoth, E., Jellyman, D., Bonnett, M. Taylor, M., 1995, Results of fisheries survey of Lake Dunstan, November 1994, Consultancy Report No: ELE037, NIWA, Christchurch.

Graynoth, E., 1998, Lake Dunstan Trout Stocks 1997, .NIWA Client Report No: CHC 98/58. NIWA, Christchurch

Graynoth, E., 1998, Lake Dunstan Trout Stocks 1998, .NIWA Client Report No: CHC 98/21. NIWA, Christchurch.

Grindell, D. and Guest, P. 1986, A list of rivers and lakes deserving inclusion in a Schedule of Protected Waters: Report of the Protected Waters Assessment Committee, Water and Soil Miscellaneous Publication No. 97, Ministry of Works and Development, Wellington

Glova, G., and Davis, S., Submission on the Proposed Luggate/Queensberry Hydro- Electric Development, Fisheries Environmental Report No. 9, MAF, Christchurch

Hayes, J. 1996, Lake Dunstan Fisheries Research 1992-1996: Executive Summary, Cawthron Report No 351, Cawthron Institute, Nelson.

Hayes, J. and Young, R., 2001, Review of the Effects of Low Flow on Trout and Salmon in Relation to Minimum Flow Policies in the Proposed Regional Water Plan for Otago, Cawthron Report No.615, Cawthron Institute, Nelson.

Hughey, K., Smith, L., and Preston, D. 1986, Birds of the Lower Clutha River. Their distribution and habitat use, Occasional Publication No.11, New Zealand Wildlife Service, Wellington

Hutchinson, R. 1980, The Freshwater Fishery, In: The Resources of Lake Wanaka, Robertson, B and Blair, I. Ed., Lincoln Papers in Resource Management No.5, Lincoln College

Kearsley, G., 1997, Wilderness Tourism: a new rush to destruction?, Inaugural Professorial Lecture, Division of Commerce, University of Otago.

Jellyman, D. and Graynoth, E., 1994, Headwater trout fisheries in New Zealand, NZ Freshwater Research Report no. 12, NIWA, Christchurch.

Jellyman, D. and Graynoth, E., 1993, Summary of results of fisheries survey of Lake Dunstan March 1994, Consultancy Report No. ELE027 NIWA, Christchurch.

Jellyman, D. and Graynoth, E., 1992, Survey of juvenile trout in the Lindis and Cardrona Rivers, and Clutha River in the vicinity of Cromwell, March 1992, including a review of previous surveys. NZ Freshwater Misc. Report no. 120, MAF, Christchurch.

Jellyman, D., Bonnett, M. and Graynoth, E., 1993, Summary of results of fisheries survey of Lake Dunstan: November 1993, NZ Freshwater Misc. Report no. 140, NIWA, Christchurch.

Johnson, W., 1976, Distribution and Habitat Utilization of the Chukar Partridge (*Alectoris chukar*) in the Otago Acclimatization District., Dip. Wildlife Management Thesis, University of Otago, Dunedin.

Jowett, I., 1984, Fraser River Hydrology and Fish Habitat, Ministry of Works and Development, Wellington.

Jowett, I., 1995, Assessment of Flow Requirements for the Hawea River, Consultancy Report ELE60210, NIWA, Hamilton

Maturin, S. and Wright, M., 1989, Fisheries & Wildlife Values of the Shag River, Otago Acclimatisation Society, Dunedin.

New Zealand Government, 2001, New Zealand Gazette, No. 161, p3949., 29 November 2001,

- New Zealand Government, 1990, New Zealand Gazette, No. 83, 24 May 1990
- Otago Acclimatisation Society, Annual Report 1951-1952, Dunedin
- Otago Catchment Board 1983, The Taieri River: A Water Resources Inventory, Otago Catchment and Regional Water Board, Dunedin.
- Otago Catchment Board 1983, Tomahawk Lagoons: a water and soil management report, Otago Catchment and Regional Water Board, Dunedin.
- Otago Catchment Board 1985, Water Resources Inventory of the Clutha, Kawarau and Hawea Rivers: A Review, Otago Catchment and Regional Water Board, Dunedin.
- Otago Regional Council 2000, Proposed Regional Plan: Water, Otago Regional Council, Dunedin.
- Pack, Y. and Jellyman, D. 1988, Fish stocks and fisheries of the lower Clutha River, NZ Freshwater Fisheries Report No. 98, MAFFish, Christchurch.
- Richardson, J., Unwin, M., Teirney, L., 1984, The relative value of Otago rivers to New Zealand Anglers, Fisheries Environmental Report No. 48, MAF, Christchurch.
- Riddell, J., Watson, N. and Davis, S., 1988, Fisheries investigations of the Ashers-Waituna, Benhar and Hawkdun lignite deposit areas, NZ Freshwater Fisheries Report No. 94, MAFFish, Christchurch.
- Ross Dungey Environmental Consultants, 2000, Otago Irrigation Schemes: Preliminary assessment of the information existing on streams that contribute to these irrigation schemes, Ross Dungey Environmental Consultants, Benhar
- Scott, D. and Watson, R., 1980, Creel & Angling Census 1970-80, IN: Otago Acclimatisation Society Annual Report 1980, Dunedin.
- Scott, D. 1996, The Anglers' Catch: A three year study of the catch of sports fish in Lake Dunstan, Clutha Sports Fisheries Trust, Cromwell
- Soulsby, R., 1982, Duck Harvest and the 1982 Duckshooting Season in Otago, Dip. Wildlife Management Thesis, University of Otago, Dunedin
- Stankley, G.H. and Wood, J. , 1982, The Recreation Opportunity Spectrum: An Introduction, In: Australian Parks & Recreation.
- Smith, M. and Scott, D., 1991, Pomahaka River Study, Zoology Department, University of Otago. Dunedin.
- Teirney, L., Unwin, M., Rowe, D., McDowall R., Graynoth, E., 1982, Submission on the Draft Inventory of Wild and Scenic Rivers of National Importance, Fisheries Environmental Report No. 28, MAF, Christchurch.
- Teirney, L. and Jowett, I., 1990, Trout Abundance in New Zealand Rivers: An Assessment by Drift Diving, NZ Freshwater Fisheries Report No. 118, MAF Fisheries, Christchurch

Unwin, M., and Brown, S., 1998, The Geography of Freshwater Angling in New Zealand, A summary of results from the 1994/96 National Angling Survey, National Institute of Water and Atmospheric Research, Christchurch

Unwin, M., 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, National Institute of Water and Atmospheric Research, Christchurch

Unwin, M., 2009 Angler usage of lake and river fisheries managed by Fish and Game New Zealand: results from the 2007/08 National Angling Survey, National Institute of Water and Atmospheric Research, Christchurch

Unwin, M., 2009, Attributes characterising river fisheries managed by Fish and Game New Zealand: a pilot survey of the Otago and Nelson/Marlborough regions, National Institute of Water and Atmospheric Research, Christchurch

Unwin, M., 2013, Values of New Zealand Angling Rivers – Results of the 2013 National Angling Survey, National Institute of Water and Atmospheric Research, Christchurch

Walrond, C., 1995, Wilderness Fisheries Management – A Case Study of the Social Carrying Capacity for the Greenstone River, Planning Department, University of Otago, Dunedin.

Walrond, C., 1997, The Caples River Survey: A social survey of Caples River anglers conducted over the 1996/7 season, Otago Fish & Game Council, Dunedin.

Walrond, C. and Hayes, J. 1997, Social Survey of Backcountry Anglers in Nelson-Marlborough & Otago, Cawthron Institute, Nelson.

Walrond, C. W., 2001, Encounter levels – a study of backcountry river trout anglers in Nelson-Marlborough and Otago, Phd Thesis, University of Otago

Watson, N., 1982, Lower Fraser River Fisheries Investigations: Interim Report, Otago Acclimatisation Society, Dunedin

Watson, N., Regional Modifications to Waterways; Part XI, Otago's Water Resources, IN: Freshwater Catch 32, Winter 1987, MAFFish, Christchurch.

Whiting, R., 1986, Water-based recreation on the lower Clutha River, NZ Freshwater Fisheries Report No. 61, NZ MAF, Christchurch.

Williams, M., 1981, The Duckshooter's Bag – An understanding of New Zealand's wetland gamebirds, The Wetland Press, Wellington

Young, R. and Hayes, J., 1999, Trout Energetics and Effects of Agricultural Land Use on the Pomahaka Trout Fishery, Cawthron Institute, Nelson