

**RDR Modified Fish Pass
Recreation Effects Assessment**

**Prepared for Holland Beckett Lawyers
on behalf of
Rangitata Diversion Race Management Ltd**



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RDR Modified Fish Pass

Recreation and Tourism Effects Assessment

Contents

1	Introduction and summary.....	4
1.1	Method	5
2	Access and land status	6
3	Setting management and agency data.....	7
3.1	Water Conservation (Rangitata River) Order 2006	7
3.2	Canterbury Regional Council	8
3.3	Department of Conservation	12
3.4	Central South Island Fish & Game Council	15
4	Activity descriptions.....	17
4.1	Fishing	17
4.2	Kayaking	19
4.3	Rafting.....	21
4.4	Jet boating	21
4.5	Education	22
4.6	Other terrestrial recreation	22
4.7	Summary.....	23
5	Potential effects of the proposal and recommended mitigations	25
5.1	New infrastructure.....	25
5.2	Construction	25
5.3	Operation	26
5.4	Flow regime	26
5.5	Mitigations.....	28
5.5.1	In-river.....	28
5.5.2	Terrestrial.....	29
6	Conclusion	30
7	References	31
8	Appendix 1: Daly 2004.....	32

List of Figures

Figure 1: Public access near RDR intake – WAMS output October 2017	6
Figure 2: Canterbury DOC Recreation Opportunity Spectrum (detail) (ECan 2011)	15
Figure 3: Angler days for main Canterbury salmon rivers by NAS survey (Unwin et al)	17
Figure 4: Summary of recreational uses of Rangitata River.....	23
Figure 5: Proposed fish pass and return channel location	25
Figure 6: Part of the affected reach below RDR intake at 80 m ³ /s, 5 October 2017	29

1 Introduction and summary

This report is an addendum to the *Klondyke Water Storage Recreation and Tourism Effects Assessment* (5 July 2016) prepared by the same author. It addresses the recreation effects associated with the adoption of a fish screen and canal by-pass (as part of the Rangitata Diversion Race), which is different from that assessed in relation to the original Klondyke Water Storage Facility proposal. The revised proposal is described in detail in the *Rangitata Diversion Race Fish Screen Concept Report* (Morgan 2017).

Rangitata Diversion Race Management Ltd (RDRML) is proposing to install a modified fish pass to exclude fish (including very small fish) from the RDR intake. The current fish pass takes and returns a maximum of 3 m³/s of water between 10 September and 31 January to and from the Rangitata River at Klondyke over a distance of just over 2380 m. The new screen will require a take and return flow of up to: 3 m³/s over a shortened distance of 1380 m (the 'affected reach') for flows below 132.6 m³/s measured at Klondyke (before the RDR intake); up to 4 m³/s for flows between 132.6 and 142.6 m³/s; and up to 5 m³/s for flows above 142.6 m³/s. The period of operation of the fish pass would extend from 1 September to 31 May.

Two states of the 'existing environment' are considered in this assessment. RDRML is currently reapplying for the consent for its 3 m³/s bypass take, which recently expired. At the time of writing, the take is reduced to 700 l/s, and this forms the 'existing environment' today. At the time that the application for the up-to-5 m³/s bypass take is heard, it is expected that the 3 m³/s bypass take will have been reinstated and the 'existing environment' will be what has been normally experienced on the River with the current fish pass in place.

Recreational uses of the Rangitata River considered in this assessment are those which gain amenity from flows above the minimum level defined by the Rangitata River Water Conservation Order (WCO); specifically jet boating, kayaking, trout and salmon fishing and rafting. All these activities on the River, apart from trout fishing, are considered to be 'outstanding' at the national level by the WCO, with kayaking and rafting – and particularly their value for educational purposes – and salmon angling considered outstanding in the affected reach.

The key changes are:

- Increased amenity for trout and salmon angling due to improvements in fish recruitment (described in Ryder (2017)).
- Compared to the 'existing environment' with the 3 m³/s take reconsented, there is a small change in kayaking and rafting amenity due to reduced flows for 1380 m of River over a longer period of the season. The proposal is a reduction of up to 5 m³/s over the existing take of 3 m³/s for an additional 4 month period (February to May). The scale of change from 3 m³/s to 5 m³/s will be very difficult to discern in-river as the residual flow in the affected reach when the bypass take increases above 3 m³/s will result in a minimum flow of 93.4 m³/s. It is the 3 m³/s diversion flow which is of most interest, and will operate with residual flows in the affected reach as low as 17.7 m³/s. While the affected reach is short, it is steep and features a short 'bony' distance with large boulders. This represents a hurdle in the kayaking and rafting journey from above the Rangitata Gorge to Peel Forest, with a range of changes of 1.3 fewer days per season for 'beginner kayak' (a 3.3% loss), to 1.9 days more for the lower rafting band (a 2.4% gain); and
- A very minor improvement in kayaking and rafting amenity over 1000 m with an additional 700 l/s or 3 m³/s of flow (for each 'existing environment' scenario). This is

unlikely to be noticeable when in a raft or kayak under either scenario, but can be considered a minor advantage, particularly for the 3 m³/s return.

- Compared to the 'existing environment' with a 700 l/s bypass take, a more than minor adverse effect on kayak and rafting amenity over the 1380 m river section (up to 4.4 fewer days for 'advanced/expert kayakers' – a 4.7% loss, with no gains in days for any kayaking or rafting flow bands), and, as described above, an adverse effect on the journey from the Gorge to Peel Forest.

At flows above the lower threshold for beginner kayaking (40 m³/s) and the lower threshold for rafting (50 m³/s), fish bypass flows rapidly recede as an adverse effect as they will not hinder passage and only affect, in a very minor way, the whitewater experience on one short section of the River.

There is little effect on recreation access from operation of the new fish pass and discharge channel to the River. The area affected features a public easement allowing angler, walking and cycle access to the lower Rangitata Gorge on the true left. This will be retained, requiring some resurveying for a short section. There are no relevant effects – at a River-level – on preferred salmon and trout angling flows (a small increase in flow suitability for trout and a small decrease for salmon angling over 1380 m of river in a relatively low-use setting for both scenarios).

A partial cease to abstraction for the RDR scheme is proposed over two eight-hour periods, on request and affecting the entire River below the RDR intake as mitigation for the 'existing environment' with the 700 l/s baseline. The effect on kayaking and rafting compared with the 3 m³/s baseline is sufficiently slight, and includes additional days for rafting and intermediate kayaking, to avoid the need for additional mitigation (that is, the benefits of a shortened diversion and advantages in some recreation flow bands, balance the minor losses in other flow bands). In addition, the fish pass will increase recruitment of trout and salmon and benefit the largest recreational uses of the River.

Although the consented RDR irrigation scheme abstraction (a maximum of 32.7 m³/s) increases the number of days available to beginner kayakers compared with the natural flow regime, the natural regime no longer represents the existing environment. However, compared with either 'existing environment', the bypass flow maintains more days for beginner kayakers than the natural flow in the affected reach.

1.1 Method

This report is based on literature review and communication with the authors of specialist reports prepared to advise the consent application and also prepared for Holland Beckett Lawyers. In particular, these include:

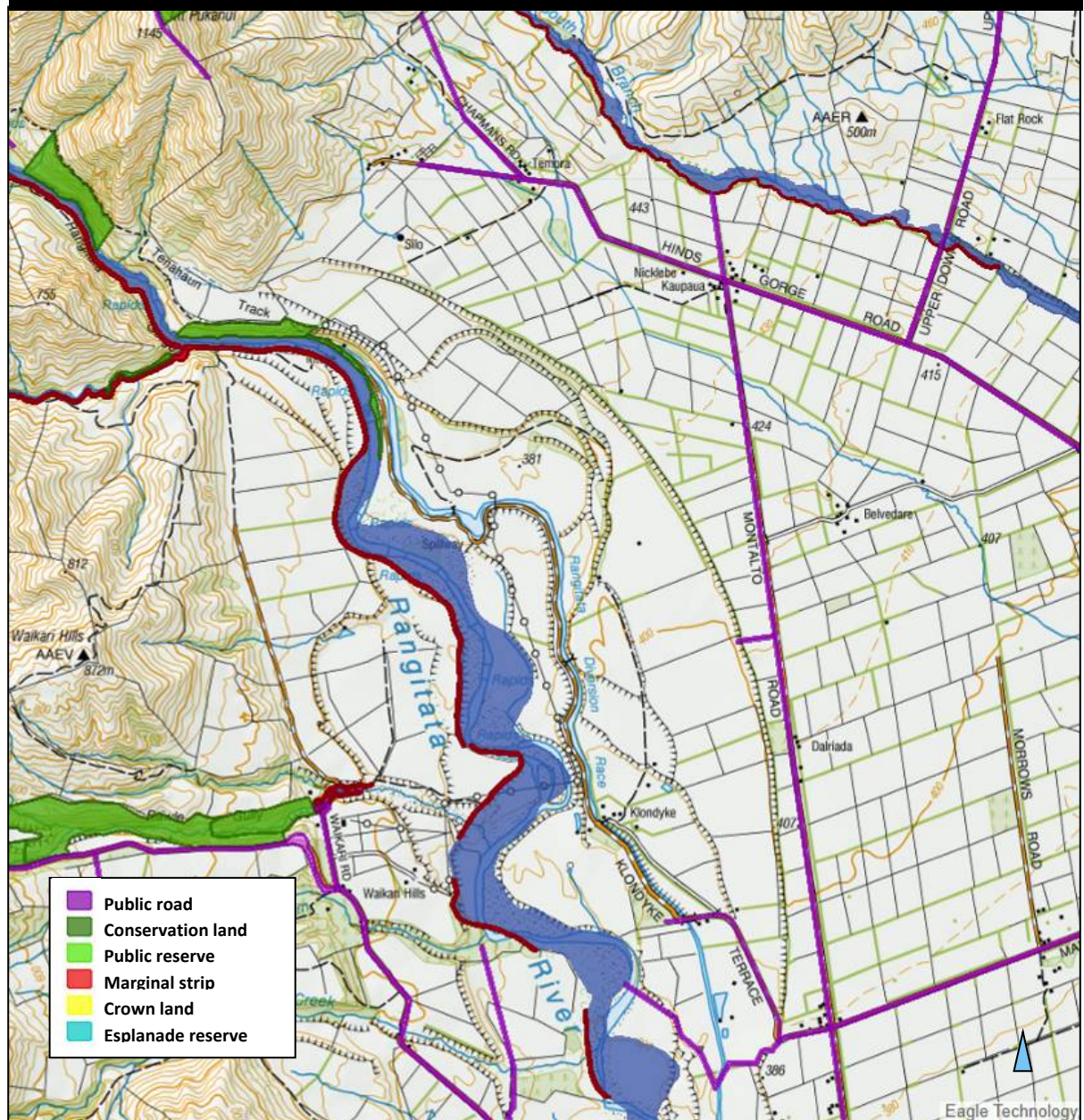
- Ryder Environmental Ltd: *Proposed Fish Screen for the RDR: Assessment on Rangitata River Water Quality and Aquatic Ecology* (Ryder 2017).
- Pattle Delamore Partners Ltd: *Rangitata Diversion Race Fish Screen – Hydrology Assessment* (Veendrick 2017).
- Brown NZ Ltd: *Rangitata Diversion Race Revised Fish Screen & By-Pass* (Brown 2017).
- Riley Consultants: *Rangitata Diversion Race Fish Screen Concept Report* (Morgan 2017).

2 Access and land status

The Walking Access Commission's online Walking Access Mapping System (WAMS) describes some of the public access opportunities in the study area (Figure 1). Legal road access ceases on Klondyke Terrace Road where it meets the RDR canal, while the Mayfield Klondyke Road extends to the River's edge. However, there is no bridge across the RDR canal on this unformed legal road; and an easement in favour of the Crown – including rights-of-way for parking, public vehicle, foot, mountain biking and conservation management access (detailed on DP 4104110) – extends from Klondyke Terrace to the start of the Tenehaun Track, via the gravel road on the western side of the RDR race as show in Figure 1, giving public access to the Tenehaun Conservation Area and the Rangitata Gorge.

The proposal, post construction, has no effect on these access arrangements, but will require resurveying of a short section of the easement.

Figure 1: Public access near RDR intake – WAMS output October 2017



3 Setting management and agency data

This section reviews central, regional and local government planning, strategy and policy material of relevance to recreation on the Rangitata River.

3.1 Water Conservation (Rangitata River) Order 2006

The Water Conservation (Rangitata River) Order 2006 (WCO) defines certain levels of protection for flows in the River and identifies the following recreation values as outstanding:

The Rangitata Gorge:

- Waters in a natural state.
- Amenity and intrinsic values.
- Wild, scenic and other natural characteristics.
- Rafting, canoeing.

Klondyke to Arundel Bridge:

- Salmon fishing.
- Water-based recreation.

Arundel Bridge to the coast:

- Salmon fishing.

The 2002 Rangitata River Water Conservation Order Application Report by the Special Tribunal noted for salmon fishing (151):

We find that the Rangitata River provides an outstanding salmon fishery in the upper Rangitata River and in the lower river (gorge to sea) because of the spawning and rearing habitat in the upper river, and the ability provided by the flow regime and water quality that enables juveniles to migrate to sea and adult salmon to return. We find that the gorge, while being more difficult for adults to move upstream, contributes to the outstanding salmon fishery.

And fishing for trout and other species (157 - 159):

Although there is undoubtedly good trout fishing in the Rangitata River, we did not conclude that it is outstanding.

While it is the salmon run that makes the fishing outstanding, the opportunity to fish for other species, especially trout (including sea-run) and whitebait enhances the fishing experience.

We do not consider that eel, whitebait or other fishing is outstanding, although some of these may have been in the past.

And for other water-based recreation (320 – 323):

We conclude that, based on our assessment of the evidence in terms of the “disappointment” factor, and features attracting interest from outside the region and outside the country the Rangitata River does have outstanding recreational values for kayaking, rafting and jet-boating in certain reaches of the river.

There are outstanding recreational values in the following sections:

- Upper River: for canoeing, rafting and jet boating

- Gorge: for kayaking and rafting
- Gorge to Arundel: for kayaking and rafting

We also find that the river provides an exceptional mix of attributes for outdoor education. We find several reaches outstanding because of the mix of water-based recreation training and the ecological values. With an increasingly urban-based population formal outdoor education is being used to teach the skills that older generations took for granted but are part of the New Zealand culture.

We find that the Rangitata River has outstanding intrinsic values in the upper river, the gorge and in the gorge to Arundel sections that make it an exceptional place for training for canoeing and rafting and more general outdoor and life skills.

3.2 Canterbury Regional Council

The Canterbury Regional Policy Statement 2013 (CRPS) identifies (5.1.1(1)d) “the loss and degradation of Canterbury’s important ... recreational values and the associated public access” as an adverse effect of development on the environment of ‘particular concern’.

In setting policy for water quantity, the CRPS notes (p77):

The flows which safeguard the life-supporting capacity of fresh water bodies and provide for drinking and stockwater supplies and the exercise of customary uses, take precedence. The relative importance of flows for in-stream recreational and amenity values and abstraction for other purposes (than drinking water supplies) are given secondary preference; but as both sets of values and uses are important for providing for economic and social well-being, there is no hierarchy between them. Rather a value judgment is required to be made in each catchment, depending on the relative importance of these values and uses to achieving the purpose of the RMA.

Policy 7.3.4 consequently requires those precedent values to be satisfied before providing water quantity for (7.3.4 (1)g):

recreational values (including the patterns and timing of flow variability desired by recreational users) and amenity values.

Policy 7.3.10 of the CRPS refers to the harvest and storage of fresh water, and notes (p83):

The Canterbury Water Management Strategy has targets for increasing the area of irrigated land. Increased efficiency is part of the approach as is water harvesting and storage. Storage can also have benefits for other commercial activities or for recreational and social activities, and as a response to climate change. ...

However, the abstraction must be undertaken in a way which does not affect flow variability especially in braided rivers....

The Canterbury Water Management Strategy Strategic Framework (2009, updated 2010) identifies targets for the fresh water values identified in the CRPS. For recreation and amenity values these are (Annex G, p16):

From 2010:

- *Maintain the existing diversity and quality of water-based recreational sites, opportunities and experiences.*

By 2015:

- *At least 80% of river bathing sites graded as suitable for contact recreation*

- *A positive trend in the availability and/or quality of fresh water angling opportunities. An increase in freshwater angler numbers (or catch rate) assessed over a 5 year average*
- *A positive trend in the availability and/or quality of recreational opportunities in each zone*
- *Identified where environmental flows are not met or require change to meet recreational outcomes and implemented actions to rectify.*

By 2020:

- *Of the lake and river sites used for contact recreation, an increase in the percentage of them that meet recreational water quality guidelines*
- *A positive trend in the availability and/or quality of recreational opportunities in each zone*
- *Made progress towards achieving environmental flows.*

By 2040:

- *Achieved all environmental flows*
- *Restored fishing opportunities in most lowland streams in each water management zone*
- *Restored at least one major fresh water recreational opportunity in each zone that is not currently available in 2010.*

The Framework identifies the role of water storage in increasing water use efficiency throughout the document.

The targets in the CRPS have been incorporated into the *Canterbury Land and Water Regional Plan* (2015) via the following high-level objectives (p49):

3.7 Fresh water is managed prudently as a shared resource with many in-stream and out-of-stream values.

3.8 The quality and quantity of water in fresh water bodies and their catchments is managed to safeguard the life-supporting capacity of ecosystems and ecosystem processes, including ... where appropriate, trout and salmon.

3.11 Water is recognised as an enabler of the economic and social wellbeing of the region.

3.15 Those parts of lakes and rivers that are valued by the community for recreation are suitable for contact recreation.

And the strategic policy (p53):

4.5 Water is managed through the setting of limits to safeguard the life-supporting capacity of ecosystems, support customary uses, and provide for group or community drinking-water supplies and stock water, as a first priority and to meet the needs of people and communities for water for irrigation, hydro-electricity generation and other economic activities and to maintain river flows and lake levels needed for recreational activities, as a second priority.

The 2011 ECan report *Canterbury Water - The Regional Context* reviews recreation and amenity values for the region's freshwater bodies in general and identifies key issues relating to the potential adverse effects of water infrastructure development. These are (p105):

- Accessibility (including ease of access, impact of developments on river flows, permission to access).
- Recreation resource quality (including effects from changes to water quantity, perceptions of wild and scenic characteristics, visual amenity, construction and operation of infrastructure).
- Water quality for contact recreation, specifically pathogens and toxic algae.
- Water quality for gathering and eating mahinga kai.
- Water quality and quantity for fish spawning.

Chapter 12 of the *Canterbury Water* report discusses environmental limits required to achieve the targets of the CWMS. The status of Environmental Flow and Allocation Plans are identified for each major river in the region, with the Water Conservation Order for the Rangitata River described as the 'operative plan' (p171).

The Rangitata River is considered in both the Orari-Opihi-Pareora Zone Implementation Plan (ECan 2012a) and the Ashburton Zone Implementation Programme (ECan 2011). Implementation priorities from these two ZIPs considered by the CWMS Regional Committee to be of regional importance are annexed to the *Canterbury Water Management Strategy Final Regional Implementation Programme* (ECan 2012b), which also includes the priorities of the CWMS Regional Committee.

Regional Committee priorities for recreation include:

RI.3.1 Facilitate funding for the ecosystem and recreation aspects of major water supply infrastructure projects alongside water user [e.g. irrigation, hydropower] funding – responsibility of the Ministry for Primary Industries and Ministry for the Environment.

RI.6.1 Regional infrastructure provides for relevant environmental flows and water quality improvement – responsibility of Developers.

The Regional Committee identified the following as of regional importance for recreation and amenity from the Ashburton Zone Committee Regional Implementation Plan (RIP) (Annex p6):

- White water sports, jet boating, salmonid angling on the Rakaia and Rangitata Rivers including the river mouths.
- White water sports, jet boating, salmonid angling on the Rangitata River.
- Potential creation of new water based recreation opportunities with any new distributive infrastructure.
- Whitebaiting on the Rangitata and Rakaia Rivers.

Recommendations from the regional implementation plan for the Ashburton Zone included (Annex p6):

- *Modification of the Rakaia and Rangitata Rivers is acceptable only if suitability of river conditions for jet boating and white water sports are maintained*
- *Modification of the Rakaia River and Rangitata Rivers is acceptable only if modification protects or enhances the overall salmonid fishery of the river system*

- *In determining the overall viability of any new distributive infrastructure consideration shall be given to delivering at least 1 new regionally significant water based recreation opportunity within 1.5 hours drive of Ashburton, but that there is not a requirement to deliver such a facility where it is found to compromise the viability of any new distributive infrastructure*
- *Whitebait populations on the Rangitata and Rakaia rivers are maintained by improving water quality and enhancing habitats.*

No regional-level recommendations were included in ECan (2012b) from the Orari-Opihi-Pareora RIP (ECan 2012c). This RIP identifies the need to cooperate with the activities of the Ashburton Zone Committee for the Rangitata and identifies a series of actions to 'protect and enhance recreational opportunities' throughout the Zone, (p23):

- Protect and enhance spawning and rearing habitat for trout, salmon and indigenous fish by flow security, riparian management, habitat works.
- Identify and reverse declining habitat quality for indigenous fish, and trout and salmon spawning sites of significance.
- Provide river flows, water quality and lake levels that sustain and improve recreational diversity.
- Ensure no net loss of public access to and along streams, rivers, wetland and lagoons, and support the work of the Walking Access Commission.
- Improve water quality to contact recreation and food gathering standards.
- Protect areas of significant game bird habitat.
- Support educational opportunities such as enviroschools.
- Consider recreational needs in development of new infrastructure.

The Ashburton RIP echoes the need to cooperate with the Orari-Opihi-Pareora Zone Committee for the Rangitata. This RIP builds recreation and amenity outcomes into many of its water management activities – such as for water quality and quality – in line with the targets of the CWMS.

Environment Canterbury prepared a series of reports and databases on the recreation values within the rivers and lakes of the Canterbury Region to support the preparation of the Canterbury Natural Resources Regional Plan (ECan 2011). Two reports are relevant: the *Inventory of Recreational Values of the Rivers and Lakes in Canterbury* (Sutherland-Downing and Elley 2004); and the *Inventory of Instream Values of the Rivers and Lakes in Canterbury* (Daly 2004). The latter present a synthesis of the former and also presents a range of data about many values of the waterbodies considered. As both were based on existing data and were essentially desktop studies, they come with a long disclaimer¹, and provide limited

¹ "The inventory report and underlying databases have been compiled using existing sources of information. The accuracy of these sources has not been field checked. The information presented does not necessarily represent or reflect the views of Environment Canterbury. Information in this inventory report and underlying databases should not be relied on for statutory processes without either field checking or reference to the original reference documents cited in Section 5 and consideration of databases held by other parties which have not been represented. While Environment Canterbury has exercised all reasonable skill and care in assembling this information, Environment Canterbury accepts no liability in contract, tort or any other heading of liability for any loss including consequential, financial direct or indirect loss, damage to property or personal injury arising out of the provision of this inventory report and underlying databases. This includes any loss arising from the use of this information by any person who sources it from Environment Canterbury or any loss arising from the use of information that has been incorporated into a third party's report or statement and whether or not the information is accompanied by any general terms and conditions as required by Environment Canterbury."

guidance. The *Inventory of Instream Values* takes its data for describing recreational and visual amenity values (wild and scenic) from the *Inventory of Recreational Values*.

The Canterbury Natural Resources Regional Plan refers to these studies to advise Policies WQN1 *Natural state water bodies* (which does not include the Rangitata) and WQN2 *High naturalness water bodies* (the mainstem of the Rangitata River and its tributaries upstream of the gorge). The recreational use value assessment relies on measurements of frequency and intensity of use. Both are subjective assessments considering the lack of empirical data. The 'intensity measurement' assumes a rating against the location's social carrying capacity which implies in many areas that the social carrying capacity has been met. There are no data to suggest that the 'intensity' assessment is correct, and it is not used in this report.

The complete findings from the Inventory of Instream Values (Daly 2004), as they relate to recreation values for the Rangitata River, are shown in Appendix 1.

In-river recreational activities identified in Daly (2004) for between the Rangitata Gorge and the mouth were: paddling/wading (low); jet boating (high); canoeing/kayaking (moderate); rafting (moderate); salmon fishing (moderate); trout fishing (moderate); and waterfowl hunting (moderate). Terrestrial activities were: sightseeing (moderate); walking (moderate); picnicking/BBQ (moderate); bird watching (low); small game hunting (moderate); four wheel or ATV driving (moderate); and trail biking (moderate).

3.3 Department of Conservation

The Department of Conservation's operative Conservation Management Strategy (CMS) for Canterbury (DOC 2002, to be replaced by the revised version in 2016 – see below) locates the study area in the Plains Place. In describing this area, the CMS states with reference to 'recreation and use' (p68):

The Waimakariri, Rakaia, Rangitata and Waitaki braided rivers are nationally significant for their salmon fishing and jet-boating opportunities, as well as for their wildlife features. The Ashley/Rakahuri, Waimakariri, Rangitata and Waitaki river-mouths, Saltwater Creek and the Estuary of the Heathcote and Avon rivers/Ihutai are regionally important whitebaiting areas.

Ongoing issues are the maintenance of recreational access to rivers and the coast and the provision of adequate flows in the main rivers and streams to provide life supporting capacity for the aquatic ecosystems, wildlife, fish, and invertebrates that depend on adequate flows to live.

There are no areas managed by the Department in the Plains Place near the development area. Key priorities for braided rivers in the Plains Place are for ecosystems and species because "Braided rivers are nationally significant for flora and fauna." (p64, 4.6.1).

The Peel Forest area is within the Rangitata Place, which also extends up-river from the Rangitata Gorge. For 'recreation and use' the CMS notes (p86):

The number of reserves in the unit and their closeness to reasonably significant urban areas has resulted in a number of camp-sites and picnic areas serving as roadside facilities. A major camping-ground at Peel Forest services about 12,000 visitors per year....

The Arrowsmith Range and upper Rangitata / Rakaia rivers provide wilderness and remote-experience climbing, hunting, heli-skiing and tramping opportunities. The Rangitata Gorge is a popular grade 5 rafting opportunity and is guided commercially.

'Key priorities' for recreation on the Rangitata and Rakaia Rivers in this Place focus on 'the remote mountain areas of the upper catchments', with conservation park status for these areas to be investigated (p90).

For Peel Forest, the CMS notes (p91):

Peel Forest is an important focus for departmental management. The Peel Forest Park, which has scenic reserve status, is an outstanding area of relatively unmodified mountain and lowland podocarp forest. Associated with it is a well-developed track system and a camping-ground. Commercial camp-ground management is not a core departmental function and the Conservancy has leased out the Peel Forest Camp-ground. Ecological monitoring of the reserve is an ongoing activity of the Royal Forest and Bird Protection Society.

Objectives

*To protect and enhance the natural values and landscape of Peel Forest Park.
To provide opportunities for the public to benefit from and use the park.*

The revised draft CMS 2015-2025 (currently in the final stages of approval) places the Rangitata River in the 'Braided Rivers / Ki Uta Ki Tai Place' and notes (p43):

Management of braided rivers since early 1900s has focused on energy production, water and gravel extraction, the confinement of rivers for flood protection, and waste disposal, all to the detriment of ecological sustainability. The Waitaki Power Scheme, the Rangitata Diversion Race and the Lake Coleridge Station have long provided regionally and nationally important hydroelectricity generation, and since the mid 1900s a series of irrigation schemes have been developed, all having varying degrees of ecological impact. Occasionally, braided river natural and ecological values have been upheld (e.g. through water conservation orders and reduced point-source waste discharges). In recent times there has been an upswing in public and agency support for a wider range of river values, for sustaining river ecosystems and indigenous species, and for recreation.

For recreation in the Braided Rivers Place the revised draft CMS notes (p44):

Recreational use of braided rivers, including their gorges, is widespread and varied, with strong Canterbury features being the extensive and popular sports fisheries, jet boating, kayaking and rafting, and simple enjoyment through swimming and picnicking. The Department's role in this is primarily through its common interests with Canterbury's three fish and game councils, under the Conservation Act 1987, regarding freshwater fisheries and wildlife habitat and threats to those. River recreation groups are often strong advocates, alongside or separate from the Department, for the protection and good management of braided rivers.

And for 'management issues; (p46):

Water storage development is sometimes seen as presenting biodiversity and recreation opportunities, but such opportunities may already be well-provided and could be at the cost of losing irreplaceable values and opportunities due to modification of peak flow regimes.

Policy specific to the Rangitata River is proposed (p50):

2.2.8 Support international status recognition (either World Heritage Area or Wetland of International Importance) for at least one of the high-naturalness high country braided rivers (e.g. Tasman, Godley, upper Rangitata), and support recognition also

for one complete river system, ki utu ki tai, potentially the Rangitata River if integrated with statutory river protection measures.

And in relation to river access:

2.2.10 Work with landholders, the New Zealand Walking Access Commission, fish and game councils, and through tenure review processes to retain existing and achieve negotiated legal public access to rivers.

The Rangitata River is identified as a geopreservation site of international and national significance (Appendix 9, p292). The New Zealand Geopreservation Inventory identifies the sites of interest to be:²

- Rangitata ice-margin features – in the Butler Downs area (Timaru District) in the upper River above the Gorge.
- Rangitata outwash terraces – Area 21 in the Ashburton District Plan (p3-106) immediately north of the proposal area.
- Rangitata River mouth hapua – not included in the Ashburton District Plan.

Peel Forest is located in the Foothills Forests Place in the revised draft CMS. Outcomes for the 'Peel Forest Park Scenic Reserve and adjacent public conservation lands' include (p121):

The Scenic Reserve plus adjacent public conservation land and waters are well known and utilised for environmental education, and provides an insight into the history of timber milling in the region.

A serviced campground provides visitors with a quality camping experience. Te Wanahu Flat is well utilised and enjoyed by day visitors, and the various tracks in the scenic reserve cater for a wide range of users from the less able-bodied, to family groups and to fit trampers.

Figure 2 shows the DOC recreation opportunity spectrum analysis for Canterbury (ECan 2011) with the proposed storage pond area identified as a 'rural' setting with the definition (p111):

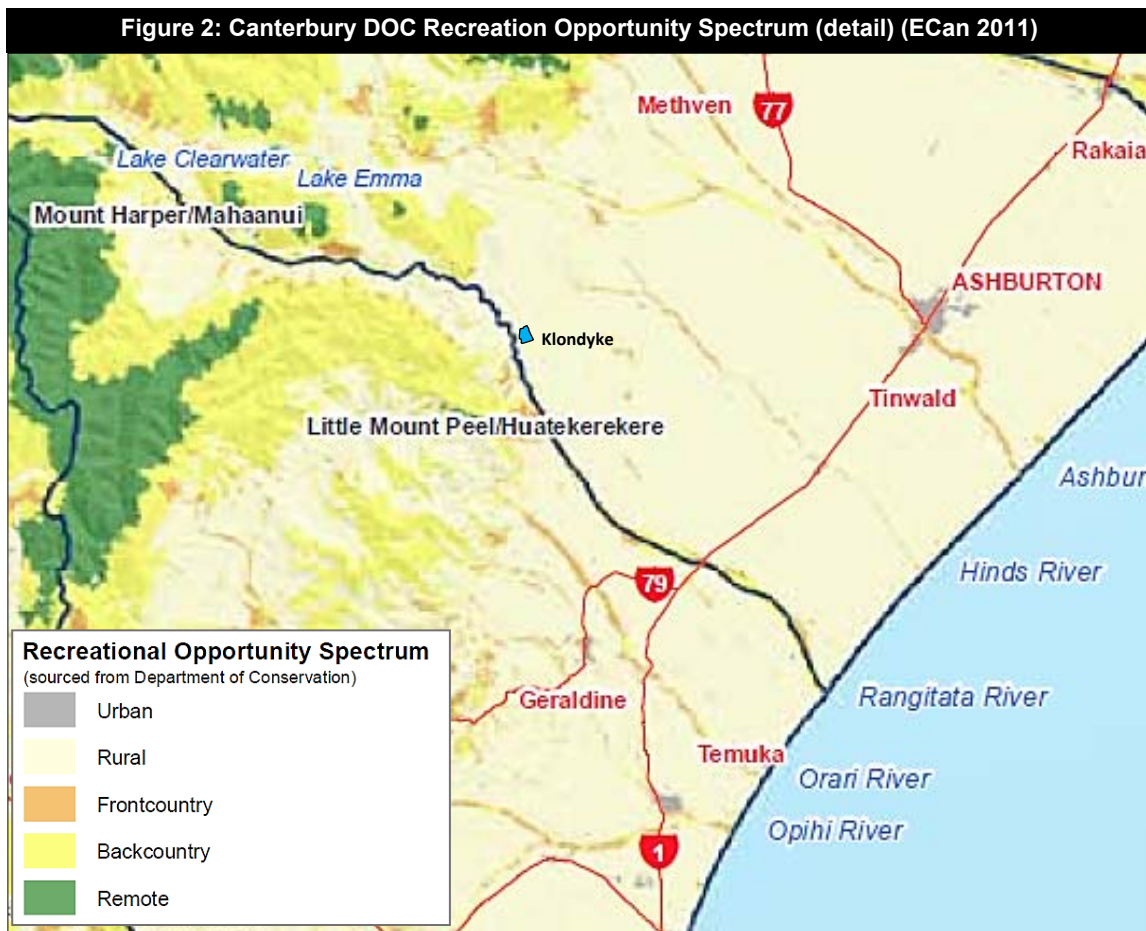
Rural - Remnant native forest, wetlands, marine reserves and historic sites in areas dominated by farmland and plantation forest. Access via sealed and unsealed roads. Suitable for activities with large or small groups and solitude in some cases.

However, this definition is probably incorrectly applied in ECan (2011) as it should refer to only DOC visitor management zones rather than non-public lands, which Figure 2 includes.³

The Department has released a recreation plan for the Ashburton lakes and upper Rangitata River (*Ö Tū Wharekai Recreation Plan*, DOC 2011). This includes the Rangitata River upstream of the Gorge; although the plan has no management directives for the Rangitata River and only general reference to recreation activities which can occur on lakes and rivers in the upper catchment.

² <http://www.geomarine.org.nz/NZGI/>, retrieved August 2015

³ The differentiation between public and non-public 'conservation lands' and visitor management zones in the revised draft CMS is not clear, and the ECan ROS definitions are that of the revised draft CMS for visitor management zones (Appendix 12). These should refer to only public conservation lands. A query has been sent to the CMS authors to clarify these definitions – although it has no bearing on the findings of this report.



3.4 Central South Island Fish & Game Council

The Central South Island (CSI) Fish & Game Council notes online⁴:

The Rangitata River is famous for its salmon fishery. It originates high in the Southern Alps and is prone to floods and freshes from high rainfall and snowmelt, particularly from warm nor'west wind conditions that occur frequently throughout the main salmon season from November to March. However the duration of unfishable periods is usually short and good fishing can be experienced as discoloured waters begin to clear. Best fishing at the mouth is generally December and January. Upriver salmon fishing is better from January to March.

The Rangitata is also noted for its sea run brown trout early in the season.

The *Sports Fish and Game Management Plan 2012-2022* for the CSI region notes that the salmon run in the Rangitata has ranged from 200 to 1500 fish per season over 'the last 10 years' (p28), and (p15):

The loss of sports fish to the fishery due to water supply schemes with poorly designed intakes is an ongoing concern throughout the CSI Fish and Game Region. A particularly important collaborative group is the Fish Exclusion Working Party, formed to develop guidelines to ensure effective fish screening at the ever increasing number of diversion and abstraction points along the Region's waterways. This group was initially established in response to the work of CSI Fish and Game and the Rangitata Diversion Race Company (a significant abstractor of irrigation water)

⁴ <http://centralsouthisland.fishandgame.org.nz/content/local-fishing-locations-access-3>

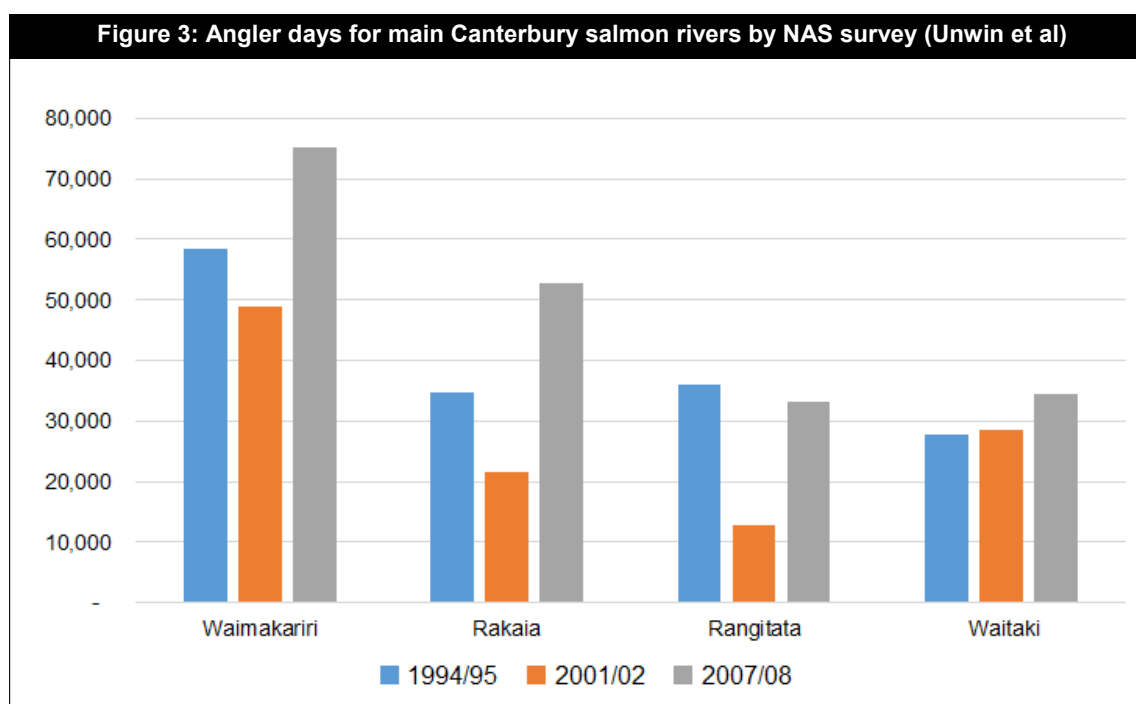
regarding the fate of juvenile salmonids diverted via an unscreened intake into a large open-race irrigation system. Such initiatives are supported and CSI Fish and Game seeks to participate wherever appropriate, whilst continuing to seek solid commitments from national, regional and local government to develop and administer standards that minimise the diversion of both indigenous and sports fish into irrigation systems. The Fish Exclusion Guidelines produced by NIWA (Fish Screening Best Practice Guidelines for Canterbury, NIWA Client Report - CHC2007-092, October 2007) resulted from the work of the group and have been incorporated into the consenting process. Incorporation into policy will be sought as part of second-generation regional plan development.

4 Activity descriptions

This section identifies and locates the recreation activities carried out in the study area based on published and popular literature.

4.1 Fishing

Figure 3 shows the national angler survey (NAS) data for fishing on the main salmon fishing rivers in Canterbury (Unwin & Brown 1998, Unwin & Image 2003, Unwin 2009). Data for the Rangitata River are not provided on a reach basis in the NAS data. The level of activity is strongly dependent on the quality of the annual salmon run.



The RDR Canal supported 110 angler days in 2007/08 and 960 in 2001/02 (Unwin 2009).

Kent (2009) describes the trout fishery in the Rangitata River:

The river is best fished when the flow rate is less than 90 cumecs. Like its northern neighbour the Rakaia, the Rangitata River is a highly regarded salmon fishery. Very few anglers fish exclusively for trout, except upstream above Peel Forest. Some good sea-run browns are taken at the mouth, usually by salmon anglers on spinning gear. The river is very large, flood-prone and braided once it leaves the gorge, and trout habitat is limited in this unstable environment. Snow-melt and glacial flour often colour the river until after Christmas. However, when the river is low and clear there are some very good brown trout caught in the upper reaches. Fish over 4 kg are not unusual, and the occasional rainbow adds to the excitement. Most trout are taken on spinners as the opportunities for fly fishing are limited in this large river. The river is best fished before the salmon anglers and jetboats arrive in February and again in March when the salmon season is closed.

Millichamp (1997) describes the Rangitata salmon fishery as a 'little river' using the definition:

Little rivers such as the Rangitata and Waimakariri drop to low levels over summer months, so the salmon tend to run in spits and spurts. Several days of spectacular

fishing can be followed by weeks of nothing. Little rivers tend to have good surf fishing as the number of fish builds up waiting for better flows before running the river....

Although the Rangitata is a little river, it has one of the best salmon runs in the country. In recent years the runs have approached those in the Rakaia, although the Rangitata is less consistent, with the fishing red hot one day and completely dead the next. As with most little rivers, much of the fishing pressure is centred on the river mouth and lagoon area where the fish build up between freshes....

The Rangitata provides good upriver fishing when there are good river flows but it quickly goes off once levels drop. Small spinners and light tackle work well once the flow starts to fall. The lower reaches between the mouth and the SH1 bridge are good when flows are suitable, particularly early in the season. In this area the river tends to be concentrated into a single braid, so is relatively accessible to the foot angler.

Much of the water between SH1 and Peel Forest is steep and good holding water is rare. Low flows, steep river gradients and big boulders all mean that jet boats are seldom used for upriver fishing in the Rangitata. Probably the best upriver fishing is around Peel Forest, where the river gradient allows the formation of good fishing water. The best fishing there is generally from Christmas onwards, when good numbers of fish arrive from the lower reaches.

The Special Tribunal's report for the WCO hearing noted that 75% of fishing effort on the River occurred between the mouth and SH1, with 13% between SH1 and the Gorge (123 – 124). More than 97% fished for salmon (117) and fewer than 20% of visits to the River were made by anglers after trout (127). In terms of flows, the Tribunal reported (139 – 141):

High flows are not suitable for angling, but many anglers, as well as experts recognised the importance of frequent higher flows to induce runs of fish (not only salmon) into the mouth. At flows of over 120 m³/s at Klondyke the river is agreed to be too turbid for fishing, and below 40 m³/s the river becomes too clear to fish well.

Webb said that for fishing preferred flows below the gorge are those corresponding to a flow at Klondyke of 70 – 110 m³/s (i.e. 40 – 80 m³/s in lower river). He reported that about 70% of angler activity and nearly 80% of the total salmon catch occurred when the river is in this range (from 3 seasons of record).

Webb stated that the window of preferred summer angling flows that provide desirable flows and turbidity is 45 – 80 m³/s in the lower river (about 87 – 110 at Klondyke under present abstraction). He noted that 44% of days in summer the water is too clear for good salmon angling.

The Sports Fish and Game Management Plan 2012-2022 for the CSI states that rainbow trout are 'locally abundant' in the Upper Rangitata River, and that brook char and perch have been recorded, and (p41):

Angling, in particular, continues to increase in popularity as a recreational pastime. Increased mobility through modern vehicles and four wheel drives, the relaxation of the traditional working week, and changes in life style patterns are manifest in increased angler numbers and angler hours on our rivers and lakes, particularly those waters near to population centres. Where previously during the salmon season, the Rangitata River mouth experienced high angler numbers during the weekend, such numbers are now common throughout the week.

4.2 Kayaking

Rankin et al (2014) describe the kayaking values of the Rangitata River from Whiterock to Klondyke (the Gorge) and from Klondyke to Peel Forest as “outstanding and exceptional value in the authors’ view and deserving of recognition by a Water Conservation Order” (pi and p28). The Klondyke to Peel Forest reach is described as Class 2 to 2+ and (pii and p28):

Outstanding beginner and intermediate white water; Good gradient and good wave trains at right flows; Popular for instruction and runnable over a wide range of flows; ‘Big’ water flood run; Intermediate to expert downriver racing run – key nursery river; Kayaking values recognised in WCO.

Rankin et al note (p22):

Groups from within and outside the region travel to visit Canterbury Rivers. For example, kayakers and school groups from South Canterbury travel north to visit the Hurunui and Waimakariri Rivers and kayakers from the Otago University Kayak Club regularly visit the Rangitata River. There was also a large influx of both national and international paddlers to the Rangitata River in late summer/early autumn 2012, because of the drought in Otago, Buller and the West Coast, as this was some of the only dependable (glacier fed) water in the South Island.

No significance ranking is given to the Rangitata River below Peel Forest in Rankin et al, but the River is described in a summary of river use for kayaking (p63). Descriptions include:

Klondyke to Peel Forest: Often paddled; User ability: novice, beginner, intermediate and advanced; Always available for paddling.

Peel Forest to Arundel Bridge: Occasionally paddled; User ability: novice, beginner; Always available for paddling.

Arundel Bridge to SH1: Very occasionally paddled; User ability: novice, beginner; Always available for paddling.

SH1 to sea: Very occasionally paddled; User ability: novice, beginner; Always available for paddling.

Rankin et al (2014) state (p74):

The three main runs used on the river by kayakers are:

- *A Class I-II run above the Rangitata Gorge near Mesopotamia*
- *The Rangitata Gorge, which is a Class IV-V run depending on flow, and*
- *The run from Klondyke down to Peel Forest or the Cracroft Intake, which is a Class II-III run...*

The lower Rangitata from Klondyke down to Peel Forest is a classic roller coaster Class II-III white water run depending on flows and is suitable for beginners to experts alike. The bed has a relatively steep gradient through the first section and so produces many large standing wave trains in higher flows. It is a good river to introduce novice kayakers to bigger water as the run outs from the rapids have few consequences. However, it is less suited to catching eddies and training novice paddlers in this art, as most of the rapids are typically straight runs down single channel ramps and into standing waves at the bottom. The river has been used for slaloms including the Invitation Slalom held with the 1974 Commonwealth Games. There are a number of get in and get out points down the run on the South bank that are frequently used to tailor the run to the abilities of the group or time constraints.

The get ins include the end of the road on Waikari Hills Station opposite the Klondyke Intake for the RDR, Raules Creek, take out/put ins at Mt Peel Station woolshed where powerlines cross the river or Lynn Stream, and lower take outs are at Clarke Flat by the Peel Forest Camp Ground or off the end of Dennistoun Road in Peel Forest. A further run down to the Arundel Bridge is also occasionally used by downriver racing kayakers.

Flow preferences in m³/s are (p33):

	Beginner	Intermediate	Advanced	Expert
Klondyke to Peel Forest	40-70	45-125	55-250	-
- multisport	-	50-100	50-150	50-250

The 'multisport' reference is taken to refer to the activity occurring in the Klondyke to Mount Peel section of the River. Rankin *et al* (2014) states (p31) that for the flow preferences given for kayaking, "The flows are also prior to the taking of any flows for irrigation purposes, most notably for the Rangitata River below Klondyke where the Rangitata Diversion Race abstracts up to 30 cumecs." However, the minimum recorded flow at Klondyke since 1979 is 35.4 m³/s, and so this statement cannot apply to the data provided (ie, no one has experienced flows as low as 10 (40 less 30), 15 (45 less 30) or 20 (50 less 30) m³/s in the River), and they are therefore taken as referring to flows below the RDR intake; which is in accord with other data provided elsewhere in Rankin *et al* based on hydrographs for the Rangitata River (eg, p37).

Consultation indicated an interest in the 100-125 m³/s flow band for kayak training below the RDR intake.

Rankin *et al* (2014) also provides an analysis of effects of the RDR abstraction using different flow preferences based on an earlier analysis (p52). For the purposes of this report, the more recent assessment shown immediately above is relied on.

Rankin *et al* (2014) replaces a number of historic national and regional river-recreation research reports which are referred to in the WCO tribunal report and are also summarised in Rankin *et al*. These older studies are therefore not referenced in this report.

Charles (2013) offers a comprehensive guide to kayaking the Gorge (from 30 m³/s to 'as much as you can handle') with the get out on private land at the bottom of the gorge, relying on an access agreement established by Rangitata Rafts. Below this point Charles states:

The Rangitata below the Gorge has been used for years by beginners and intermediates. There is a range of put in and take out options depending on how you want to go. Most are on the south bank. Put ins include; Waikari Station opposite the RDR Klondyke Intake (the get out for the Gorge run) or about 5km downstream at Raules Creek. Get outs can be at the Mt Peel Station woolshed where powerlines cross the river or at Lynn Stream, or of course further down river at Peel Forest, where there are two exit points if you want to do a long trip. Another short trip called Mandellas is from either Mt Peel Station woolshed where powerlines cross the river or at Lynn Stream down to Clarke flat by the Peel Forest Camp Ground or down to a point off the end of Dennistoun Road at Peel Forest. Plenty of options depending on peoples abilities, craft and time.

The Peel Forest Outdoor Pursuits Centre is the closest provider of educational and beginner kayak instruction.

4.3 Rafting

Commercial rafting on the Rangitata River occurs almost entirely in the Gorge – mostly for standard commercial trips offered by Rangitata Rafts – and/or in the Klondyke to Peel Forest section mostly for education purposes. The latter is offered by a number of regional education providers, including the Aoraki Polytechnic, the locally-based Peel Forest Outdoor Education Centre and Rangitata Rafts.

The Special Tribunal's report for the WCO hearing noted (51):

Gualter (manager of Rangitata Rafts [up until December 2012]) noted that the best flows for rafting are in the range 80 - 180 m³/s, but that the natural fluctuations are important. He noted that the gorge never becomes too low to navigate and only occasionally becomes too high. Rankin noted that the gorge can be kayaked in flows from 40 – 350 m³/s, but that 80 – 120 m³/s offer the easiest kayaking. From Klondyke to Peel Forest the preferred flows are in the range 80 – 150 m³/s.

Rankin *et al* (2014) states (p48):

Flow requirements of river buggers to retain the valued white water features in Canterbury Rivers are the same as those of kayakers, although river buggers can also at times use lower flows than kayakers might prefer. Rafters on the other hand, would normally prefer flows slightly on the higher side, such as those preferred by advanced or expert kayakers, to produce the most valued white water features for their purposes.

4.4 Jet boating

Rob Gerard in his 2013 Statement of Evidence on behalf of Jet Boating New Zealand and White Water New Zealand, in the matter of the Proposed Canterbury Land and Water Regional Plan, offered the following summary for jet boating on the Rangitata River:

River/reach	Jet boater values	Flow requirements
Rangitata River – Upper River above Gorge and White Rock	Family boating	All flows up to flood (natural)
Rangitata Gorge	Extreme adventure boating; very big rapids	130 - 80 m ³ /s at Klondyke
Rangitata River– Klondyke to Peel Forest	Family boating	>80 m ³ /s to flood. Flows severely and routinely reduced to levels at which many jet boating values absent because of large off-take by the RDR for irrigation and hydroelectricity generation. WCO on reach.

Hughey *et al* (2015) identified the following use levels for each section of the Rangitata:

- Upper braided section: used by approximately 1000 regional jet boaters per year; used for events; useable about 95% of the time due to high flows; suitable for family boating, salmon fishing, trout fishing and hunting.
- Top of Gorge to RDR intake: used by approximately 2 local jet boaters per year; no events; useable about 5% of the time due to low flows; suitable for adventure boating.

- RDR intake to SH1: used by approximately 20 jet boaters per year; not used for events; useable about 5% of the time due to low flows, rocks and the degree of fall; suitable for adventure boating.
- SH1 to the sea: used by approximately 400 jet boaters per year, not for events; useable about 70% of the time due to low flows; suitable for salmon fishing, white baiting, trout fishing, family boating and duck hunting.

Greenaway *et al* (2015) reports for flows in the reach below the RDR intake:

Flows: There is abstraction for irrigation at the lower end of the gorge. The river from this point to SH1 bridge is very rocky and bouldery, and consequently seldom boated. The RDR takes 30.7 m³/s most of the time during the irrigation season and so while the preferred minimum flow for jet boating is 85 m³/s below the gorge, the Klondyke flow recorder would need to be showing 115 m³/s to ensure the required flows for jet boating below the intake.

Rob Gerrard (pers comm) notes that a critical requirement for jet boating, particularly in the reach below the RDR is a reasonable degree of water clarity, and that this is not often available during high flows.

Jet boating in the River section below SH1 is possible in lower flows than between the Gorge and SH1 due to a lesser gradient and fewer large rocks. The data in Hughey *et al* (2015) indicates that jet boating below SH1 is available 70% of the time and is limited by low flows. During the summer season, 1 November to 30 April, flows of 40 m³/s and above are available 70% of the time. There are no changes to flow bands as a result of the proposed new take below 77 m³/s. For the purposes of this assessment a higher minimum flow of 77 m³/s is used for jet boating in the SH1 to sea section to illustrate this upper scale of potential effect.

4.5 Education

The Special Tribunal's report for the WCO hearing noted the value of the Klondyke to Peel Forest section of the River for outdoor education. Uses are largely for kayaking and rafting, as discussed above.

4.6 Other terrestrial recreation

Other terrestrial activities occurring around the Rangitata River include walking, bird watching, camping, picnicking, tramping and hunting.

Tramping occurs mostly in the headwaters, but Little Mount Peel and Mount Peel are important regional walking and tramping destinations, supported by the camping and picnicking opportunities provided at Mount Peel. The study area is visible from these peaks.

The *Sports Fish and Game Management Plan 2012-2022* for the CSI states paradise shelduck are abundant in the Upper Rangitata River.

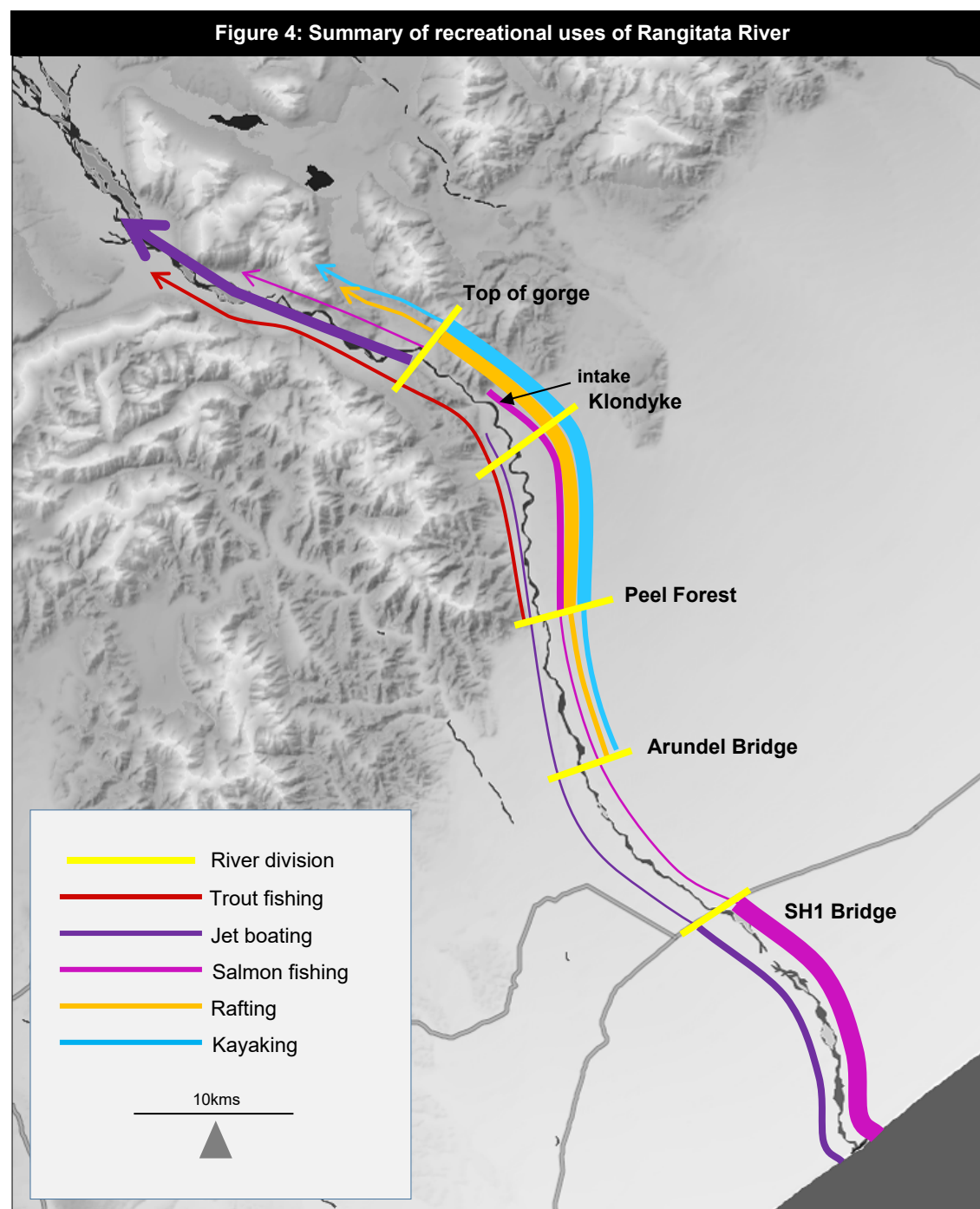
Hunting will otherwise occur throughout the riverbed area for small game, ducks and other game birds. For example, the Special Tribunal's report for the Rangitata WCO hearing noted (306):

Webb gave evidence on game bird hunting and showed that the Rangitata River had a higher harvest rate (birds per hour) than for the Central South Island (Fish and Game Council) (CSI) region overall since 1966 in all years except one. He also showed from survey data that CSI has a very high harvest rate compared to other major hunting areas. Much game bird hunting is on private land, but the Rangitata River offers a large public area that is available to all. Webb concluded that the

hunting opportunities and benefits provided by the Rangitata River are of regional and national importance, and that it has an outstanding recreational resource for gamebird hunting.

4.7 Summary

Figure 4 locates the five main recreation uses and their relative indicative levels of activity on the Rangitata River; based on the data in this and the preceding section. The River below the SH1 Bridge is likely to have the greatest level of use due to its popularity for salmon fishing. The Gorge and section downriver to Peel Forest has the most diverse use, with all five activities represented, and notably those associated with education programmes. Low levels of use for all five activities will occur throughout the River, and the section from Arundel Bridge to SH1 is the least used. Other activities include whitebaiting at the mouth, and swimming and wildfowl hunting throughout the River corridor.



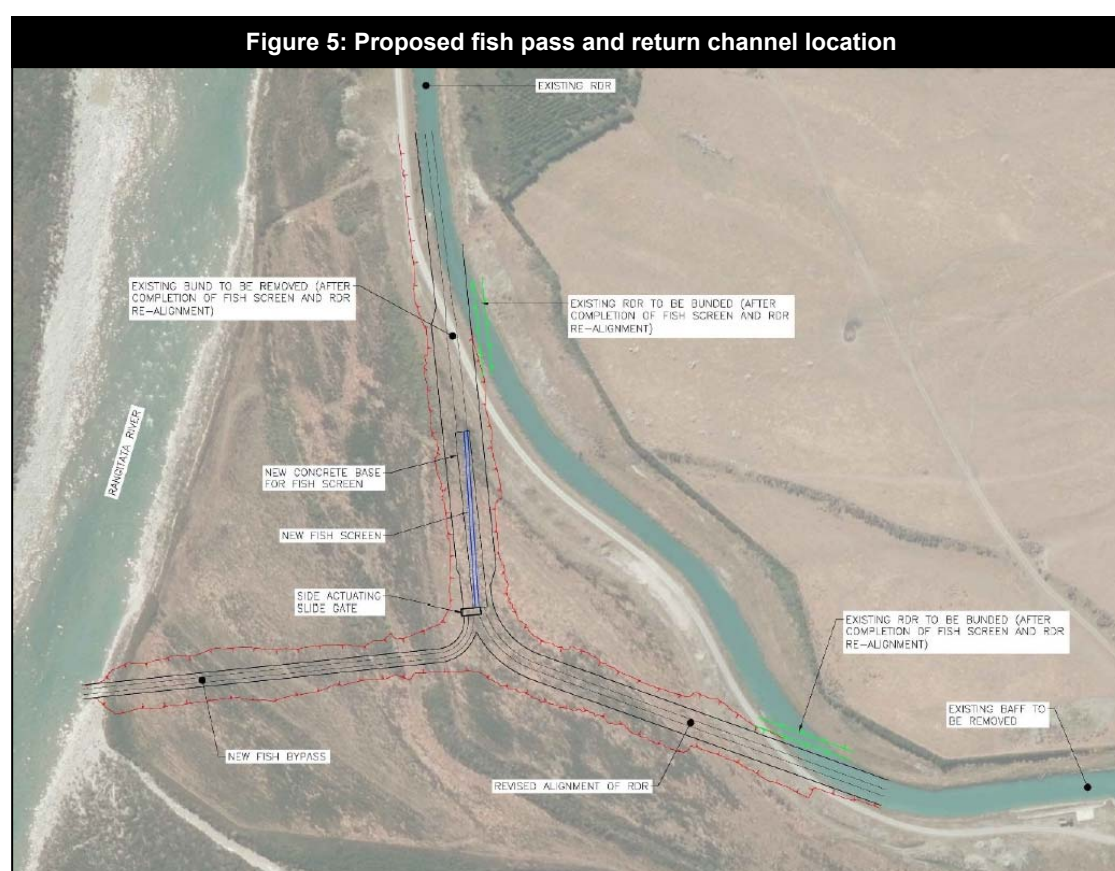
The Water Conservation Order defines the River as outstanding throughout for salmon fishing, outstanding above the Gorge for jet boating, rafting and canoeing, and from the top of the Gorge to Arundel Bridge for rafting and kayaking.

5 Potential effects of the proposal and recommended mitigations

This section considers the potential for adverse effects on recreation from the construction and operation of the fish screen, and the effects of new infrastructure, and recommends mitigations where required.

5.1 New infrastructure

The fish screen and relocated return channel are situated on private land, although the setting provides angler access by agreement. The return channel will interrupt passage along the true right of the River where it meets the mainstem, and walkers will need to track up and back down the edge of the channel to the RDR canal – some 400m. Angler access in the Klondyke area is, however, focused on the lower Gorge, and effects on angler amenity are, in my opinion, very slight.



The return channel will discharge up to 8 m³/s of flow back into the River. This will create a novel flow characteristic at the return point which will represent, at low base flows, a large portion of the total flow in the main stem (around 20% at low base flows). This will be akin to a braid re-joining the main channel, and not an unusual feature on the Rangitata River – albeit not a natural feature.

5.2 Construction

Construction will occur on private land and on public easement. Temporary interruptions to angler and other recreation access along the RDR race are likely and will need to be communicated to Fish & Game and the Department of Conservation and others and signposted on site (see section 5.5). The alignment of the public access easement (see

section 2) will need to be resurveyed from the gravel road adjacent to the race (shown in Figure 5) to be adjacent to the new race alignment.

5.3 Operation

Operational effects of interest to recreation are the up to 5 m³/s take and return of flow required to operate the fish pass over a river distance of 1380 m.

Mitigations are recommended in section 5.5.

5.4 Flow regime

Preferred flow levels for the main recreation values below the RDR intake, as measured at Klondyke (prior to the RDR take), are identified in Section 4 as:

- Trout fishing: less than 90 m³/s.
- Salmon fishing: 70 – 110 m³/s.
- Kayaking: 70 to 280 m³/s (beginner: 70-90, intermediate: 75-155, advanced/expert: 85-280).
- Rafting: 80 to 150 m³/s.
- Jet boating: more than 115 m³/s down to SH1 with much lower flows required below SH1 (100m³/s for this assessment).

These flows are included here as they are most likely to be the ones familiar to users of the River who access water level data as reported at Klondyke.

Considering the RDR take, preferred flow ranges below this point (accounting for the RDR take) would be:

- Trout fishing: less than 60 m³/s (see section 4.1).
- Salmon fishing: 40 – 80 m³/s (see section 4.1).
- Kayaking: 40 to 250 m³/s (beginner: 40-70, intermediate: 45-125, advanced/expert: 55-250) (see section 4.2).
- Rafting: 50 to 120 m³/s (see section 4.3).
- Jet boating: more than 85 m³/s above SH1 and more than 77 m³/s below SH1 (see section 4.4).

Modelled changes in flow availability in days per 'summer' recreation season (based on 1 November to 30 April) as a result of the proposal are shown in Table 2 for the 'existing environment' with the 700 l/s bypass take, and in Table 2 for the 3 m³/s bypass. Flows are based on data provided by Pattle Delamore Partners and referenced in Veendrick (2017), modelled on flow records from 1971 to 2015. Additional flow bands have been added to the analysis based on the submission of Whitewater NZ to the Klondyke Water Storage consent application.

The proposal is a reduction of up to 5 m³/s over the existing take of 3 m³/s for an additional 4 month period (February to May). The scale of change from 3 m³/s to 5 m³/s will be very difficult to discern in-river as the residual flow in the affected reach when the bypass take increases above 3 m³/s will result in a minimum flow of 93.4 m³/s. It is the 3 m³/s diversion flow which is of most interest, and will operate with residual flows in the affected reach as low as 17.7 m³/s. While the affected reach is short, it is steep and features a short 'bony' distance with large boulders. This represents a hurdle in the kayaking and rafting journey from above the Rangitata Gorge to Peel Forest

Table 1: Existing and change in <i>average days</i> flow band ⁵ availability, 1 Nov – 30 April Existing environment = 700 l/s bypass take				
Flow band (m³/s)	Natural	Existing	Proposed	Change
<60 (trout)	29.7	91.1	95.3	+4.1
40 – 80 (salmon)	66.9	69.4	67.1	-2.3
40 – 70 (beginner kayak)	47.7	56.0	54.8	-1.2
45 – 125 (intermediate kayak)	128.1	92.5	92.9	+0.4
45 – 170 (intermediate kayak)	151.3	104.6	102.4	-2.2
55 – 250 (advanced/expert kayak)	150.2	93.5	89.2	-4.4
80 – 170 ('big' water kayaking)	89.8	45.1	44.7	-0.4
50 – 120 (rafting)	116.3	81.2	81.1	-0.1
80 – 170 (rafting)	89.8	45.1	44.7	-0.4
85 + (jet to SH1)	103.1	54.5	51.6	-2.9
60 – 80	38.4	30.2	28.8	-1.3
75 – 80	9.6	6.0	5.5	-0.5
80 – 100	37.2	20.7	25.4	+4.7
95 – 100	8.5	5.9	4.6	-1.3
100 – 125	29.5	12.2	9.7	-2.5
100 – 150	44.7	20.2	15.7	-4.5
150 +	31.2	19.1	16.1	-3.0

Table 2: Existing and change in <i>average days</i> flow band availability, 1 Nov – 30 April Existing environment = 3 m³/s bypass take				
Flow band (m³/s)	Natural	Existing	Proposed	Change
<60 (trout)	29.7	93.4	95.3	+1.8
40 – 80 (salmon)	66.9	69.4	67.1	-2.3
40 – 70 (beginner kayak)	47.7	56.6	54.8	-1.8
45 – 125 (intermediate kayak)	128.1	91.1	92.9	+1.7
45 – 170 (intermediate kayak)	151.3	102.9	102.4	-0.5
55 – 250 (advanced/expert kayak)	150.2	90.8	89.2	-1.7
80 – 170 ('big' water kayaking)	89.8	43.5	44.7	+1.2
50 – 120 (rafting)	116.3	79.2	81.1	+1.9
80 – 170 (rafting)	89.8	43.5	44.7	+1.2
85 + (jet to SH1)	103.1	52.9	51.6	-1.2
60 – 80	38.4	29.7	28.8	-0.9
75 – 80	9.6	5.8	5.5	-0.3
80 – 100	37.2	19.7	25.4	+5.8

⁵ Flow bands are, for example, 0-59.999 and 60 – 84.999.

Table 2: Existing and change in <i>average days</i> flow band availability, 1 Nov – 30 April Existing environment = 3 m ³ /s bypass take				
Flow band (m ³ /s)	Natural	Existing	Proposed	Change
95 – 100	8.5	5.4	4.6	-0.8
100 – 125	29.5	12.0	9.7	-2.3
100 – 150	44.7	19.8	15.7	-4.1
150 +	31.2	18.7	16.1	-2.6

For the 'existing environment' with a 3 m³/s bypass take in the affected reach there is

- An increase in the availability of flows suited to trout fishing (<60 m³/s); and
- Changes ranging from 1.8 days less per season for 'beginner kayak' (a 3.2% loss) to an increase of 1.9 days for the lower rafting band (a 2.4% gain).

For the 700 l/s bypass take, the changes are all negative and range up to a 4.7% loss in 'advanced/expert' kayaking days and 1% loss in rafting days.

Compared with natural flows, the combined effect of the RDR abstraction and the fish bypass flows are positive for beginner kayak flows.

At flows above the lower threshold for beginner kayaking (40m³/s) and the lower threshold for rafting (50m³/s), fish bypass flows rapidly recede as an adverse effect as they will not hinder passage and only affect, in a very minor way, the experience on one short section of the River.

It is important to note that the changes in availability of flow bands described above are unlikely to occur in contiguous periods. For example, the availability of the 100-125 m³/s band is currently available (with the 3 m³/s take) on 12.0 days per season (6.7% of the time) between the RDR and Arundel. This may be represented by many periods of hours or minutes, and includes night-time flows. The coincidence of a recreational user and the availability of such narrow and occasional flow bands is quite low. If a kayaking opportunity is within a 10 hour period of good light over 24 hours, the average availability of a flow of 100-125 m³/s drops to 5.0 non-contiguous days per season.

Nevertheless, the proposal compared with the 700 l/s bypass take will result in a minor loss of kayaking and rafting amenity over a short reach. This includes a short, relatively steep and rocky section (which would be termed 'bony' by kayakers and rafters) (Figure 6 – see also aerial images in Ryder (2017)). Loss of flow availability over this section creates a hurdle for white water users travelling between, or from above, the Gorge to Peel Forest.

Compared with the 700 l/s bypass take as the 'existing environment', the adverse effects for kayaking and rafting, while minor, will require some form of mitigation.

Compared with the 'existing environment' with the 3 m³/s take consented, there is a small change in kayaking and rafting amenity due to reduced flows for 1380 m of River over a longer period of the season, with a range of changes of 1.3 fewer days per season for 'beginner kayak' (a 3.3% loss), to 1.9 days more for the lower rafting band (a 2.4% gain)

5.5 Mitigations

5.5.1 In-river

The proposal – compared with the 700 l/s 'existing environment' – would result in a loss of kayaking and rafting amenity in an important recreation setting.

Although the losses are small and over a short distance, they are not mitigated by the additional 700 l/s returned to the river 1000 m earlier than currently, and represent a new loss of amenity. Mitigations are recommended to include two eight-hour partial ceases of abstraction from the RDR on the request of Whitewater NZ in association with the Peel Forest Outdoor Centre, to occur annually, if flows and irrigation demand allow, between January and December, but definitely by March. To mitigate effects, the partial ceases should augment flows above or up to the 40+ m³/s bands (see Table 1). The partial ceases will benefit flows for the full length of the River downstream of the RDR intake. An increase in flow of between 10 and 15 m³/s, where it reaches or exceeds a residual flow of 40 m³/s, is likely to have a meaningful effect on rafting and kayaking amenity.

The effect on kayaking and rafting compared with the 3 m³/s baseline is sufficiently slight, and includes additional days for rafting and intermediate kayaking, to avoid the need for additional mitigation (that is, the benefits of a shortened diversion and advantages in some recreation flow bands, balances the minor losses in other flow bands). In addition, the fish pass will increase recruitment of trout and salmon and benefit the largest recreational uses of the River.

5.5.2 *Terrestrial*

Signage will be required during the construction period to advise potential recreational users of alternative river access opportunities during the construction period. If the various agencies agree, this advice should be reflected on the Fish & Game, Department of Conservation, ECan and NZFishing.com websites for the construction period. The applicant will be required to advise these agencies when access is closed and again when reopened, and the closure period minimised. The alignment of the easement will need to be resurveyed.

Figure 6: Part of the affected reach below RDR intake at 80 m³/s, 5 October 2017



6 Conclusion

While the effects of the take and return flow for the proposed fish pass are minor in scale – considering the short length of river affected and the scale of change – there is a potential loss of amenity for kayaking and rafting when the proposal is compared with the 700 l/s bypass take as the existing environment. A partial cease to abstraction for the RDR scheme over two eight-hour periods, on request and affecting the entire River below the RDR intake, is suitable mitigation, but is not required when compared with the 3 m³/s baseline.

With these mitigations in place for the 700 l/s scenario, residual adverse effects on recreation will be less than minor, in my opinion.

The fish pass will increase recruitment of trout and salmon and benefit the largest recreational uses of the River (angling).

Recreation access from the end of Klondyke Terrace to the Tenehaun Track will be temporarily interrupted during construction, and will require resurveying where the race alignment is modified near the new screen.

7 References

All web references are indicated in footnotes and were retrieved through the period from late 2014 to early 2016.

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8 Appendix 1: Daly 2004

Rangitata River Catchment	Recreation Physical Value		Recreation Use Value <u>Frequency</u> <u>Intensity</u>																																							
			Passive				Contact		Mechanised Water Craft		Paddling & Floating Water Craft				Sail Water Craft		Angling & Hunting						Off-road Vehicles				Other															
	Water Quality	Scenic Appeal	Natural Appeal	Sightseeing	Walking	Tramping	Picnicking / Barbeque	Camping	Horse Trekking	Bird-watching	Swimming	Paddling / Wading	Diving	Jet Boating	Water Skiing	Jet Skiing	Power Boating	Canoeing / Kayaking	Rafting	Floating	Drift Boating	Rowing	Sail Boating	Board Sailing	Kite Sailing	Salmon	Trout	White-baiting	Eeling	Other Fishing	Waterfowl	Small Game	Big Game	Four-wheel Driving / ATVs	Trail Biking	Mountain Biking	Dune Buggies	Land Sailing	Multi-sports	Ice Skating		
Upper Rangitata River, headwaters to Clyde and Havelock Rivers confluence	H	H	H		M	M																				M	M				M	H	M	M	M							
Middle Rangitata River, Clyde and Havelock Rivers confluence downstream to the Gorge.	H	H	H	M	L					L	L			L	L			M	M							M	M				M	M										
Lake Denny	L	M	M	L	L		L	L		L	L	L						L				L		L				M														
Rangitata River Gorge	H	H	H											M				M	H							M	M				M	M										
Lower Rangitata River Gorge to mouth	H	M	M	M	M		M			L	L			H	M			M	M							M	M				M	M		M	M		M	M				
Rangitata River mouth	H	M	M	M	L		M	L		M	M			M	L			M								M	M	L	M	M	M	L	M		M							

Rangitata River Catchment	ATTRIBUTES																																								
	Travel Time (from major population centre)			Facilities			Accommodation			Fishing and hunting abundance of target species			Channel features						Flow strength			Flow conditions supporting recreation	Obstructions	Accessibility																	
	Close (<30 min)	Moderate (< 1 hr)	Far (> 1 hr)	Extensive	Many	Some	Limited	Camping	Tramping hut	Caravan/ Camper-van	Crib/ Batch	Very common	Common	Uncommon	Shallows	Waterfall	Shallow rock drop	Rock obstacles	Riffles	Rapids	Pools			Sluggish	Moderate	Strong	Powerful	Year-round	Certain times of year	Bankside willows	Bank/bed obstructions	Good access	Limited access	Good access	Moderate access	Private access	Good access	Moderate access	Limited access		
Upper Rangitata River, headwaters to Clyde and Havelock Rivers confluence			•				•	•	•			sg	st	sg	•				•	•	•			•	•	•				•					•				•		
Middle Rangitata River, Clyde and Havelock Rivers confluence downstream to the Gorge			•				•	•		•			st	sg	sg				•	•	•			•	•	•					•						•				
Lake Denny			•				•						st																		•					•			•		
Rangitata River Gorge		•	•				•						st	sg	st	sg	•	•	•	•	•	•			•	•	•			•		•			•	•			•		
Lower Rangitata River, Gorge to mout	•	•					•						st	sg	st	sg			•	•	•	•			•		•			•									•		
Rangitata River mouth	•					•		•		•	•	st	st	wh	sg	ef			•		•			•			•				•								•		