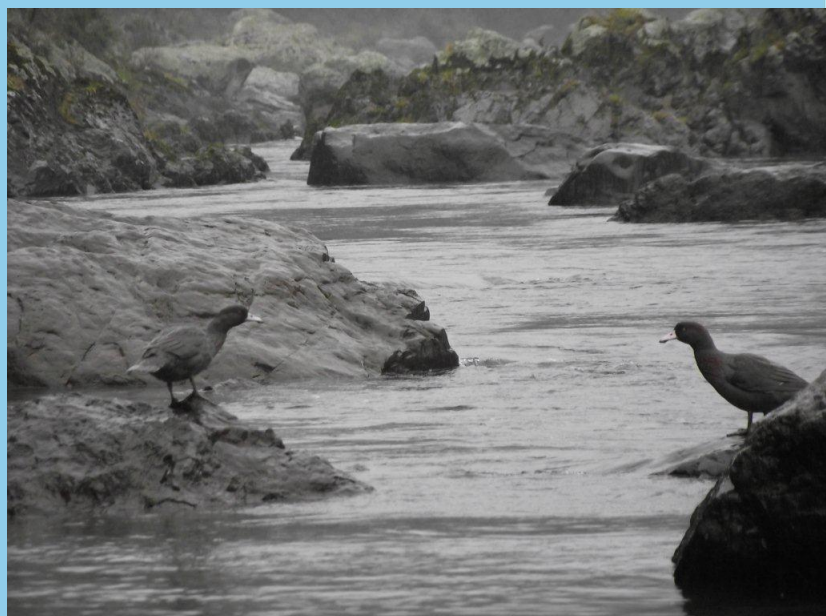


Native Birdlife in Hawke's Bay: Application of the River Values Assessment System (RiVAS and RiVAS+)



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Land Environment & People



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1. INTRODUCTION

1.1 PURPOSE

This report presents an application of the River Values Assessment System for existing value (RiVAS) and for potential value (RiVAS+) to native birdlife in the Hawkes Bay Region. A workshop was held in Napier on 3rd October 2011 to apply the method. This Hawkes Bay Region bird report needs to be read in conjunction with the method and with the first native bird application reports (see Hughey et al. 2010 and Gaze et al. 2010).

1.2 PREPARATORY STEP: ESTABLISH AN EXPERT PANEL AND IDENTIFY PEER REVIEWERS

The Expert Panel for the native birdlife application in the Hawkes Bay comprised John Cheyne, Fiona Cameron, Rod Dickson, Adam Forbes, Keiko Hashiba, Hans Rook, Tim Sharp, Brent Stephenson and Bryan Welch, advised by Ken Hughey (Lincoln University) who managed the case study. Credentials of the Expert Panel are provided in Appendix 1.

2. APPLICATION OF THE METHOD

There are two parts of the system: RiVAS is applied to existing value in steps 1-9 and RiVAS+ to potential value in steps 10-14.

STEP 1: DEFINE RIVER VALUE CATEGORIES AND RIVER SEGMENTS

RIVER VALUE CONTEXT FOR NATIVE BIRDLIFE IN HAWKES BAY

Most Hawkes Bay rivers are single channel and have their headwaters in catchments largely dominated by native forest – in these catchments the rivers are dominated by single channel bird fauna, typically in this region by the endangered blue duck. The lower sections of these rivers typically run through intensively developed farmland and into estuarine or lagoon systems. In these sections of single channel rivers the birdlife is dominated by shags and waterfowl. There are a few braided rivers in Hawkes Bay, notably the Tukituki – this river, not surprisingly, has a more diverse fauna than the others.

RIVER VALUE CATEGORIES

There is a distinction, typically, between the birdlife of braided rivers and that of single channel rivers. The former is typified by a community of birds that includes gulls and terns, waders, shags and a variety of waterfowl – multiple species are considered 'threatened or at risk'; the latter is typified by waterfowl and shags with far fewer species threatened or at risk. Despite this distinction it is proposed to treat all rivers primarily in the same way, except where distinctive indicators for the prime attributes (see steps 3 and 4 below) can be identified and used appropriately.

RIVER SEGMENTS

Work in advance of the expert panel meeting to collate existing data, indicated that expert knowledge primarily held by the Department of Conservation¹, but also by OSNZ on occasions, would be the primary data source. Considerable data exist for the braided sections of key rivers and for blue duck in the region, including formal survey information for most rivers. For the purposes of this analysis we generally consider catchments as a whole (except for the Tukituki which is separated into 3 sections).

¹ Note that this resource includes occasional surveys undertaken by individuals, consultants and NGOs (e.g., community groups, Forest and Bird, the Ornithological Society of NZ).

Lagoons and/or estuarine systems are excluded from analysis and a separate evaluation of all lagoons, estuaries, etc., is required.

OTHER CONSIDERATIONS

Related to the above, an important feature of many surveys and much evidence presented in hearings is associated with total bird numbers of a river. We note the imprecision of the survey data, but again reiterate it is the best available information. Note the following, again consistent with the Canterbury report:

- Some species are particularly difficult to find, e.g., crake and bittern, and until a reliable survey method is found, are excluded from this analysis. Equally, threatened and at risk species such as grey duck are present, but difficult to identify correctly – they too are excluded from that part of the analysis dealing with threatened and at risk species. At least one other species identified as 'threatened or at risk', i.e., NZ pipit, is not considered as it is mostly not recorded (for some unknown reason) in surveys.

OUTCOMES

Use whole catchments as the primary data set and populate with existing river bird survey data and/or expert panel considerations, except as already noted for the Tukituki.

Ignore the presence of swamp species such as bittern and marsh crake until reliable survey data become available.

Do not include NZ pipit until routinely required within the standard survey method, and then record appropriately.

Do not include grey duck.

STEP 2: IDENTIFY ATTRIBUTES

Attributes i.e., the facets of the birdlife river value. The same attributes as used by Hughey et al. (2010) and Gaze et al. (2010) for Canterbury and Tasman respectively were used here (see Appendix 2).

STEP 3: SELECT AND DESCRIBE PRIMARY ATTRIBUTES

The same six primary attributes used by Hughey et al. (2010) and Gaze et al. (2010) are used here (see Appendix 2).

STEP 4: IDENTIFY INDICATORS

The same indicators used by Hughey et al. (2010) and Gaze et al. (2010) are used here.

STEP 5: DETERMINE INDICATOR THRESHOLDS

Thresholds are applied to an indicator to determine high, medium and low relative importance for that indicator. Thresholds are defined by real data (e.g. for recreational fishing <1,000 angler days per annum = relatively low importance, or expert panel judgements) for each indicator and were identified by the Expert Panel. Because native birdlife is comparatively data rich (c.f. some other river values), this step was informed by 'hard' data (albeit much from expert panel assessment for this region) for five of the six indicators.

STEP 6: APPLY INDICATORS AND INDICATOR THRESHOLDS

Most indicators were assessed using expert panel based quantitative survey data - this step involved entering data from the relevant data sources (primarily the experts). Data were kept in their original format (e.g. *actual area* of habitat, *number* of birds). This assisted the Expert Panel when evaluating the data, and helps achieve process transparency.

STEP 7: WEIGHTING OF PRIMARY ATTRIBUTES

As per the Hughey et al. (2010) and Gaze et al. (2010) applications weightings are equal.

OUTCOME

Equal weighting.

As a consequence of this decision it was decided for Canterbury and Tasman to introduce a 'species stronghold' criterion into the decision support system for defining priorities, i.e., if a river contains 5% or more of a population of a 'threatened or at risk' species then it is of national importance – such a criterion is consistent with decisions made for national water conservation orders. In the case of Tasman no species on any river reached this criterion – however, it should be noted that blue duck is being managed to get to 50 pairs as one of 8 selected sites nationally - if successful then it will rise to more than the 5% threshold and the river will rise to National significance. This same criterion is used here.

STEP 8: DETERMINE RIVER SIGNIFICANCE

STEP 8A: RANK RIVERS

The spreadsheet in Appendix 3 was used to sum the indicator threshold scores for each river. The sums 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. As per the Canterbury report the following criteria were applied to defining importance within the Appendix 3 evaluation:

National significance:

Criterion 1: *Species strongholds* – if any river contained one or more species with over 5% of the total population(s) then = 3, and automatic national significance. We chose 5% as this level has been used in a number of Water Conservation Order decisions as being a threshold for national importance (despite the fact that the World Conservation Union (IUCN) uses a 1% level for international significance); or

Criterion 2: total score is 15 or more then national significance.

Regional significance:

Those rivers in the table not defined as nationally or locally significant, and scoring 11-14.

Local significance:

Sole criterion: *Number of 'threatened or at risk' species present* = 0 and all other indicator columns (i.e., 1-5) are 2 or less then automatic local significance; or if the total score <11 = local significance.

Translation of these functions to rivers is shown in Appendix 3.

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

1. Sites of Special Wildlife Interest for braided rivers in Hawkes Bay
2. Existing Water Conservation Orders associated with birdlife
3. Existing planning documents, including Regional Plans under the RMA, and
4. Reference to MfE Waters of National Importance work.

It is acknowledged that, owing to the judgmental nature of this exercise, rivers close to the threshold points could 'swing either way', and that in time the Mohaka River is likely to be of national significance for blue duck but is not currently.

OUTCOME

- A list of rivers ranked by a scoring system from highest to lowest represents an initial significance ranking list. See Appendix 3 (columns highlighted in green).
- Rivers identified as significant at the national, regional and local level - see Appendix 3 (and Figure 1).
- Rivers in the Hawkes Bay Region not listed have either very low value to birdlife dependent on rivers or streams or are of unknown value.

STEP 9: OUTLINE OTHER FACTORS RELEVANT TO THE ASSESSMENT OF SIGNIFICANCE

Perhaps the most telling other issue concerns the 'state' of the survey data – there is little that is format that is up to date. As a consequence, and unlike for Canterbury, there is little quantitative data available and this needs to be noted. Despite these comments we are of the view that our assessments are likely to be 'reasonably accurate' at least as far as diversity is concerned, if not in terms of absolute numbers.

OUTCOME

Notes have been made in Appendix 2 about data sources.

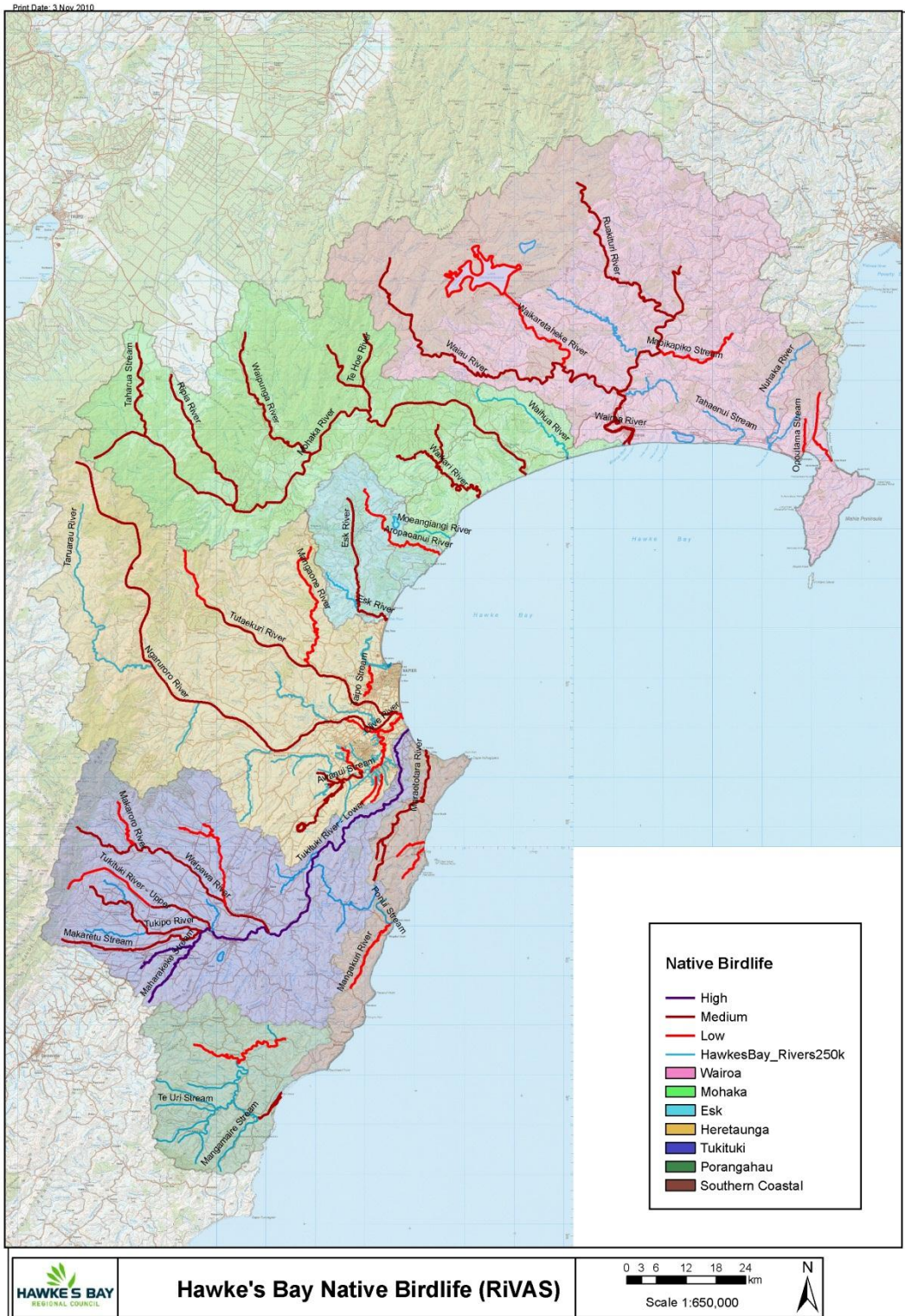


Figure 1: Hawke's Bay native birdlife rivers mapped by significance level

STEP 10: IDENTIFY RIVERS AND INTERVENTIONS

RIVERS FOR POTENTIAL STATE ASSESSMENT

All river sections identified in the RiVAS assessment (see Appendix 3) were used as the basis for the RiVAS+ analysis (Appendix 4). The Expert Panel considered every river section for its potential value, however only a few were thought worthy of considering interventions in reality.

No new river reaches were added that represent rivers with potential value for native birdlife but hold little current value.

POTENTIAL INTERVENTIONS

Means by which river conditions may be enhanced are listed in Table 1.

Table 1: Potential interventions to enhance river values

1. Manage access
1a. Enhance access and/or 1b. Control access
i) Helicopter access
ii) Vehicle access
iii) Boat access
iv) Foot access
2. Enhance flow
a. Increase minimum
b. Stabilise (around targeted specific flow)
c. More natural variability
d. Restore flood flows
e. Transfer water between catchments
3. Improve bed & in-stream habitat
a. Maintain channel works (e.g. groynes, other structures) that enhance worth
b. Remove channel works (groynes, stop banks etc) that detract from worth
c. Control weeds (in-stream, including active river bed) to enhance worth
d. Remove hazards (e.g., wire, trees, old structures, forestry slash)
e. Leave woody debris in river that enhance worth
f. Improve timing of management within flood control area, including root raking
4. Remove or mitigate fish barriers
a. Culverts
b. Dams
c. Flood gates
d. Chemical
5. Set back stopbanks
6. Improve riparian habitat
a. Weed control
b. Pest control
c. Native revegetation
d. Remove litter
7. Enhance water quality
a. Remove/fence out stock
b. Reduce non-point source nutrient pollution (e.g., farm nutrient budgets)
c. Reduce point source pollution (e.g., mining waste)
d. Reduce sediment input (e.g., forest management practices)
8. Stock with fish

9. Provide amenities
a. Boat launching facilities
b. Car parking
c. Toilets
d. Storage facilities (for kayaks etc)
e. Artificial hydraulic feature (for kayakers, swimmers, anglers)
i) Slalom course
ii) Play wave
iii) Swimming hole
f. Interpretive signage
g. Riverside track (for access)
10. Construct water storage
a. In-river
b. Out-of-river
11. Develop a run-of-the-river diversion
12. Provide telemetered flow monitoring (& communicate readings)

OUTCOMES

Appendix 4 lists the Hawkes Bay Region river sections used for the RiVAS+ assessment.

Table 1 and Appendix 4 record potential interventions.

STEP 11: APPLY INDICATORS AND INDICATOR THRESHOLDS FOR POTENTIAL VALUE

Taking each river in turn, the Expert Panel considered which interventions were relevant to that river. These were recorded in Appendix 4.

Then the Panel considered the net effect of these interventions upon the value of the river to native birdlife. The degree or extent of intervention was discussed. The RiVAS+ methodology calls for the panel to select the two most important interventions for each river, and for these to be practical and feasible rather than ideal.

The effect of the potential interventions was assessed for each indicator by considering the current score (from RiVAS) and identifying whether the score would change as a result of the interventions.

By definition, there are no raw data for native birdlife based on potential future conditions of a river, so the Panel focused primarily on the scores. Occasionally, the Panel considered whether interventions would be likely to shift the raw data over the relevant threshold value to a higher score.

The new scores were recorded. Where the Panel believed the interventions were likely to enhance (or degrade) river conditions for native birdlife, but that the score itself would not change, '+' or '-' was recorded, indicating a positive or negative shift respectively. Where no change was thought likely, the RiVAS score was not altered (cells were left blank for convenience).

As may be expected, rivers with high current value seldom changed – rivers with low current value offer the greatest opportunities for enhancement.

Sometimes discussion slipped into consideration of protecting current value or avoiding its degradation. It was reinforced that the RiVAS provides information to assist decision-makers with those questions, and the Panel was steered back to addressing potential future value.

OUTCOME

Appendix 4 records the indicator scores for potential value.

STEP 12: WEIGHT THE PRIMARY ATTRIBUTES FOR POTENTIAL VALUE

Because no attributes or indicators were altered for the RiVAS+ exercise, weightings were not revisited (i.e. an equal weighting regime was automatically applied to the RiVAS+ exercise).

OUTCOME

The RiVAS weighting regime (equal weighting) applied.

STEP 13: DETERMINE RIVER POTENTIAL VALUE

The scores were summed for each river. A score of 0.5 was given to each '+' and '-' (i.e. +0.5 or -0.5).

Of the 38 river segments considered in RiVAS, five when considered for RiVAS+ altered their sum, all in a positive direction. The Mohaka River shifted dramatically (from regional to national importance). This relates to the view that this river, with pest control, could be a major contributor to blue duck recovery and thus be a stronghold for the species.

Other river sections typically recorded small shifts in value, with no consequential change in their river importance classification.

In total, five rivers were identified as having potential to improve river conditions in a way that would enhance native birdlife value. The interventions most frequently identified for enhancing native birdlife value (with the number of times it was identified across all rivers given in brackets) were:

3: Improve bed and instream habitat: c. Control weeds (in-stream, including active river bed) to enhance worth (x3)

3: Improve bed and instream habitat: f. Improve timing of management within flood control area, including root raking (x2)

6: Improve riparian habitat: b. Pest control (x3)

OUTCOMES

Appendix 4 provides a list of rivers ranked by their potential increase in value for native birdlife, with possible interventions identified for each river.

ACKNOWLEDGEMENTS

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APPENDIX 1: CREDENTIALS OF THE EXPERT PANEL MEMBERS

The Expert Panel comprised three members. Their credentials are:

Fiona Cameron is a Senior Resource Analyst for the Hawke's Bay Regional Council working within the Water Quality and Ecology team. Fiona has been working for HBRC for 5 years, managing the regional wetland monitoring programme and specialises in river and wetland bird monitoring.

John Cheyne has spent 44 years working on the conservation of birds for the NZ Wildlife Service, Department of Conservation and Fish and Game Hawke's Bay. John has been based in Hawke's Bay for the last 24 years. A significant part of this time has been spent working on improving the management of wetland and riverine bird species. John's work in this area has involved population surveys, habitat protection and development of improved management programmes.

Rod Dickson is a Biosecurity advisor for the Hawke's Bay Regional Council who specialises in Biodiversity protection and predator control. Rod has previously worked for the Department of Conservation and has worked on a range of bird related projects including New Zealand Dotterel monitoring and protection on Waiheke Island, baseline bush-bird and lizard surveys on Great Barrier Island and little spotted kiwi surveys on Tiritiri Matangi Island. Rod co-ordinates and manages HBRC's bird monitoring programme and assists community groups to protect birdlife by establishing predator control.

Adam Forbes consults widely within public and private sectors as a generalist ecologist. He commonly undertakes ecological baseline and effects studies, involving specialists when necessary, mainly in association with infrastructure projects, such as river flood protection schemes, hydro power generation development, transmission line development, quarrying and State Highway development. Over recent years Adam has also undertaken a number of studies of ecological values and advised on appropriate ecological management.

Keiko Hashiba is a Resource Technician for the Hawke's Bay Regional Council looking after the quality assurance system of the Environmental Science section, and is also involved in terrestrial ecology, water quality and ecology monitoring. Keiko has a background in forestry and forest ecology.

Ken Hughey is Professor Environmental Management at Lincoln University. His expert knowledge of river birdlife spans the period 1981-2011, including his PhD thesis (habitat needs of birds of braided rivers), multiple river bird surveys in almost all regions of the South Island, expert evidence at multiple hearings and published research papers (e.g., Hughey 1997, 1998, Duncan et al., 2008). Ken is overall project manager of the river values project. Selected references:

Hans Rook is a biodiversity ranger for the Department of Conservation. Hans has spent 40 years working in the conservation of wildlife around New Zealand first with the NZ Wildlife Service and then, the Department of Conservation. Based in Hawke's Bay for the last 30 years, Hans has spent a considerable part of this time working to restore spawning sites for whitebait, breeding grounds for the nationally endangered Australasian bittern and leading the way in marine mammal conservation.

Tim Sharp is a Strategic Policy Advisor for the Hawke's Bay Regional Council where he coordinates the RiVAS programme for Council. He has an environmental management background, specialising in resource management to assess and support community values. Tim's interests include amateur bird photography and he has been involved in bird habitat restoration programmes.

Brent Stephenson has been studying birds in Hawke's Bay all his life and completed his PhD, Ecology and breeding biology of Australasian gannets at Cape Kidnappers in 2005. Brent began the BIRDING-NZ newsgroup, to help with the exchange of birding information in New Zealand. Brent has worked for the Department of Conservation (Boundary Stream Mainland Island), is involved in

the Cape Kidnappers and Ocean Beach Wildlife Preserve, and has worked on many research expeditions globally including to Antarctica and the Arctic. Brent is a professional wildlife photographer and guides bird watching tours.

Bryan Welch, Hawke's Bay Biodiversity Programme Manager, Department of Conservation

APPENDIX 2: ASSESSMENT CRITERIA FOR BIRDLIFE (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: <u>Select</u> and describe primary attributes		Step 3: Select and <u>describe</u> primary attributes	Step 4: Identify indicators	Step 5: Determine significance thresholds	
Represent- ativeness	Guild presence				
	Endemism				
	Quality of habitat				
	Distinctiveness	Measures the relative distinctiveness of the habitat type and/or bird species presence compared to others represented in New Zealand	Relative distinctiveness	1= low; 2= medium; 3= high Threshold data result from the following assessment: 1= Habitat type or species assemblage/presence widely represented elsewhere in NZ; 2= Habitat type or species assemblage/presence rarely represented elsewhere in NZ; 3= Habitat type or species assemblage/presence not represented in other regions in NZ	This is a subjective assessment based on the knowledge of the expert panel. As reliable as the experience and knowledge represented by the panel – in this case very high.
Life supporting capacity	Habitat size	Amount of Habitat - measured in area for braided rivers and distance for single channel rivers. Note that while some braided rivers also have single channel reaches it is the dominant habitat that is recorded.	Objective and quantitative measures of: Area (ha) of riverbed for braided rivers; Distance (km) for single channel rivers	For area/distance combined: 1=<5000ha and/or <10km; 2=5000-9999ha and/or 11-30km; 3= >10000ha and/or >30km	Area is based on Wilson, J. 2001. National Distribution of Braided Rivers and the Extent of Vegetation Colonisation. Landcare Research Contract Report LC0001/068, Lincoln. Distance based on Google Map estimate.
	Numbers	Measures 'actual' numbers of native birds surveyed on the river (excluding southern black-backed gulls – see main text at section 2, step 1).	Total number for all (except Southern black-backed gull) native species recorded	1 = <1000 individuals; 2= 1000-4999 individuals; 3= >5000 individuals	Most 'significant for birdlife' NZ rivers have been subject to some survey effort but it varies greatly in spatial coverage and sometimes reliability. Where possible all survey information is referenced; otherwise expert panel judgement is also included.
	Foraging guilds	Provides a measure of species diversity on the river	Number of guilds present ranges from 0-8, i.e., a= open-water divers; b= deep water waders; c= shallow water waders; d= dabbling waterfowl; e= torrent specialists; f= aerial hunting gulls and terns; g= swamp specialists; h= riparian wetland birds	1= 1-4 = low; 2= 5-6= medium; 3= 7-8= high	Guilds for wetland birds are defined in O'Donnell, C.F.J. 2000. The significance of river and open water habitats for indigenous birds in Canterbury, New Zealand. Environment Canterbury Unpublished Report U00/37. Environment Canterbury, Christchurch.
	Feeding guilds				
	Roosting guilds				

Natural diversity	Within guilds				
	Microhabitat diversity				
	Number threatened species	Provides a measure of the diversity of threatened or at risk bird species using the river.	Actual number of species within 'threatened or at risk' conservation status categories, i.e., blue duck (BD); black stilt (BS); pied stilt (PS); wrybill (WB); banded dotterel (BDo); NZ pied oystercatcher (NZPO); black-fronted tern (B-FT); black-billed gull (B-BG); white-fronted tern (W-FT); red-billed gull (R-BG); Caspian tern (CT); southern crested grebe (SCG); dabchick (DC)	1=1 species; 2= 2-3 species; 3= 4 or more species	Based on actual surveys or expert panel knowledge: generally very reliable although some potential to under report.
Distinctiveness/ stronghold site	Overwintering				
	Migration stopover				
	Significant breeding site	Provides a measure of relative importance of rivers as strongholds for populations of 'threatened or at risk' species in New Zealand. (Note that Australasian bittern, marsh crane, and grey duck have been excluded due to imprecision with survey technique (first two species) and with identification (final species))	Proportion of 'threatened or at risk' species present with a significant (>1% or >5%) proportion of their total populations, ranges from 0-10, i.e., blue duck (BD), black stilt (BS), pied stilt, NZ pied oystercatcher (NZPO), wrybill (WB), banded dotterel (BDo), black-fronted tern (B-FT), black-billed gull (B-BG), white-fronted tern (W-FT); red-billed gull (R-BG); Caspian tern (CT); ; southern crested grebe (SCG); dabchick (DC)	0= no species >1%; 1= 1 species at 1-4.9% = low; 2= 2 species at 1-4.9% = medium; 3= 1 or more species > 5%, or 3 or more 1-4.9% of total population = high	Based on actual surveys or expert panel knowledge: for some rivers and species, e.g., blue duck, the reliability is likely to be only moderate because of doubt about total population size and doubt about numbers on the river concerned, i.e., two sources of error.
	Significant moulting site				
	Only region typically supporting a particular species				
	Habitat for specialist needs				
	Habitat for species with special diet or foraging behaviour				
Intactness/ naturalness	Level of modification				
Long term viability	Vulnerability to natural perturbations				

APPENDIX 3: EXISTING SIGNIFICANCE ASSESSMENT CALCULATIONS FOR BIRDLIFE (RIVAS) (STEPS 1 AND 5-8)

River 'grouping' or river	River or section thereof	PRIMARY ATTRIBUTES						SCORING OF PRIMARY ATTRIBUTES						Step 8: River significance		Comments	
		Step 6A: Apply indicators and thresholds						Step 6B: Apply indicators and thresholds						Sum Weights 1	Rank1		Overall evaluation of importance
		1. Relative distinctiveness (Subj)	2. Amount of Habitat (Obj) - measured in area for braided rivers and distance for single channel rivers. Note that while some braided rivers also have single channel reaches it is the dominant habitat	3. Numbers (Obj)	4. Foraging guilds (Obj)	5. Number of 'threatened or at risk' species present (Obj) (Note: 3 species not included: grey duck, NZ pipit, Australasian bittern - see main report for reasons)	6. Proportion of 'threatened or at risk' species present with a significant (>1% or >5%) proportion of their total populations (Obj/Subj)	1. Relative distinctiveness of habitat	2. Amount of Habitat	3. Numbers (ranked with SBBG removal adjustment)	4. Foraging guilds	5. Number of 'threatened or at risk' species present (Obj)	6. Species strongholds				
		INDICATORS						INDICATOR THRESHOLDS						Standard	Rank1		DSS: If column 6, of Step 6B, (threatened spp >5%) = 3; or total score is 15 or more = national importance; if all columns 1-5 are 2 or less and column 6 is 0; or the total score <10 = local; otherwise regional
1= Habitat type or species assemblage widely represented elsewhere in NZ; 2= Habitat type or species assemblage rarely represented elsewhere in NZ; 3= Habitat type or species assemblage not represented in other regions in NZ	ha for braided river birds	km for mainly single channel bird rivers	Number adjusted by removing SBBGs	Ranges from 0-8, i.e., a= open-water divers; b= deep water waders; c= shallow water waders; d= dabbling waterfowl; e= torrent specialists; f= aerial hunting gulls and terns; g= swamp specialists; h= riparian wetland birds	Principally: blue duck (BD), black stilt (BS), wrybill (WB), banded dotterel (BDo), black-fronted tern (B-F), black-billed gull (B-BG), pied stilt (PS), NZ pied oystercatcher (NZPO), white-fronted tern (W-F); red-billed gull (R-BG); Caspian tern (CT); southern crested grebe (SCG); NZ dabchick (DC); White heron (WH); Royal spoonbill (RSB)	Principally: blue duck (BD), black stilt (BS), wrybill (WB), banded dotterel (BDo), black-fronted tern (B-F), black-billed gull (B-BG), pied stilt (PS), NZ pied oystercatcher (NZPO), white-fronted tern (W-F); red-billed gull (R-BG); Caspian tern (CT); southern crested grebe (SCG); NZ dabchick (DC) - note that where surveys are based only on part sections then expert assessment is used to estimate proportionality.	1= low; 2= medium; 3= high	1=<5000ha and/or <10km; 2=5000-9999ha and/or 10-30km; 3= >10000ha and/or >30km	1=<1000 individuals; 2= 1000-4999 individuals; 3= >5000 individuals	1-4 = low = 1; 5-6= medium = 2; 7-8= high = 3	1=1; 2-3= 2; 4 or more = 3	0= no species with >1% of the total population; 1= 1 at 1-4.9% = low; 2= 2 at 1-4.9% = medium; 3= 1 or more > 5%, or 3 or more 1-4.9% = high	Standard			Rank1	
Northern coastal	Opoutama stream (includes swamp)	1	6.99	100	a,b,d,g,h	DC	0	1	1	1	2	1	0	6	30	Local	Spotless crane; Bittern booming; grey duck; banded rail?; NI ferbird
	Kopuawhara stream	1	6	100	a,b,d,f,g,h	PS,CT	0	1	1	1	2	2	0	7	27	Local	Spotless; Bittern; grey duck; banded rail?; NI ferbird
Wairoa	Lake Waikaremoana catchment	1	c.50	100	a,b,d,e,h	BD	0	1	3	1	2	1	0	8	21	Local	c.20 whio
	Waikaretaheke river	1	24.35	100	a,b,d		0	1	2	1	1	0	0	5	33	Local	
	Waiau river	2	85.8	500	a,b,d,e,h	BD, PS	0	2	3	1	2	2	0	10	9	Regional	Whirinaki connectivity for BD; further info required, poorly surveyed; grey duck
	Ruakituri river	2	47.13	200	a,b,d,e,h	BD	0	2	3	1	2	1	0	9	13	Regional	Grey duck
	Mangapoike river	1	25	100	a,b,d,h	PS	0	1	2	1	1	1	0	6	30	Local	Grey duck
	Wairoa river	1	268	1200	a,b,c,d,f,h	PS,BDo,B-BG,R-BG,W-FT,CT	0	1	3	2	2	3	0	11	5	Regional	
Waikari	Waikari river (incl Anaura Stm)	1	30.47	200	a,b,c,d,e,f,h	BDo, PS, BD	0	1	3	1	3	2	0	10	9	Regional	Occasional BD reports, incl. -Recent; grey duck
Aropauanui	Aropauanui river/Waikoau	1	28.62	200	a,b,c,d,e,f,h	BDo, PS, BD	0	1	2	1	3	2	0	9	13	Local	Occasional BD reports, incl. - recent in headwater; grey duck
Mohaka	Upper (above Te Hoe - includ tribs)	2	c.200	1500	a,b,c,d,e,h	BDo, PS, BD	BD (1-2%)	2	3	2	2	2	1	12	2	Regional	Grey duck; needs moore work re BD

	Lower Mohaka river	1	88.6	50	500	a,b,c,d,f,h	BDo,PS,CT, W-FT	0	1	3	1	2	2	0	9	13	Local		
Esk	Esk river	1		33.75	200	a,b,c,d,e,f,h	BDo, PS, BD	0	1	3	1	3	2	0	10	9	Regional	Occasional BD reports	
Tutaekuri	Mangaone river	1		33.01	100	a,b,d,h		0	1	3	1	1	0	0	6	30	Local		
	Upper (Mangatutu & above)	1		c.30	100	a,b,d,h	BDo	0	1	2	1	2	1	0	7	27	Local	Very old blue duck records 1984 NZFS	
	Lower	2	285.6	c.60	1400	a,b,c,d,f,h	BDo,PS,NZPO	BDo(c.1%)	2	3	2	2	2	1	12	2	Regional	OSNZ-NZWS 1986; NZ pipit; grey duck	
Ngaruroro	Upper (Whanawhana cableway)	2		62	500	a,b,d,e,h	BD,BDo,PS	BD (1% if pop 3000)	2	3	1	2	2	1	11	5	Regional	BD increasing; grey duck	
	Lower (below Whanawhana cableway)	1	1597	54	1300	a,b,c,d,f,h	BDo,PS,NZPO,B-BG,CT,R-BG	BDo (2.5% - 480)	1	3	2	2	3	1	12	2	Regional	NZ pipit, grey duck	
Karamu/Urban	Upper (Poukawa, Awanui, Karewarewa stream)	1		29.92	1000	a,b,c,d,f,g,h	PS,DC,BDo,B-BG,CT		0	1	2	1	3	3	0	10	9	Regional	Connected Lake Poukawa; bittern, crake spp
	Muddy Creek	1		2	500	a,b,c,d,f,g,h	PS,BDo,CT,DC,RSB		0	1	1	1	3	3	0	9	13	Local	Bittern, Spotless Crake, Grey duck
	Lower (Clive, Ruahapia stream, Irongate, Raupare)	1		c.30	500	a,b,c,d,f,g,h	PS,R-BG,B-BG,CT,W-FT		0	1	2	1	2	2	0	8	21	Local	Bittern
	Havelock stms (Mangarau stream, Herehere stream)	1		10	200	a,d,h	PS		0	1	2	1	1	0	0	5	33	Local	
Ahuriri	Taipu stream	1		9.6	200	a,b,d,g,h	PS,CT		0	1	1	1	2	2	0	7	27	Local	Odd bittern,
Tukituki	Makaretu stream	1		31.24	150	a,b,c,d,h	BDo,PS,BD		0	1	3	1	2	2	0	9	13	Regional	Odd old BD sighting; NZ pipit, grey duck
	Upper (SH 50 above)	1		51	c.1000	a,b,c,d,e,h	BD,BDo,PS	(BD possibility - if 20-30 birds)	1	3	1	3	2	1	11	5	Local	NZ pipit, grey duck, NI fernbird	
	Lower (downstm, incl Maharakeke and Porangahau stream)	2	2000	77	3000	a,b,c,d,f,g,h	BDo, B-BG, PS, NZPO, W-FT, RBG, CT, WH, RSB, B-FT	BDo (5%); PS(1.5%)	2	1	2	3	3	3	14	1	National	Bittern, NZ Pipit, Grey, Spotless crake	
	Tukipo river	1		33.14	200	a,b,c,d,h	BDo,PS		0	1	3	1	2	2	0	9	13	Regional	
	Makaroro river	1		17.79	200	a,b,c,d,e,h	BDo, BD,PS		0	1	2	1	2	2	0	8	21	Local	
	Mangaonuku river	1		18.67	200	a,b,c,d,g,h	BDo,PS		0	1	2	1	2	2	0	8	21	Local	
	Waipawa river	1		37.31	200	a,b,c,d,h	BDo, PS		0	1	3	1	2	2	0	9	13	Regional	
	Tukituki river (middle btw SH2 and SH 50)	1		20	200	a,b,c,d,e,h	BDo, PS		0	1	2	1	2	2	0	8	21	Regional	
Southern Coastal	Maraetotara river	1		35.24	150	a,b,c,d,h	BDo,PS		0	1	3	1	2	2	0	9	13	Regional	
	Waingongoro stream	1		8	100	b,c,d,h	PS		0	1	1	1	1	1	0	5	33	Local	
	Puhokio stream	1		12.5	100	a,b,d,f,h	PS,B-BG,R-BG		0	1	2	1	2	2	0	8	21	Local	
	Mangakuri stream	1		17.48	50	a,b,d,f,h	PS,R-BG		0	1	2	1	1	0	0	5	33	Local	
	Porangahau river	1		35.31	500	a,b,c,d,f,g,h	PS,CT,RSB,NZPO,B-BG,R-BG,Bdo		0	1	3	1	3	3	0	11	5	Regional	
	Huatokitoki	1		17.15	50	a,d,h	PS,CT,RSB,NZPO,B-BG,R-BG,Bdo		0	1	2	1	1	0	0	5	33	Local	

Colour Code Key (as at 28 May 2012)

Significance thresholds (highlighted columns)

Green	High = National
Blue	Moderate = Regional
Yellow	Low = Local

Misc (highlighted rivers)

Pink	Rivers overlap with neighbouring council
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Data reliability (font colour)

Blue/Purple	Less reliable data
Red	Data checked by Expert Panel and has been adjusted

APPENDIX 4: POTENTIAL SIGNIFICANCE ASSESSMENT CALCULATIONS FOR BIRDLIFE (RIVAS+)

River 'grouping' or river	River or section thereof	Interventions (choose from pick list)	PRIMARY ATTRIBUTES						SCORING OF PRIMARY ATTRIBUTES						Step 8: River significance			
			Step 6A: Apply indicators and thresholds						Step 6B: Apply indicators and thresholds						Sum Weights 1	Sumweights2 RIVAS+	Overall evaluation of importance	
			1. Relative distinctiveness (Subj)	2. Amount of Habitat (Obj) - measured in area for braided rivers and distance for single channel rivers. Note that while some braided rivers also have single channel reaches it is the dominant habitat that is recorded	3. Numbers (Obj)	4. Foraging guilds (Obj)	5. Number of 'threatened or at risk' species present (Obj) (Note: 3 species not included: grey duck, NZ pipit, Australasian bittern - see main report for reasons)	6. Proportion of 'threatened or at risk' species present with a significant (>1% or >5%) proportion of their total populations (Obj/Subj)	1. Relative distinctiveness of habitat	2. Amount of Habitat	3. Numbers (ranked with SBBG removal adjustment)	4. Foraging guilds	5. Number of 'threatened or at risk' species present (Obj)	6. Species strongholds				
INDICATORS						INDICATOR THRESHOLDS						Standard	RIVAS+ score	DSS: If column 6, of Step 6B, (threatened spp >5%) = 3; or total score is 15 or more = national importance; if all columns 1-5 are 2 or less and column 6 is 0; or the total score <10 = local; otherwise regional				
Northern coastal	Opoutama stream (includes swamp)		2	6.99	100	a,b,d,g,h	DC,	0	2	1	1	2	1	0	7		Local	
Wairoa	Kopuawhara stream		2	c.10	100	a,b,d,f,g,h	PS,CT	0	2	1	1	2	2	0	8		Local	
	Lake Waikaremoana catchment		1	c.50	100	a,b,d,e,h	BD	0	1	1	1	2	1	0	6		Local	
	Waikaretaheke river		1	24.35	100	a,b,d		0	1	1	1	1	0	0	4		Local	
	Waiau river		2	85.8	??500	a,b,d,e,h	BD, PS	0	2	3	1	2	2	0	10		Regional	
	Ruakituri river		2	47.13	200	a,b,d,e,h	BD	0	2	2	1	2	1	0	8		Regional	
	Mangapoike river		1	25	100	a,b,d,h	PS	0	1	1	1	1	1	0	5		Local	
Wairoa river		1	268	36.88	1200	a,b,c,d,fh	PS,BDo,B-BG,R-BG,W-FT,CT	0	1	2	2	2	3	0	10		Regional	
Waikari	Waikari river (incl Anaura Stm)		1	30.47	200	a,b,c,d,e,f,h	BDo, PS, BD	0	1	2	1	3	2	0	9		Regional	
Aropauanui	Aropauanui river/Waikoau		1	c.25	200	a,b,c,d,e,f,h	BDo, PS, BD	0	1	2	1	3	2	0	9		Local	
Mohaka	Upper (above Te Hoe - includ tribs)	6b	3	c.200 +	1500	a,b,c,d,e,h	BDo, PS, BD	BD (5%)+	3	3(+0.5)	2	2	2	1(+2)	13	15.5	National	
Esk	Lower Mohaka river		1	88.6	50	300	a,b,c,d,f,h	BDo,PS,CT	0	1	1	1	2	2	0	7		Local
	Esk river		1	30.47	200	a,b,c,d,e,f,h	BDo, PS, BD	0	1	2	1	3	2	0	9		Regional	
Tutaekuri	Mangaone river		1	33.01	100	a,b,d,h		0	1	2	1	1	0	0	5		Local	

	Upper (Mangatutu & above)		1	c.60	100	a,c,d,h	BDo	0	1	2	1	2	1	0	7		Local		
Ngaruroro	Lower	3c, 3f	2	285.6+	c.30	1400+	a,b,c,d,f,h	BDo,PS,NZPO	BDo(c.1%)+, PS	2	2(+0.5)	2(+0.5)	2	2	1(+0.5)	11	12.5	Regional	
	Upper (Whanawhana cableway)		2		>50	500	a,b,d,e,h	BD,BDo,PS	BD (1% if pop 3000)	2	2	1	2	2	1	10		Regional	
	Lower (below)	3c	1	1596.5+	115.9	1300+	a,b,c,d,f,h	BDo,PS,NZPO,B-BG,CT,R-BG	BDo (2.5% - 480),PS+	1	3(+0.5)	2(+0.5)	2	3	1(+0.5)	12	13.5	Regional	
Karamu/Urban	Upper (Poukawa, Awanui, Karewarewa stream)		2		29.92	1000	a,b,c,d,f,g,h	PS,DC,BDo,B-BG,CT		0	2	2	1	3	3	0	11		Regional
	Muddy Creek		2		2	500	a,b,c,d,f,g,h	PS,BDo,CT,DC,RSB		0	2	1	1	3	3	0	10		Local
	Lower (Clive, Ruahapia stream, Irongate, Raupare)		1		11.85	500	a,b,c,d,f,g,h	PS,R-BG,B-BG,CT,W-FT		0	1	2	1	2	2	0	8		Local
	Havelock stms (Mangarau stream, Here Here stream)		1		20	200	b,c,d,h	PS		0	1	2	1	1	0	0	5		Local
Ahuriri Tukituki	Taipo stream		1		10	200	a,b,d,g,h	PS,DC,CT		0	1	1	1	2	2	0	7		Local
	Makaretu stream		1		31.24	150	a,b,c,d,h	BDo,PS		0	1	3	1	2	2	0	9		Regional
	Upper (HW 50 above)		1		c.100	c.100	a,b,c,d,e,f,h	BD,BDo,PS	(BD possibility - if 20-30 birds)	1	3	1	3	2	1	11		Local	
	Lower (downstm, incl Porangahau stream)	3c,6b,3f	3	2000+		3000+	a,b,c,d,f,g,h	BDo, B-BG, PS, NZPO, W-FT, RBG, CT, WH,RSB	BDo (5%); PS(1.5%)+	3	1(+0.5)	2(+0.5)	3	3	3(+0.5)	15	16.5	National	
	Tukipo river		1		33.14	200	a,b,c,d,h	BDo,PS		0	1	2	1	2	2	0	8		Regional
	Makaroro river	6b	1		17.79	200	a,b,c,d,e,h	BDo, BD,PS	BD: 6 to 9 pairs +	1	1	1	2	2	0(+0.5)	7	7.5	Local	
Southern Coastal	Mangaonuku river		1		18.67	200	a,b,c,d,g,h	BDo,PS		0	1	2	1	2	2	0	8		Local
	Waipawa river		1		37.27	200	a,b,c,d,h	BDo, PS		0	1	3	1	2	2	0	9		Regional
	Tukituki river (tributary in own right)		1		c.50	200	a,b,c,d,h	BDo, PS		0	1	3	1	2	2	0	9		Regional
	Maraetotara river		1		35.24	150	a,b,c,d,h	BDo,PS		0	1	3	1	2	2	0	9		Regional
	Waingongoro stream		1		8	100	b,c,d,h	PS		0	1	1	1	1	1	0	5		Local
	Puhokio stream		1		12.5	100	a,b,c,d,f,h	PS,B-BG,R-BG		0	1	2	1	2	2	0	8		Local
	Mangakuri stream		1		17.48	50	a,b,d			0	1	2	1	1	0	0	5		Local
	Porangahau river		1		35.31	500	a,b,c,d,f,g,h	PS,CT,RSB,NZPO,B-BG,R-BG,Bdo		0	1	3	1	3	3	0	11		Regional
	Huatokitoki		1		8	50	a,d,h			0	1	1	1	1	0	0	4		Local

Colour Code Key (as at 28 May 2012)	
Significance thresholds (highlighted columns)	
Green	High = National
Blue	Moderate = Regional
Yellow	Low = Local
Misc (highlighted rivers)	
Pink	Rivers overlap with neighbouring council
Data reliability (font colour)	
Blue/Purple	Less reliable data
Red	Data checked by Expert Panel and has been adjusted
RIVAS+ (highlighted rows)	
Blue	Also assessed for potential future state (RIVAS+)
Orange	Score changed by proposed interventions (RIVAS+)
Green	Positive influence on attribute but not enough to shift value - counted as an increase of 0.5 (RIVAS+)