Source: Hughey, K.F.D., Baker, M-A. (eds). (2010a). The River Values Assessment System: Volume 1: Overview of the Method, Guidelines for Use and Application to Recreational Values. LEaP Report No.24A, Lincoln University, New Zealand.

Chapter 5
Salmonid angling in Tasman District: Application of the River Values Assessment System (RiVAS)

Kay Booth (Lindis Consultants)
Neil Deans (Fish and Game Nelson-Marlborough)
Martin Unwin (NIWA)
Mary-Anne Baker (Tasman District Council)

Peer reviewed by:
John Hayes (Cawthron Institute) and Chris Arbuckle (MAF)

Preamble

The first application of RiVAS, following development of the draft method, was to salmonid angling in Tasman District. The choice of this value and this district reflected the following:

- Key individuals in the project team had management and research responsibilities for salmonid angling;
- Salmonid angling has a large base of supporting information;
- The entire project was designed around outputs required by Tasman District for planning purposes; and
- Half of the team worked within Tasman District boundaries.

Because this was the first application of the method it was expected there would be a range of teething issues and such proved to be the case. Probably most notable amongst these was the narrow geographical focus the team applied to the task, especially to the choice of primary attributes and related indicators, and to cut off points around national, regional and local important – the implications of this narrow focus only became apparent when the method was subsequently trialled in the neighbouring Marlborough District. As a result of the Marlborough trial, a range of changes were required to the Tasman assessment – these changes have been made. The amended, detailed application to Tasman that follows reflects the finalised approach.

5.1 Introduction

5.1.1 Purpose

This report applies the River Values Assessment Method (RiVAS) outlined in, *River Values Assessment System (RiVAS) – The Method* (Hughey et al. herein, Chapter 3), and should be read in conjunction with that chapter. Its purpose is two-fold: (1) to provide a case study of how to apply the method, using the exemplar of salmonid[1] angling in the Tasman District; and (2) to provide an assessment for salmonid angling for the Tasman District.

This is the second version of this report. It was revised in July 2010 in order to incorporate minor revisions to the salmonid angling method arising from its application in the Marlborough District (Deans et al. 2010). Two changes were made: (1) the addition of a new primary attribute (*intensity of use*), and (2) a change to the calculation of the water quality index (the faecal coliform metric). As a result of these changes, one river (Station Creek) was reclassified from local significance to regional significance (see an explanation of the issues around use of 'significance' or 'importance' in footnote 23 of chapter 3.8.4.). Appendix 5-1 outlines report revisions.

1 Salmonid species are brown trout, rainbow trout, lake trout, brook trout, Chinook salmon, sockeye salmon and Atlantic salmon. Only brown and rainbow trout and Chinook salmon are widespread and these fisheries provide the vast majority of angling effort.

5.1.2 Preparatory step: Establish an expert panel and identify peer reviewers

The National Expert Panel for the salmonid trial in Tasman District comprised Neil Deans, Martin Unwin, Mary-Anne Baker and, for the water quality attribute only, Trevor James, Rob Smith and Tom Kroos. Peer reviewers were John Hayes and Chris Arbuckle. Kay Booth facilitated the case study. Credentials of the Expert Panel and peer reviewers are provided in Appendix 5-2.

5.2 Application of the method

5.2.1 Step 1: Define river value categories and river segments

River value categories

Expert Panel discussion identified that trout and salmon angling are very different in nature and these may represent different categories of salmonid angling, in that a slightly different approach or weighting may be required for rivers with salmon (c.f. trout) fisheries. For the purposes of this analysis, there was considered to be little difference between angling for different trout species.

However, Expert Panel knowledge identified that Tasman District primarily offers brown trout angling and has no salmon angling opportunities; therefore there was no need to divide salmonid angling into separate categories.

River segments

Work in advance of the meeting to collate existing data, identified that the four national angling surveys would be the primary sources of data. The surveys provide a list of rivers, a small number of which are subdivided into two segments. This list was chosen for this exercise and rivers (and segments) within the Tasman District were copied into a spreadsheet (See Appendix 5-5). This resulted in a list of 36 river segments on 33 individual rivers.

Some rivers within the Tasman District were not listed, i.e., were excluded from the assessment. These included: (1) rivers which hold negligible value for salmonid angling (survey data did not identify any angling use; the Expert Panel considered they had no known angling value) and (2) rivers for which robust data were not available owing to small survey sample size (i.e., few anglers) and which the Expert Panel considered to be of local significance. An alternative approach for rivers known to have limited salmonid angling value was considered but rejected - to include them and identify them as having 'local value but insufficient data for assessment', or simply identify them as 'data deficient' or 'value unknown'.

Other

The Expert Panel noted that the national angling survey provides a categorisation of rivers based on angling amenity: headwaters, backcountry, lowland. Fish & Game New Zealand (FGNZ) have applied a similar classification to Nelson/Marlborough rivers based upon a Recreational Opportunity Spectrum typology: remote, natural, rural, urban. It was decided that these categories would provide a useful 'check' on the representativeness of the final list of rivers and that this information should be recorded as part of the process. In other words, it provided one means to consider the validity of results. No changes were made as a result of this subsequent deliberation.

Outcomes

Treat salmonid angling as one river value (no separate categories).

Use the national angling survey list of rivers that fall within the Tasman District as the base list of rivers and river segments.

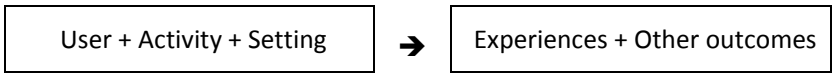
Include the national angling survey and FGNZ river classification systems as a 'check' (presented in Appendix 5-5).

5.2.2 Step 2: Identify attributes

Attributes which describe salmonid angling were structured around the Recreation Opportunity Spectrum (ROS) framework and classified into three groups:

1. *Existing use attributes* were identified based on the dimensions of the 'recreation opportunity', defined as: a chance for a *person* to participate in a specific recreational *activity* within a specific *setting*, in order to achieve a recreational *experience*, with other *outcomes* also realised (positive benefits and negative impacts which may accrue to the recreationist, their group, local communities, or the nation)[2] (Figure 5-1).

Figure 5-1
Framework for existing use attributes



Appendix 5-3 is structured on this basis – user attributes and activity attributes are presented first, followed by setting attributes, experiential attributes and attributes associated with other outcomes. The recreation setting is considered in terms of the three setting components of the ROS: environmental parameters (fishery, river features, landscape), social parameters (other recreationists) and managerial parameters (facilities and services, access).

2. *Contextual attributes* consider the river in its wider geographical context – its role within the *spectrum* of recreation settings (c.f. existing use attributes which are specific to the river itself). This set of values derives from the ROS premise that quality recreational experiences are best achieved by providing a range or diversity of recreation opportunities[3]. Given the regional (rather than river) scale of these attributes, they will be addressed in Step 9.
3. *Future and past use attributes* are identified because the notion of a 'recreation opportunity' highlights the chance or opportunity to undertake recreation – it is not restricted to opportunities which have been taken up (existing use). Given the conceptual nature of these attributes, they will be considered in Step 9.

Attributes encompass three of the four well-beings defined in the Local Government Act (social, economic, environmental). Cultural attributes may also be relevant for salmonid angling, but no data are available to illuminate this.

Outcome

A list of all attributes is provided in Appendix 5-3.

5.2.3 Step 3: Select and describe primary attributes

From the list of attributes outlined in Step 2, primary attributes were selected to *represent* salmonid angling. Selection was based on:

1. The need for pragmatism – only ten attributes were identified but these covered three of the four well-beings;

2 Adapted from Stankey and Wood (1982) and Driver (2009)
3 McCool et al. (2007)

2. Research literature on the attributes identified by anglers as important. In addition, Expert Panel members' opinion about the contribution of attributes to an understanding of salmonid angling was used;
3. Focus upon the parameters that relate to the specific river rather than the role of the river within the wider context (the recreation opportunity spectrum contextual attributes). This decision was made for practical reasons – not because contextual factors were considered less important;
4. Coverage of the following dimensions of the ROS framework, as these were considered the most important: users, environmental setting, experiences;
5. 'Experiences' attributes, which have focused upon the *overall* perceptions of users. There are many experiential attributes which have been ignored for practical reasons, e.g., sense of challenge and solitude; and
6. Existing data - consideration was not given to the availability of existing data, as later steps account for data deficiency (via the Expert Panel) and provide for input into future research needs (to overcome data deficiencies in the future).

In the initial application in Tasman District (report dated May 2009), nine primary attributes were identified. Subsequent application of the method in Marlborough produced results that suggested that there was too much emphasis upon qualitative perceptual attributes and too little on actual usage. Therefore a new attribute measuring the intensity of use was added. This acknowledges the importance of short but highly used reaches. The Tasman application was revised to accommodate this new primary attribute.

Outcome

Appendix 5-3 identifies the ten primary attributes (in bold) and describes them, with emphasis on explanation of the attribute's validity and reliability as a representative measure of salmonid angling.

5.2.4 Step 4: Identify indicators

One indicator for each primary attribute was identified, using SMARTA criteria, based on:

1. Existing data – for salmonid angling, there is a wealth of appropriate and fit-for-use-now data;
2. Expert Panel judgment – especially required for the water quality indicator, in order to identify and apply those data relevant to salmonid angling; and
3. Indicator portability – based on an attempt to identify indicators that may be portable to other river values (e.g., 'level of use' and 'travel distance' are likely to be generic indicators for all recreation values).

Appendix 5-4 shows the assessment of each indicator on SMARTA criteria.

No primary attributes were dropped owing to difficulty in devising measurable indicators. Data deficiencies are outlined in Step 10.

Each indicator was considered carefully. For example, discussion about the contribution and difference between *perceptions of wilderness* and *perceptions of scenic attractiveness*, included:

1. Was it more appropriate to measure these environmental parameters by perceptions of anglers or professional assessment (e.g., from landscape architects)? As data were available for the former measurements, and this seemed the most relevant indicator, the former style of indicator was chosen.
2. Data were correlated to check the attributes' similarity. Results indicated they measured different things – e.g., some rivers were rated high scenically but low on the wilderness parameter.

A difficulty was encountered in terms of the specificity of some attributes and indicators, and some revision was undertaken to attributes as a result. In other words, the attributes were found to be too generic as originally defined. For salmonid angling, this occurred for the attribute *origin of users*. Two indicators were feasible – travel distance (for New Zealand anglers) and percentage of users who were from overseas. Since both are very different, choosing just one indicator was problematic. The decision was made to specify two attributes – *origin of New Zealand anglers* and *proportion of international anglers* fishing a particular river. Consideration was given to the relative contribution each made to the *set* of attributes – but it was noted that weighting could correct for this (Step 7). In summary, it is useful to reconsider the list of attributes and check the choice of indicators is appropriate.

Outcome

Indicators are listed in Appendix 5-3 and assessed against SMARTA criteria in Appendix 5-4.

5.2.5 Step 5: Determine indicator thresholds

Thresholds for each indicator were identified by the Expert Panel. Because salmonid angling is comparatively data rich (c.f. other river values), this step was informed by data for all indicators.

Consideration was given to the meaning of the thresholds. Examples:

For the attribute, *scenic attractiveness*, the indicator relied upon survey data (anglers' perceptions of scenic attractiveness). The 'high' threshold was set so that >50% of people would have to rate scenic attractiveness of the river as a 4 or 5 (on a scale where 5 = highest value) in order for it to be considered of high relative importance.

For the attribute *level of use*, the indicator was number of angler days p.a. Considerations in the decision-making process were:

1. High use threshold - initially >10,000 angler days was considered because this measure is used by MfE in its Waters of National Importance work with respect to a catchment;
2. Data from the national angling survey, which was interrogated to check how many rivers would meet a threshold of >10,000 angler days (=15 rivers in the whole country from a total of 881 angling rivers) and >5,000 angler days (=25 rivers). The panel considered that, on usage alone, the number of 25 rivers seemed more appropriate than 15 given the total number of angling rivers.
3. Ratio - thought was given to a ratio of 10:1 compared with 5:1 for 'high' to 'low' importance. 5:1 was considered a more defensible ratio.
4. The decision was made to use >5,000 angler days p.a. as the 'high' threshold, primarily owing to the result that 25 rivers (within New Zealand) would trigger this threshold and thus indicate that a river was nationally significant.

Outcome

Thresholds are identified in Appendix 5-3.

5.2.6 Step 6: Apply indicators and indicator thresholds

Given that all indicators were assessed using primary data, this step involved entering data from the relevant data sources (primarily the national angling surveys). Data were kept in their original format (e.g., *actual number* of angler days, *percentage* of international anglers). This helped the Expert Panel to relate to the data.

For the *water quality* indicator, the Expert Panel combined data that were considered relevant to salmonid angling. The process used was to:

1. Identify criteria: Selection of water quality criteria was based on the research literature about water quality and its effect upon sports fish (drawing on the knowledge of the Expert Panel);
2. Identify how to measure the criteria (indicators/thresholds): Again, scientific knowledge was used – known trigger points influence a sports fishery (e.g., fish die when the water temperature is over 24 degrees). Ranking was considered in the calculations. Appendix 5-6 (*Water quality calculations* worksheet) illustrates that each component of water quality was considered equal (i.e., maximum score of 1 for each component of water quality – all components were then simply averaged);
3. Populate with data (or estimates where no data) for each river. A scale between 0.0 and 1.0 was used since this was easy to comprehend and to compare attributes before any weighting is considered.

This example illustrates the need for the Expert Panel to be very familiar with the river value (in this case, salmonid angling), especially given the likely heavy reliance upon the Expert Panel for data estimates for many river values.

Outcome

Appendix 5-6 (*Water quality calculations* worksheet) presents the data calculations for the indicator *water quality*. The resultant data were entered into the main spreadsheet shown in Appendix 5-5.

5.2.7 Step 7: Weighting the primary attributes

The Expert Panel reviewed the ten primary attributes and considered whether some made a relatively greater contribution to salmonid angling as a whole. Initial thoughts were that they made an equal contribution. Several weighting options were 'checked out' via the spreadsheet, which was easy to do (see Appendix 5-5 for the three weightings options). Results with the different weightings were reviewed and changes in rank order of rivers considered. Fundamentally little changed, so the decision was reached to keep weightings equal. In other words, an iterative process was used to 'test' weightings and decide the most appropriate.

Considerations in choosing equal weightings were:

1. Testing - various weighting sets showed no fundamental difference in river ranking;
2. Application - applying weighting(s) to attribute(s) potentially introduced spurious accuracy; and
3. Attributes - reinforcing the importance of selecting appropriate primary attributes earlier in the process.

Outcome

Equal weighting. See Appendix 5-5 for weighting testing.

5.2.8 Step 8: Determine river significance

Step 8a: Rank rivers

The spreadsheet was used to sum the indicator threshold scores for each river. Since we had chosen to equally weight the primary attributes, we did not have to first multiply the threshold scores by the weights. The sum of the indicator threshold scores were placed in a column and then sorted in descending order. This provided the list of rivers ranked by their significance scores.

Step 8b: Identify river significance

Using the ranked list from Step 8a, the Expert Panel closely examined the rivers, and their attribute scores. It was noted that a strong correlation existed between angling and rivers which scored a 3 (high) for the indicator *% overseas anglers*. Intuitively this made sense – international anglers were likely to target 'the best' rivers in New Zealand. Therefore this attribute was chosen as a surrogate attribute. No obvious national trigger attribute presented itself. The following criteria were applied:
National significance:

Criterion 1: *% overseas anglers* = 3, plus 25% or more of the other attributes = 3; or
Criterion 2: 50% or more of the attributes = 3.

Regional significance:

Those rivers in the table not defined as nationally or locally significant.

Local significance:

Sole criterion: *% overseas anglers* < 3, plus maximum of one other attribute = 3.

Translation of these functions to rivers is shown in Appendix 5-5.

The Expert Panel assessed the output from this process against the results of existing assessments and other relevant considerations, including:

1. Special features of rivers in the Tasman District with respect to salmonid angling;
2. Existing Water Conservation Orders associated with salmonid angling;
3. Existing planning documents, including Regional Plans under the RMA and the Nelson Marlborough *Sports Fish and Game Management Plan*.
4. Reference to MfE *Waters of National Importance* work.

The results of these considerations showed that this significance assessment corresponded to the most significant water bodies for salmonid angling identified through other processes. The current method was considered to effectively discriminate rivers having attributes favourable to salmonid angling.

Other assessments confirmed that, compared with a national average, a higher proportion of Tasman rivers, is likely to be nationally significant for their salmonid angling. It is acknowledged that, owing to the judgmental nature of this exercise, rivers close to the threshold points could 'swing either way'.

Outcome

A list of rivers ranked by a scoring system from highest to lowest, which represents an initial significance ranking list. See Appendix 5-5 (columns highlighted in green).

Rivers identified as significant at the national, regional and local level. See Appendix 5-5.

Rivers in the Tasman District not listed have either low or no salmonid angling value.

5.2.9 Step 9: Outline other factors relevant to the assessment of significance

Seven attributes of salmonid angling have been identified which are not quantifiable but considered relevant to significance assessment. These attributes are discussed in Appendix 5-7 in order to highlight their importance to a meaningful understanding of salmonid angling. The attributes are:

- Access;
- Degree of scarcity of the experience;

- Contribution to a collective value;
- Users' perceptions of the river's 'status';
- Potential future angling use;
- Existence value; and
- Past use (former high quality angling rivers).

These attributes do not influence the numeric calculation of river significance, but are relevant to decision-making about salmonid angling.

Outcome

List and description of non-measured attributes (Appendix 5-7).

5.2.10 Step 10: Review assessment process and identify future information requirements

The National Angling Survey provides a national angling database which greatly assists with indicator measurement. However, some desired data are not available or are out of date. For future assessment, desired data are noted in Appendix 5-8.

References

Deans, N., Greenaway, R., Hammill, P., Hovell, K., Unwin, M. (in prep). *Salmonid angling in the Marlborough District: Application of the river values assessment system (RiVAS).* Draft report. Lincoln University, Canterbury.

Driver, B.L. (2009). What is Outcomes-Focused Management? in Driver, B.L. (ed.). (2009). *Managing to Optimize the Beneficial Outcomes of Recreation.* Venture Publishing, State College, Pennsylvania, USA.

Hay, J., Hayes, J.W., Young R. (2006*). Water Quality Guidelines to Protect Trout Fishery Values.* Prepared by Cawthron Institute for Horizons Regional Council. Cawthron Report No. 1205, Nelson.

Hughey, K., Booth, K., Deans, N., Baker, M-A. (Herein). *River Values Assessment System (RiVAS) – The method.*

McCool, S.F., Clark, R.N., Stankey, G.H. (2007). *An assessment of frameworks useful for public land recreation planning.* General Technical Report PNW-GTR-705. US Department of Agriculture, Forest Service, Pacific Northwest Research Station, Portland, Oregon, USA.

Stankey, G., Wood, J. (1982). The Recreation Opportunity Spectrum: An Introduction. *Australian Parks and Recreation,* 22, 2, 5-13.

Teirney, L.D., Richardson, J. (1992). Attributes that characterize angling rivers of importance in New Zealand, based on angler use and perceptions. *North American Journal of Fisheries Management,* 12, 693-702.

Teirney, L.D., Unwin, M.J., Rowe, D.K., McDowall. R.M., Graynoth, E. (1982). *Submission on the Draft Inventory of Wild and Scenic Rivers of National Importance.* Report to the National Water Soil Conservation Authority. Fisheries Environmental Report No. 28. NZ Ministry of Agriculture and Fisheries, Christchurch.

Unwin, M.J. (in prep). *Angler perceptions of river fisheries in Nelson/Marlborough and Otago.* NIWA Client Report. Working draft report. (referred to in this report as the '2008 pilot survey')

Unwin, M.J. (2009). *Angler usage of lake and river fisheries managed by Fish & Game New Zealand: Results from the 2007/08 National Angling Survey.* Prepared by NIWA for Fish & Game New Zealand. NIWA Client Report CHC2009-046, Christchurch.

Unwin, M., Brown, S. (1998). *The Geography of Freshwater Angling in New Zealand: A summary of results from the 1994/96 National Angling Survey.* Prepared by NIWA for Fish & Game New Zealand. NIWA Client Report: CHC98/33, Christchurch.

Unwin, M., Image, K. (2003). *Angler usage of lake and river fisheries managed by Fish & Game New Zealand: Results from the 2001/02 National Angling Survey.* Prepared by NIWA for Fish & Game New Zealand. NIWA Client Report: CHC2003-114, Christchurch.

Appendix 5-1
Record of report revisions

Amendments made to reflect method revisions arising from salmonid angling Marlborough application Made by: Kay Booth Approved by: All authors and peer reviewers Date of approval: 10 July 2010		
Section & page number	**Amendment**	**Reason for amendment**
Section 1.1, p1	Addition of explanatory paragraph that identifies the report has been revised and in what way	Alerts readers about changes to report
Step 3, p3	Additional attribute introduced: 'intensity of use'	Provides more emphasis on angling usage within the set of attributes
Appendix 5-3, p14/15	'Intensity of use' attribute described	
Appendix 5-4, p22	Indicator for the new attribute described (called 'mean free reach')	
Appendix 5-5	Indicator data entered into spreadsheet, thresholds identified/populated, and added into calculations	
Step 6, p5	Faecal coliform index standard changed from 'alert' to 'action'	Angling is not a contact recreation activity. It involves secondary contact (with water) which has an inherently lower risk of disease. Therefore the more stringent 'alert' level (which is used for contact recreation) was deemed too stringent.
Appendix 5-3, p17/18	Water quality standard described	
Appendix 5-5	Water quality calculations redone on basis of new standard. This resulted in four river sections changing their water quality score: Motueka River (below Wangapeka) Mangles River Station Creek Howard River	
Appendix 5-5	Some rivers changed their ranking as a result of the new primary attribute and revised water quality scores	
Appendix 5-5	One river (Station Creek) shifted significance status from local to regional significance. No other river sections changed river significance status	

Appendix 5-2
Credentials of the Expert Panel members and peer reviewers

The Expert Panel comprised three members. In addition, three other people contributed to the development of the water quality indicator. Their credentials are:

1. **Neil Deans** is manager of the Nelson Marlborough Fish and Game Region and has expert knowledge of all rivers and salmonid angling in the District in his field and other work over the last 20 years. He has written widely about sports fishery management, including as lead author of the chapter on Sport Fishery Management in the recently published 'Freshwaters of New Zealand'. He is the immediate Past President of the Freshwater Sciences Society of New Zealand and has produced a paper on evaluation of salmonid fisheries for Fish and Game New Zealand nationally.
2. **Martin Unwin** is a fisheries scientist with over 30 years experience, based with NIWA in Christchurch. He has contributed to, or has overseen, the four National Angler Surveys and other related angler surveys. He can access the data associated with these for the use of this analysis.
3. **Mary-Anne Baker** is a policy planner with Tasman District Council, with 20 years experience in soil conservation and freshwater management. She has contributed to the preparation of the Council's water and contaminant discharge management provisions in its Resource Management Plan.

Contributed to the water quality indicator:

1. **Trevor James** is a resource scientist at the Tasman District Council, with 18 years experience in both the private and public sector. He is responsible for surface water State of the Environment monitoring and assessment at Council, with familiarity of, and access to, water quality data for the District.
2. **Rob Smith** is the Environmental Information Manager at Tasman District Council with 18 years experience in the monitoring or management of freshwater resources.
3. **Tom Kroos** is the principal biologist at Fish & Wildlife Services, a consultancy company based in Richmond, where he has involvement in fish and water quality surveys for public and private sector organisations.

Peer reviewers for this work were:

1. **Dr John Hayes**, a senior scientist with the Cawthron Institute, has considerable national and international expertise in salmonid fisheries and the development of models of fish behaviour and energetics. He is an internationally respected fisheries scientist with an extensive publication list in fisheries management. He frequently authors popular articles in 'Fish and Game' magazine and is the co-author of 'The Artful Science of Trout Fishing', summarising his fisheries knowledge for the non-technically minded angler.
2. **Chris Arbuckle** is a senior policy advisor with MAF in Dunedin. He has a background in freshwater science, policy and management with the Otago Regional Council and Environment Southland.

Appendix 5-3
Assessment criteria for salmonid angling (Steps 2-4)

ATTRIBUTE CLUSTERS	ATTRIBUTE (primary attributes in bold)	DESCRIPTION OF PRIMARY ATTRIBUTES	INDICATORS	INDICATOR SIGNIFICANCE THRESHOLDS	DATA SOURCES AND RELIABILITY)
Step 2: Identify attributes Step 3: Select and describe primary attributes		Step 3: Select and describe primary attributes	Step 4: Identify indicators	Step 5: Determine significance thresholds	
ATTRIBUTES ASSOCIATED WITH EXISTING USE					
Users	**Level of use**	High use implies high value. However, this assumption will under-value special and remote places for several reasons, including: **Activity specialisation.** Resources suitable for highly specialised participants (high skill levels) will attract low numbers of users but may be highly valued and/or rare opportunities. **Access.** Restrictions upon access will reduce use and/or make it available only to some potential users due to cost, availability of time, specialised equipment or transport, physical capability, etc. **Wilderness and remote areas**. Areas that offer few encounters with other people may be highly valued for this attribute (amongst other things). This is particularly so for anglers, as other anglers represent not only a potential disturbance to wilderness values, but also a competitor for a fishing opportunity which is affected by the presence of others. In NZ, evaluation of the significance of freshwater fisheries has gone further than most other forms of water-based recreation. A review of the first national angling survey undertaken in 1980 (Teirney and Richardson, 1992: 693-702, our emphasis) summarised this issue as follows:	Number of angler days p.a. Notes: Ideally should be number of angler days per season, as some rivers are open to angling all year while others only for the main 7 month fishing season. Considered but dismissed an alternative indicator (angler days per km).	National: >5,000 angler days p.a. (**score: 3**) Regional: 1,000 - 5,000 angler days p.a. (**score: 2**) Local: <1,000 angler days p.a. (**score: 1**)	National Angling Survey: mean from 3 surveys (good)

ATTRIBUTE CLUSTERS	ATTRIBUTE (primary attributes in bold)	DESCRIPTION OF PRIMARY ATTRIBUTES	INDICATORS	INDICATOR SIGNIFICANCE THRESHOLDS	DATA SOURCES AND RELIABILITY)
		The total number of fishing visits made to each river provided a measure of its relative importance. [However] the relative importance (and presumably therefore the absolute value) cannot be evaluated solely by reference to measures of angler use. A list of seven other factors believed to be important determinants of high-quality river fishing experiences in New Zealand was compiled… For each river, anglers were asked to assign a rating between 1 (lowest) and 5 (highest) for distance from home, ease of access, area of fishable water (defined as the area of river bed or bank from which to fish), scenic beauty, peace and solitude, catch rate and size of fish. The overall importance of each river fished was also evaluated with the same rating scale… *For trout rivers, our results suggest angler use alone should not be used as an absolute measure of a river's value; none of our three measures of angler use were correlated with anglers' perceptions of overall importance. The rivers used most in New Zealand tended to be close to home and have easy access, whereas the most highly valued rivers were characterised by good catch rates of large fish, extensive areas of fishable water, and scenically attractive and peaceful surroundings…* *It seems that the hope, even if unrealistic for many anglers, of landing a fish or having an occasional success weighs particularly heavily in the perception of a New Zealand river's value.*			
	Intensity of use	Intensity of use is measured by the Mean Free Reach (MFR), which is the length of the reach divided by the number of angler days. The smaller the MFR, the more crowded the river, i.e., low values imply high density. It is an idealisation, based on the assumption that anglers are evenly distributed along the length of each river, but NIWA suggests the measure gives	Mean free reach (MFR) = average distance (in km) an angler would have to travel on an average day before encountering another	National: MFR <5km (**score: 3**) Regional: MFR 5-20 km (**score: 2**) Local: MFR >20 km	National Angling Survey: 2007/8 (good)

ATTRIBUTE CLUSTERS	ATTRIBUTE (primary attributes in bold)	DESCRIPTION OF PRIMARY ATTRIBUTES	INDICATORS	INDICATOR SIGNIFICANCE THRESHOLDS	DATA SOURCES AND RELIABILITY)
		credible results. High density is taken as an indicator of high value.	angler	(**score: 1**)	
	Level of commercial use				
	Origin of New Zealand users	Origin of users is suggested as an indicator of quality of the recreational experience, based on the assumption that the higher the expected quality of the experience, the greater the distance users will be prepared to travel.	Mean number of km travelled from home by NZ anglers Note: Actual metric is mean log travel distance in km from home address to river mid-point	National: >100 km (**score: 3**) Regional: 50-100 km (**score: 2**) Local: <50 km (**score: 1**)	National Angling Survey: mean from 3 surveys (good)
	Level of international use	Same as above.	% overseas anglers (of total number of angler days)	National: >20% overseas angler visits (**score: 3**) Regional: 10-20% overseas angler visits (**score: 2**) Local: <10% overseas angler visits (**score: 1**) None: No use by overseas anglers (**score: 0**)	National Angling Survey: mean from 3 surveys (good)
	User demographics				
	Behaviour of users				
Activity	Activity specialisation (degree of skill				

ATTRIBUTE CLUSTERS	ATTRIBUTE (primary attributes in bold)	DESCRIPTION OF PRIMARY ATTRIBUTES	INDICATORS	INDICATOR SIGNIFICANCE THRESHOLDS	DATA SOURCES AND RELIABILITY)
	required)				
Environmental setting: Fishery	**Anticipated catch rate**	Data (from the National Angling Survey 1979/80 and the 2008 FGNZ pilot survey) indicate that the attributes: perceptions of "catch rate" and "chance of catching a large fish": are important components of the angling experience. Both attributes could be assessed as *actual* or *anticipated* measures. The choice of users' perceptions (*anticipated* measure) for both attributes relates to the greater influence that users' perceptions have on their recreational behaviour (c.f. actual rates and chances).	User's perception of catch rate	National: >0.5 (**score: 3**) Regional: 0.2-0.5 (**score: 2**) Local: <0.2 (**score: 1**) Data result from the following calculation: Respondents to the 2008 FGNZ Pilot Survey were asked to identify the 3 most important attributes (from 8 possible candidates) which characterised each river they fished. Scores for each attribute were derived by expressing the number of respondents who listed that attribute as a proportion of the total responses for each river.	2008 pilot survey (good)
	Anticipated chance of catching a large fish		User's perception of chance of catching a large fish	National: >0.5 (**score: 3**) Regional: 0.2-0.5 (**score: 2**) Local: <0.2 (**score: 1**) Data result from the following calculation: See *Anticipated catch rate*	2008 pilot survey (good)

ATTRIBUTE CLUSTERS	ATTRIBUTE (primary attributes in bold)	DESCRIPTION OF PRIMARY ATTRIBUTES	INDICATORS	INDICATOR SIGNIFICANCE THRESHOLDS	DATA SOURCES AND RELIABILITY)
	Angling methods permissible				
	Area of fishable water				
	Species present				
	Species population				
Environmental setting: River features	Water characteristics (e.g., pool/riffle/run sequences)	Given that river features are usually the focus of the decision-making process for which this method will be implemented, ideally all attributes would be selected as primary attributes. However, this is not practical. Water quality was chosen because the water quality requirements of salmonids are well known and most rivers of interest have relevant water quality data			
	Flow (% river segment's length with water deeper than 1 metre, at summer low flow)				
	Water quality	In July 2010, the faecal coliform standard used in calculations of the water quality index was changed. The 2009 report used the 'alert standard' (260); in July 2010 the 'action standard' (550) was adopted. See Appendix 5-5 (worksheet labelled *Water quality calculations)*	Combination of 5 components: water temperature, oxygenation, faecal coliforms, clarity and macro-invertebrate community index	National: >0.8 (**score: 3**) Regional: 0.5-0.8 (**score: 2**) Local: <0.5 (**score: 1**) Data result from the calculations shown in Appendix 5-5 (worksheet	Tasman District Council & some Fish and Game data. Expert Panel estimates (fair).

ATTRIBUTE CLUSTERS	ATTRIBUTE (primary attributes in bold)	DESCRIPTION OF PRIMARY ATTRIBUTES	INDICATORS	INDICATOR SIGNIFICANCE THRESHOLDS	DATA SOURCES AND RELIABILITY)
				labelled *Water quality calculations)*	
Environmental setting: Landscape	Degree of naturalness natural character				
	Scenic attractiveness	Identified in all of the (few) attempts to rate river recreation (National Angling Survey 1979/80 and the 2008 FGNZ pilot survey). As with wilderness character (see next), the measure is based on users' perceptions rather than professional judgment, as users' perception will influence behaviour and satisfaction. Generally, it is expected that there is a positive correlation between perceived scenic attractiveness and angling amenity.	Anglers' perceptions of scenic attractiveness	National: >0.5 (**score: 3**) Regional: 0.2-0.5 (**score: 2**) Local: <0.2 (**score: 1**) Data result from the following calculation: See *Anticipated catch rate*, above	2008 pilot survey (good)
	Wilderness character	This setting attribute has a positive relationship with wilderness angling – the higher the perceived wilderness character, the higher the angling value (National Angling Survey 1979/80 and the 2008 FGNZ pilot survey). Tierney and Richardson (1992) found that angling attributes directly associated with fishing (such as catch rate or fish size) accounted for less than 30% of perceived fishery value.	Anglers' perceptions of wilderness character	National: >0.5 (**score: 3**) Regional: 0.2-0.5 (**score: 2**) Local: <0.2 (**score: 1**) Data result from the following calculation: See *Anticipated catch rate*, above	2008 pilot survey (good)
Social setting	Encounters with other anglers				
	Encounters with other users (not anglers)				
Managerial	Facility and				

ATTRIBUTE CLUSTERS	ATTRIBUTE (primary attributes in bold)	DESCRIPTION OF PRIMARY ATTRIBUTES	INDICATORS	INDICATOR SIGNIFICANCE THRESHOLDS	DATA SOURCES AND RELIABILITY)
setting	services provision and regulation (e.g., bridges; air services)				
	Access: Provision of unrestricted public access; Access charges; Degree of difficulty (e.g., walk in)	See Step 9.			
Experiences	**Perceptions of the importance of the river**	Currently the National Angling Survey does not collect this information. A question could be added asking anglers to rate rivers in terms of its overall importance. This differs to the contextual value 'perception of the river's status' in that it is specific to users' perceptions – the latter value relates to the status by which the river is held by the recreational community (users and non-users). For example, the Tongariro River is an iconic New Zealand rainbow trout fishery. It also differs to the angler's perception of the quality of their experience (see next attribute), as that is usually measured based on a single visit. This parameter refers to perception of the river in a general sense (long-term view).	Anglers' perception of the overall importance of the river	National: >4 on question scale (**score: 3**) Regional: 3-4 on question scale (**score: 2**) Local: <3 on question scale (**score: 1**)	1979 National Angling Survey (fair, owing to age of data) While there were more recent data for Otago and Nelson Marlborough, rankings were mostly similar but older data was more robust and a full national dataset
	Perceptions of the quality of the experience				
Other	Economic				

ATTRIBUTE CLUSTERS	ATTRIBUTE (primary attributes in bold)	DESCRIPTION OF PRIMARY ATTRIBUTES	INDICATORS	INDICATOR SIGNIFICANCE THRESHOLDS	DATA SOURCES AND RELIABILITY)
outcomes	benefits: To local area, region, nation				
	Non-economic benefits, including existence value				
CONTEXTUAL ATTRIBUTES					
Opportunity *spectrum*	Degree of scarcity of the experience	See Step 9.			
	Contribution to a collective value	See Step 9.			
	Users' perceptions of the river's 'status'	See Step 9.			
ATTRIBUTES ASSOCIATED WITH FUTURE AND PAST USE					
Recreation *opportunity*	Potential future angling use (option value) - avoid precluding future uses	See Step 9.			
	Past use (former glory)	See Step 9.			

Appendix 5-4
Assessment of indicators by SMARTA criteria

Indicator	Specific	Measurable	Achievable	Relevant	Timely	Already in use
Number of angler days p.a.	Yes	No. days	Survey data available	Use implies valued by user	Data available	Yes
Mean free reach	Yes	Fishable reach / angler days p.a.	Survey data available	High intensity implies high value	Data available	Yes
Mean number of km travelled from home by NZ anglers	Yes	No. km	Survey data available	Travel distance = indicator of quality of experience	Data available	Yes
% overseas anglers (of total number of angler days)	Yes	%	Survey data available	Same as above (international travel)	Data available	Yes
User's perception of catch rate	Yes	Response to rating scale question	Survey data available	Known to influence choice of angling site	Data available	Yes
User's perception of chance of catching a large fish	Yes	Response to rating scale question	Survey data available	Known to influence choice of angling site	Data available	Yes
Combination of 5 components: water temperature, oxygenation, faecal coliforms, clarity and MCI	Yes	Combination of relevant components	Data available	Influences both fishery and quality of angling experience	Data available + some estimates	Yes
Anglers' perceptions of scenic attractiveness	Yes	Response to rating scale question	Survey data available	Known to influence choice of angling site	Data available	Yes
Anglers' perceptions of wilderness character	Yes	Response to rating scale question	Survey data available	Known to influence choice of angling site	Data available	Yes
Anglers' perception of the overall importance of the river	Yes	Response to rating scale question	Survey data available	Known to influence choice of angling site	Data available	Yes

Appendix 5-5
Significance assessment calculations for salmonid angling in Tasman District (Steps 1 and 5-8)

Step 1: Define river segments			Additional useful information (not part of method) - You may wish to hide these columns		Step 6A: Apply indicators and thresholds										Step 6B: Apply indicators and thresholds										Step 8: River significance						
River code	Reach	River	Water body type	ROS class	Angler days (n) NAS 2007/8,2001/2,1994/6)	Intensity of use (mean free reach) (NAS 2007/8)	Travel distance (km) (NAS 2007/08,2001/2,1994/6)	Overseas anglers (%) (NAS 2007/8,2001/2,1994/6)	Perception catch rate (0.0-1.0) (FGNZ 2008)	Perception fish size (0.0-1.0) (FGNZ 2008)	Water quality (0.0-1.0) (Expert Panel)	Perception scenic attractiveness (0.0-1.0) (FGNZ 2008)	Perception wilderness (0.0-1.0) (FGNZ 2008)	Perception importance (0.0-5.0) (NAS 1979)	Angler days score	Intensity of use score	Travel distance score	Overseas score	Perception catch rate score	Perception fish size score	Water quality score	Perception scenic score	Perception wilderness score	Perception importance score	Sum Weights 1	Rank1	Sum Weights 2	Rank 2	Sum Weights 3	Rank 3	River significance
21060	**0**	**Travers River**	**Headwater**	**Remote**	**342**	**15.1**	**105.3**	**43%**	**0.37**	**0.44**	**1.00**	**0.81**	**0.74**	**4.06**	**1**	**2**	**3**	**3**	**2**	**2**	**3**	**3**	**3**	**3**	25	1	**27**	**2**	**29**	**2**	National
21048	**0**	**Sabine River**	**Headwater**	**Remote**	**208**	**28.1**	**108.2**	**45%**	**0.27**	**0.55**	**1.00**	**0.82**	**0.65**	**4.21**	**1**	**1**	**3**	**3**	**2**	**3**	**3**	**3**	**3**	**3**	25	1	**28**	**1**	**30**	**1**	National
21013	**0**	**D`Urville River**	**Headwater**	**Remote**	**560**	**14.0**	**113.2**	**39%**	**0.09**	**0.41**	**1.00**	**0.64**	**0.77**	**4.18**	**1**	**2**	**3**	**3**	**1**	**2**	**3**	**3**	**3**	**3**	24	3	**26**	**3**	**28**	**3**	National
21009	**1**	**Buller River**	**Mainstem river**	**Natural**	**1470**	**9.0**	**170.5**	**59%**	**0.57**	**0.21**	**0.90**	**0.52**	**0.18**	**3.78**	**2**	**2**	**3**	**3**	**3**	**2**	**3**	**3**	**1**	**2**	24	3	**26**	**3**	**26**	**4**	National
21017	**0**	**Gowan River**	**Back country**	**Natural**	**267**	**15.1**	**110**	**81%**	**1.00**	**0.10**	**0.90**	**0.50**	**0.35**	**3.33**	**1**	**2**	**3**	**3**	**3**	**1**	**3**	**3**	**2**	**2**	23	5	**24**	**6**	**25**	**6**	National
21027	**0**	**Maruia River**	**Back country**	**Natural**	**1109**	**30.6**	**119.9**	**39%**	**0.32**	**0.25**	**1.00**	**0.68**	**0.20**	**3.84**	**2**	**1**	**3**	**3**	**2**	**2**	**3**	**3**	**2**	**2**	23	5	**26**	**3**	**26**	**4**	National
21026	**0**	**Mangles River**	**Back country**	**Rural**	**479**	**13.1**	**103**	**45%**	**0.28**	**0.17**	**0.80**	**0.61**	**0.22**	**3.69**	**1**	**2**	**3**	**3**	**2**	**1**	**2**	**3**	**2**	**2**	21	7	**22**	**9**	**23**	**9**	National
21035	**0**	**Owen River**	**Back country**	**Rural**	**519**	**11.9**	**85.9**	**68%**	**0.33**	**0.45**	**0.90**	**0.50**	**0.28**	**2.93**	**1**	**2**	**2**	**3**	**2**	**2**	**3**	**3**	**2**	**1**	21	7	**21**	**11**	**21**	**12**	National
21028	**0**	**Matakitaki River**	**Back country**	**Natural**	**1037**	**22.2**	**78.2**	**49%**	**0.20**	**0.36**	**1.00**	**0.64**	**0.18**	**3.54**	**2**	**1**	**2**	**3**	**2**	**2**	**3**	**3**	**1**	**2**	21	7	**24**	**6**	**24**	**7**	National
21011	0	Cobb River	Headwater	Remote	106	38.2	106.7	0%	0.50	0.08	1.00	0.96	0.54	3.22	1	1	3	1	3	1	3	3	3	2	21	7	23	8	24	7	National
21073	**0**	**Wangapeka River**	**Back country**	**Natural**	**911**	**15.6**	**46.7**	**44%**	**0.18**	**0.48**	**1.00**	**0.73**	**0.49**	**3.76**	**1**	**2**	**1**	**3**	**1**	**2**	**3**	**3**	**2**	**2**	20	11	**21**	**11**	**22**	**11**	National
21095	0	Fyfe River	Headwater	Natural	17	47.2	541.2	0%			1.00				1	1	3	1	1	2	3	3	3	2	20	11	22	9	23	9	Regional
21068	0	Waingaro River	Back country	Natural	29	390.6	220.5	0%	0.00	1.03	1.00	0.53	0.83	1.00	1	1	3	1	1	3	3	3	3	1	20	11	21	11	21	12	National
21030	**1**	**Motueka River**	**Mainstem river**	**Rural**	**1642**	**4.8**	**33.9**	**39%**	**0.35**	**0.11**	**0.80**	**0.32**	**0.10**	**3.84**	**2**	**3**	**1**	**3**	**2**	**1**	**2**	**2**	**1**	**2**	19	14	**20**	**14**	**20**	**17**	Regional
21054	2	Takaka River	Lowland river	Rural	638	13.2	76.5	0%	0.33	0.53	0.80	0.53	0.00	3.04	1	2	2	1	2	3	2	3	1	2	19	14	20	14	21	12	Regional
21042	**0**	**Riwaka River**	**Lowland river**	**Rural**	**304**	**10.8**	**46.7**	**44%**	**0.14**	**0.09**	**0.90**	**0.54**	**0.20**	**3.51**	**1**	**2**	**1**	**3**	**1**	**1**	**3**	**3**	**2**	**2**	19	14	**20**	**14**	**21**	**12**	National
21067	**0**	**Waimea River**	**Lowland river**	**Rural**	**496**	**5.2**	**124.5**	**22%**	**0.24**	**0.06**	**0.50**	**0.06**	**0.12**	**3.00**	**1**	**2**	**3**	**3**	**2**	**1**	**2**	**1**	**1**	**2**	18	17	**19**	**18**	**20**	**17**	Regional
21007	**0**	**Baton River**	**Back country**	**Natural**	**222**	**29.9**	**36**	**36%**	**0.23**	**0.19**	**0.90**	**0.73**	**0.15**	**3.29**	**1**	**1**	**1**	**3**	**2**	**1**	**3**	**3**	**1**	**2**	18	17	**20**	**14**	**21**	**12**	National
21004	**0**	**Aorere River**	**Back country**	**Natural**	**845**	**21.0**	**116.9**	**10%**	**0.17**	**0.12**	**0.90**	**0.56**	**0.48**	**2.91**	**1**	**1**	**3**	**2**	**1**	**1**	**3**	**3**	**2**	**1**	18	17	**19**	**18**	**19**	**22**	Regional
21002	0	Anatoki River	Back country	Natural	17	305.6	100.7	0%	0.00	0.25	1.00	0.58	0.25	2.50	1	1	3	1	1	2	3	3	2	1	18	17	19	18	19	22	Regional
21030	**2**	**Motueka River**	**Mainstem river**	**Rural**	**3351**	**4.8**	**23**	**8%**	**0.37**	**0.10**	**0.62**	**0.40**	**0.16**	**3.84**	**2**	**3**	**1**	**1**	**2**	**1**	**2**	**2**	**1**	**2**	17	21	**18**	**23**	**18**	**29**	Local
21050	0	Speargrass Creek	Back country	Rural	19	135.4	149.9	0%	0.00	1.50	0.90	0.00	0.00	3.00	1	1	3	1	1	3	3	1	1	2	17	21	19	18	20	17	Regional
21003	0	Anatori River	Back country	Remote	13	234.5	100.7	0%	0.00	0.00	0.90	3.00	0.00	3.00	1	1	3	1	1	1	3	3	1	2	17	21	19	18	20	17	Regional
21029	0	Matiri River	Back country	Natural	131	46.3	35.2	0%	0.50	0.00	0.90	0.50	0.29	2.85	1	1	1	1	3	1	3	3	2	1	17	21	18	23	18	29	Regional
21020	0	Howard River	Back country	Rural	62	43.6	202.2	65%	0.00	0.00	0.62	0.75	0.00	2.70	1	1	3	3	1	1	2	3	1	1	17	21	18	23	18	29	National
21009	**2**	**Buller River**	**Mainstem river**	**Natural**	**483**	**9.0**	**92.9**	**0%**	**0.33**	**0.19**	**0.80**	**0.48**	**0.17**	**3.78**	**1**	**2**	**2**	**1**	**2**	**1**	**2**	**2**	**1**	**2**	16	26	**17**	**31**	**18**	**29**	Local
21054	1	Takaka River	Lowland river	Rural	223	13.2	38.9	0%	0.00	0.00	0.90	0.50	0.00	3.04	1	2	1	1	1	1	3	3	1	2	16	26	17	31	18	29	Regional
21063	0	Tutaki River	Back country	Rural	104	55.7	31.3	0%	0.63	0.31	0.60	0.31	0.00	3.58	1	1	1	1	3	2	2	2	1	2	16	26	18	23	19	22	Local
21031	0	Motupiko River	Lowland river	Rural	66	257.6	54.2	0%	0.15	0.29	0.70	0.47	0.36	3.25	1	1	2	1	1	2	2	2	2	2	16	26	18	23	19	22	Local
21024	0	Lee River	Back country	Rural	48	90.7	5.5	0%			1.00			3.23	1	1	1	1	1	2	3	2	2	2	16	26	18	23	19	22	Local

21015	0	Glenroy River	Headwater	Natural	110	41.0	46.4	0%	0.30	0.00	0.90	0.30	0.20	3.00	1	1	1	1	2	1	3	2	2	2	16	26	18	23	19	22	Local
21070	**0**	**Wairoa River**	**Back country**	**Natural**	**200**	**40.2**	**113.4**	**0%**	**0.00**	**0.14**	**1.00**	**0.43**	**0.29**	**2.97**	**1**	**1**	**3**	**1**	**1**	**1**	**3**	**2**	**2**	**1**	16	26	**17**	**31**	**17**	**34**	Regional
21064	0	Wai-iti River	Lowland river	Rural	193	42.2	396.9	0%	0.00	0.00	0.70	1.00	0.00	2.86	1	1	3	1	1	1	2	3	1	1	15	33	16	35	16	36	Regional
21074	0	Warwick River	Back country	Rural	8	474.3	34.3	0%	0.00	0.00	0.70	3.00	0.00	4.50	1	1	1	1	1	1	2	3	1	3	15	33	18	23	20	17	Regional
21019	0	Hope River	Back country	Natural	18	299.5	211.4	0%	0.00	0.00	0.80	0.00	0.00	3.50	1	1	3	1	1	1	2	1	1	2	14	35	16	35	17	34	Local
21053	0	Station Creek	Back country	Rural	8	409.9	43.6	0%			0.90			4.50	1	1	1	1	1	1	3	1	1	3	14	35	17	31	19	22	Regional

Colour coding:

Blue rows - reliable data

Green rows - less reliable data

Red typeface - data checked by Expert Panel and may have been adjusted

Set of weightings used to test rankings

	Weights 1	1	n/a	1	1	1	1	1	1	1	1
	Weights 2	2	n/a	1	1	1	1	1	1	1	2
	Weights 3	1	n/a	1	1	1	1	1	1	1	3

Weights relate to the column under which they are positioned

e.g., Weights set 3 gives 3x relative contribution to 'Perception importance' attribute

Step 6A > Step 6B

Data for each indicator are tested against the thresholds (identified in Step 5) and translated into an indicator threshold score (1, 2, 3).

e.g., Sabine River has 208 angler days p.a. (Step 6A). This is <1,000 days (the lower threshold) and therefore the Sabine River is of relatively low importance for angler days. In Step 6B it scores 1.

River ranking vs. significance

River rankings do not exactly match river significance (national, regional, local) owing to specific Decision Support System criterion.

e.g., Howard River is assessed as nationally significant because it has a high score (3) for *% overseas anglers* plus high scores (3) for two other attributes

Appendix 5-6
Water quality calculations for Tasman District

River Name	Temperature	Dissolved Oxygen	Faecal coliform (original)	Faecal Coliform (revised May 2010)	Clarity	MCI	Water Quality Score (original)	Water Quality Score (revised May 2010)
	Is maximum summer temperature average over past five years >24 degrees? Yes: 0; 19-23 degrees: 0.5; < 19 degrees: 1	Is oxygen level <80% saturation more than 10% of time in summer? Yes: 0.5, No: 1	Are faecal coliforms likely to exceed alert standard (260) more than once a month under low flow conditions during fishing season? Yes: 0, No: 1	Are faecal coliforms likely to exceed action standard (550) more than once a month under low flow conditions during fishing season? Yes: 0; 520<260, 0.5; <260, 1	Typical water clarity at base flow/level: >7m: 1, 3-7m: 0.5, <3m: 0.1 Average	Is 5 year running average MCI < 100: 0; 100-120: 0.5; >120: 1	**Average of five criteria**	**Average of five criteria**
Aorere River	1	1	1	1	0.5	1	**0.9**	**0.9**
Spey Stream	1	1	1	1	1	1	**1**	**1**
Takaka River (above Lindsay's Bridge)	1	1	1	1	0.5	1	**0.9**	**0.9**
Takaka River (below Lindsay's Bridge)	1	1	1	1	0.5	0.5	**0.8**	**0.8**
Waikoropupu River	1	0.5	1	1	1	0.5	**0.8**	**0.8**
Anatoki River	1	1	1	1	1	1	**1**	**1**
Waingaro River	1	1	1	1	1	1	**1**	**1**
Cobb River	1	1	1	1	1	1	**1**	**1**
Marahau River	0.5	1	1	1	0.5	1	**0.8**	**0.8**
Riwaka River	1	1	1	1	0.5	1	**0.9**	**0.9**
Motueka River (above Wangapeka)	0.5	0.5	1	1	1	1	**0.8**	**0.8**
Motueka River (below Wangapeka)	1	0.5	0	1	0.1	0.5	**0.42**	**0.62**
Graham River	1	1	1	1	1	1	**1**	**1**
Pearse River	1	1	1	1	1	0.5	**0.9**	**0.9**
Dove River	0	0	0	0	0.5	0.5	**0.2**	**0.2**
Baton River	1	1	1	1	0.5	1	**0.9**	**0.9**

Wangapeka River	1	1	1	1	1	1	**1**	**1**
Rolling River	1	1	1	1	1	1	**1**	**1**
Tadmor River	0	0.5	1	1	0.5	0.5	**0.5**	**0.5**
Motupiko River	0	1	1	1	0.5	1	**0.7**	**0.7**
Rainy River	1	1	1	1	0.5	1	**0.9**	**0.9**
Moutere River	0	0	0	0	0.1	0.5	**0.12**	**0.12**
Waimea River	0.5	0	1	1	0.5	0.5	**0.5**	**0.5**
Waiiti River	0.5	1	1	1	0.5	0.5	**0.7**	**0.7**
Wairoa River	1	1	1	1	1	1	**1**	**1**
Lee River	1	1	1	1	1	1	**1**	**1**
Buller River (btw Iron Bridge+Gowanbridge)	0.5	1	1	1	0.5	1	**0.8**	**0.8**
Buller River (upstream Gowanbridge)	1	1	1	1	0.5	1	**0.9**	**0.9**
Maruia River	0.5	1	1	1	1	1	**0.9**	**0.9**
Warwick River	1	1	0	0	0.5	1	**0.7**	**0.7**
Matiri River	1	1	1	1	0.5	1	**0.9**	**0.9**
Matakitaki River (upper)	1	1	1	1	1	1	**1**	**1**
Glenroy River	1	1	1	1	0.5	1	**0.9**	**0.9**
Mangles River	0.5	1	0	1	0.5	1	**0.6**	**0.8**
Tutaki River	0.5	1	0	0	0.5	1	**0.6**	**0.6**
Fyfe River	1	1	1	1	1	1	**1**	**1**
Owen River	1	1	1	1	1	0.5	**0.9**	**0.9**
Gowan River	1	1	1	1	1	0.5	**0.9**	**0.9**
Sabine River	1	1	1	1	1	1	**1**	**1**
D'Urville River	1	1	1	1	1	1	**1**	**1**
Hope River	1	1	1	1	0.5	0.5	**0.8**	**0.8**
Station Creek	1	1	0	1	0.5	1	**0.7**	**0.9**
Howard River	1	0.5	0	1	0.1	0.5	**0.42**	**0.62**
Speargrass Creek	1	1	1	1	0.5	1	**0.9**	**0.9**
Travers River	1	1	1	1	1	1	**1**	**1**
Anatori River	1	1	1	1	0.5	1	**0.9**	**0.9**
Paturau River	1	1	1	1	0.5	1	**0.9**	**0.9**

Notes: RED NUMBERS: estimates based on expert knowledge, rather than data; BLACK NUMBERS: drawn from TDC or FGNZwater quality data; BLUE NUMBERS: revised May 2010; HIGHLIGHTED CELLS: Score revised May 2010.

Appendix 5-7
Other factors relevant to the assessment of significance for salmonid angling (Step 9)

Access
Given access is a prerequisite for angling activity, it is of fundamental importance. Access includes the legal right as well as the practical ability to exercise this right (cross the land). Consideration must be given to the influence that access provision has upon the pattern of existing use - lack of legal or practical access may limit or completely restrict use, even to otherwise suitable sites.
Context
An individual river may have values that relate to its contribution to the regional collective. These may have important benefits to the region but are difficult to quantify. This includes several parameters: Degree of scarcity of the experience Where few alternative (substitute) sites exist that will satisfy the recreation experience being sought (e.g., challenging and remote wilderness angling), then the degree of scarcity is high (and vice versa). This notion has parallels with the biodiversity rarity argument – protection of the rare and endangered species. So too, for recreation opportunities – protection of the recreation opportunities that are most scarce. Contribution to a collective value Individual sites may contribute to a set of values found within a region or nationally – the sum may be greater than the parts. If parts of the collective are compromised, this may act as a 'tipping point' to reduce or negate the value of the collective. A good example is the Buller River, which has a wide range of tributary rivers of differing sizes, settings, and hydrological and fishery characteristics. Many anglers visit this area to be able to fish lake-fed large rivers, small catchment-fed bush streams, remote tannin-stained bush catchments, large lakes of glacial origin and smaller lakes surrounded by bush. Hundreds of kilometres' length of different fishing water is available and some fishing opportunity is always available irrespective of season or weather. This argument mirrors biodiversity hot spots of endemism – hot spots for angling may occur that require protection. Users' perceptions of the river's 'status' While more nebulous, anglers may rate a river in, for example, the top three best fishing areas in New Zealand/internationally.
Potential future angling use
This is about the potential to undertake angling at that place in the future. The goal is to avoid precluding future recreational use. The Recreation Opportunity Spectrum is predicated on the notion of the recreation opportunity rather than recreational use. An opportunity is just that – the *potential* to undertake a recreational activity - which may be currently taken up (or not). This factor is therefore about potential, but not yet realised, opportunities. There are a variety of reasons why recreation opportunities may not be realised. Recreation is subject to rapid developments in technology and changing social preferences. Changes in access similarly may alter use. As a result, dramatic changes in use patterns can occur and existing use patterns may be poor indicators of future use value. For example, individual angler inflatables now facilitate angler access to sections of rivers previously not fished; fish finders have increased the chance for a lake fisher of catching a fish. The best example of this phenomenon is the work by Egarr and Egarr (1981). Their assessment of the recreational potential of New Zealand rivers nearly three decades ago does not match the current use patterns owing to the sort of factors already outlined. For this reason, 'future proofing' for potential recreational value is required. Some decisions may inadvertently preclude future recreational options. The goal is to avoid this outcome.
Existence value
Existence value relates to knowing that a resource exists and that the present generation will pass it on to the next generation (in a healthy state suitable for angling).
Past use
This value is also non-quantifiable and is associated with important past uses of a river. With respect to salmonid angling, former 'world renowned' fisheries are relevant.

Appendix 5-8
Future data requirements for salmonid angling

Data need
Users' perception of scenic attractiveness
Users' perception of wilderness character
Users' evaluation of the overall importance of the river
Users' satisfaction with their visit to the river for angling
Enter Ministry of Works 1956 list of rivers (i.e., make into electronic list) and link to REC