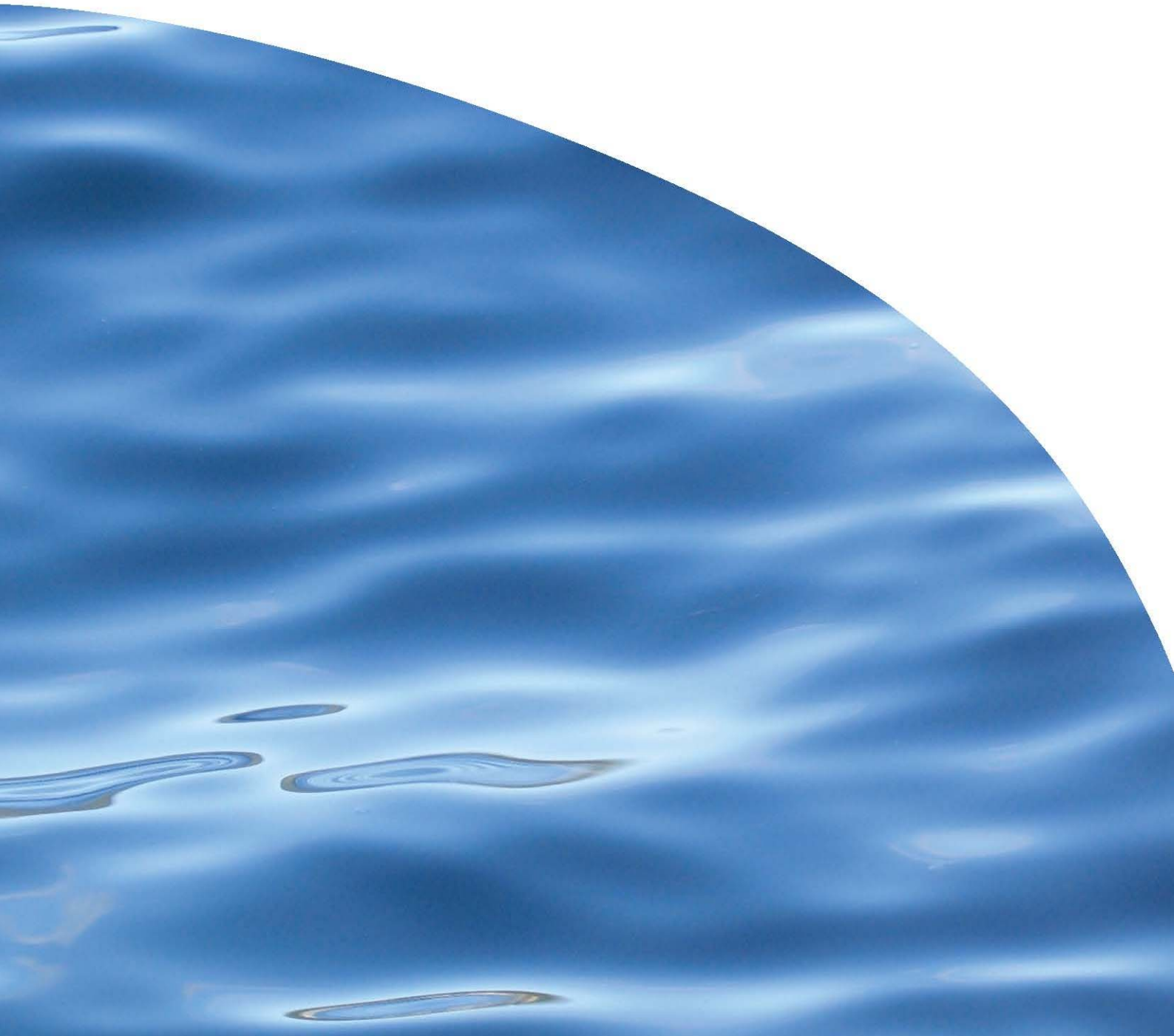
CAWTHRON INSTITUTE

REPORT NO. 2445

RAPID HABITAT ASSESSMENT WORKSHOP



RAPID HABITAT ASSESSMENT WORKSHOP

JOANNE CLAPCOTT

Prepared for Hawkes Bay Regional Council

CAWTHRON INSTITUTE
98 Halifax Street East, Nelson 7010 | Private Bag 2, Nelson 7042 | New Zealand
Ph. +64 3 548 2319 | Fax. +64 3 546 9464
www.cawthron.org.nz

REVIEWED BY:
Robin Holmes

APPROVED FOR RELEASE BY:
Rowan Strickland

ISSUE DATE: 22 November 2013

RECOMMENDED CITATION: Clapcott JE 2013. Rapid habitat assessment workshop. Prepared for Hawkes Bay Regional Council. Cawthron Report No. 2445. 7 p.

EXECUTIVE SUMMARY

This report summarises the output of a workshop convened to advance the development of a standardised rapid habitat assessment (RHA) protocol for rivers and streams. The workshop was hosted by the Ministry for the Environment, Wellington, on 17 September 2013. It was attended by a Ministry agent, seven regional councils' representatives, and seven stream habitat scientists. The workshop was funded by Envirolink medium advice grant 1433.

Following consideration of a recent review document outlining the similarities and differences of the various RHA protocols applied nationwide, the workshop attendees reached consensus on key parameters to inform a standardised national RHA protocol. They included:

- Fine sediment
- Invertebrate habitat abundance
- Invertebrate habitat diversity
- Fish habitat abundance
- Fish habitat diversity
- Hydraulic heterogeneity
- Bank stability
- Channel modification
- Riparian buffer width
- Riparian integrity
- Riparian shade

Appropriate wording to inform the scores for each parameter was discussed at the workshop. Following the workshop, stream habitat experts were engaged to complete a draft protocol which was then distributed to regional councils for comment. Suggested edits have been incorporated into a draft protocol combining nine parameters. The draft protocol is included in this report.

It is recommended that the draft national RHA protocol is used this field season by regional councils, to test subjectivity and to generate data that can be used in to further develop and validate the protocol. An Envirolink Tools grant is an option to complete the development of a national RHA protocol, but this funding is yet to be secured.

TABLE OF CONTENTS

1. INTRODUCTION

A recent review of rapid habitat assessment (RHA) protocols for rivers and streams (Clapcott 2012) identified similarities in methods currently in use by regional councils, but also a lack of standardisation. Commonly assessed habitat parameters showed strong relationships with both land use and biotic indices supporting their inclusion in a national protocol.

The Stream Habitat Assessment Protocols (Harding *et al.* 2009) provides three levels of habitat assessment but none result in a single 'score' that can be incorporated into state of the environment (SOE) reporting. In the recent review, Clapcott (2012) identified that data collected from SHAPs can be used to provide a SOE assessment. However, regional council staff considers the SHAP protocols to be to resource intensive to include as part of routine SOE monitoring. A RHA protocol would provide a relatively quick (< 5 min) tool that can be readily applied during a SOE assessment, complementing more resource intensive SHAP assessments, and could be validated using SHAPs data.

2. WORKSHOP

The aim of the workshop was to scope and develop a standardised national RHA method for rivers and streams by combining advice from stream habitat scientists and regional council representatives. The workshop was hosted by the Ministry for the Environment, Wellington, on 17 September 2013. It was attended by a Ministry agent, seven regional councils' representatives, and seven stream habitat scientists. The workshop was funded by Envirolink medium advice grant 1433.

2.1. Attendees

Workshop attendees and their organisations included:

- Alastair Suren: Bay of Plenty Regional Council
- Logan Brown: Horizons Regional Council
- Summer Greenfield: Greater Wellington Regional Council
- Fiza Hafiz: Taranaki Regional Council
- Brooke Thomas: Taranaki Regional Council
- Sandy Heidekker: Hawkes Bay Regional Council (project champion)
- Duncan Gray: Environment Canterbury
- Roger Hodson: Environment Southland

- Russell Death: Massey University
- Jon Harding: University of Canterbury
- Kevin Collier: University of Waikato
- Richard Storey: NIWA
- Joanne Clapcott: Cawthron Institute (project coordinator)
- Robin Holmes: Cawthron Institute
- Carl Howarth: Ministry for the Environment

2.2. Agenda

A brief outline of the workshop agenda identifies the key points of discussion:

09:00 hr	**Workshop open**
Session 1:	Introduction. Definitions. What is steam habitat? Why asses stream habitat? How to assess stream habitat? What habitat parameters to assess? Where and when to assess stream habitat?
Session 2:	How to score habitat? River typologies. What we can achieve today versus future needs?
Session 3:	Straw man #1
Session 4:	Points of consensus and where to from here
16:30 hr	**Workshop close**

2.3. Output

2.3.1. Definitions

A rapid habitat assessment provides a *quick and easy* (qualitative) site-based assessment of physical stream habitat condition. It was suggested that an ideal RHA would *minimise subjectivity*, provide a *consistent* (standardised) national tool, and result in a *score* that could be used to report the state of stream habitat.

2.3.2. RHA format

The USEPA habitat assessment — HABSCORE (Barbour *et al.* 1999) provides the basis of several RHA currently in use regionally and was used as the foundation for the development of a national RHA protocol. The HABSCORE framework:

1. Adopts a 0–20 scoring system for each habitat parameter (total score being the sum of all parameter scores).

2. Recognises the need to scale the resulting site total score to a suitable reference condition. For example, habitat condition could be scored as a percentage of reference. Ideally reference score would be obtained from an appropriate reference site but a minimal approximation of reference would be the maximum RHA score.

2.3.3. River typologies

Rivers and streams are highly diverse and as such it is unlikely that a single RHA will be applicable in all flowing waters. It was decided to focus initial efforts on the development of a RHA to apply to *wadeable, hard-bottomed* rivers and streams. It was recognised that potential parameters may be biased in their application to other waterways but testing and further development would be required to determine such bias.

2.3.4. Key rapid habitat assessment parameters

A main focus of the workshop was discussion of potential RHA parameters. Consensus was reached on the inclusion of the following 11 parameters:

- Fine sediment
- Invertebrate habitat abundance
- Invertebrate habitat diversity
- Fish habitat abundance
- Fish habitat diversity
- Hydraulic heterogeneity
- Bank stability
- Channel modification
- Riparian buffer width
- Riparian integrity
- Riparian shade

Each parameter was chosen because of its importance to stream biota. Additional parameters were excluded because they did not fit this requirement. For example, the assessment of human litter does not directly describe the suitability of habitat for stream biota. It was agreed that each parameter should be equally weighted in the summation of a total score.

3. POST-WORKSHOP RAPID HABITAT ASSESSMENT DEVELOPMENT

Progress towards populating the wording for key parameters was mainly achieved following the workshop. Habitat experts from the workshop together drafted a protocol that was then circulated to regional council representatives for comment. Specific comments were used to further amend the draft protocol that is reported in the following section.

During and following the workshop it was recognised that additional funding would be required to continue RHA protocol development. Several regional council representatives were in favour of an Envirolink Tools application as a means to progress. Alastair Suren (Bay of Plenty Regional Council) and Graham Sevicke-Jones (Greater Wellington Regional Council) intended to follow this line of potential funding.

A key point conveyed by regional council representatives was the need for a field and / or training guide to accompany the RHA field sheet. This would also be part of future RHA development, yet to be funded.

4. DRAFT RAPID HABITAT ASSESSMENT PROTOCOL

It is recommended that the following protocol be applied:

Where:	At SOE monitoring sites
When:	On completion of a site visit for other biological monitoring, *e.g.* invertebrate monitoring. If the RHA was applied independently of other monitoring then the field officer should walk the full length of the site prior to scoring. If site length is not previously defined then use 20 x wetted width or a minimum of 50 metres
Who:	By all field officers present (to allow for testing of subjectivity)
What:	All parameters, except 1 — fine sediment at soft-bottomed streams
Plus:	Take as many notes as possible (to aid protocol development)
How:	Print the following pages for field assessments and record results in Excel

In the absence of a field guide, examples on how to score parameters are included in the draft RHA protocol.

1. Fine sediment deposition in naturally hard-bottomed streams	<10% of the stream bed in run habitats covered by fine sediment	10-20% of the stream bed in run habitats covered by fine sediment	20-50% of the stream bed in run habitats covered by fine sediment; score lower if deposits are deep	>50% of the stream bed in run habitats covered by fine sediment; score lower if deposits are deep
Example score	*20 = 0%, 16 = 8%*	*15 = 10%, 11 = 18%*	*Thin film: 10 = 30%, 9 = 35%, 8 = 40%, 7 = 45%, 6 = 50%* *Deep/sandy deposits: 10 = 20%, 9 = 25%, 8 = 30%, 7 = 35%, 6 = 40%*	*Thin film: 5 = 60%, 4 = 70%, 3 = 80%, 2 = 90%, 1 = 100%* *Deep/sandy deposits: 5 = 55%, 4 = 60%, 3 = 65%, 2 = 70%, 1 = 75%+*
SCORE ___	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1
2. Invertebrate habitat	Abundant and diverse >75% substrate favourable for EPT colonisation. Present year-round. *and* Wide variety (>5) of substrate sizes and types. Inorganic includes boulders, cobbles, gravels, sand. Organic includes wood, leaves, root mats, macrophytes. *and* Interstitial spaces open.	Common and adequate 50-75% substrate favourable for EPT. Some habitat may be transient or not persist beyond a season. *and* Moderate variety (4-5) of substrate sizes and types. *and* Interstitial spaces open.	Patchy and limited 25-50% substrate favourable for EPT. Score lower if large proportion of habitat not persistent. *and* Limited variety (2-3) of substrate sizes and types. *and* Interstitial spaces and/or crevices limited.	Rare or absent <25% substrate favourable for EPT. *and* Homogenous substrate (predominantly 1 substrate type). *and* Very limited interstitial space and/or crevices.
Example score	*20 = 95% cobbles & gravels, with boulders, sand, wood & leaves present.* *19 = 90%, 18 = 85%, 17 = 80%, 16 = 75%*	*15 = 70% stable substrate with 4 additional substrate types* *11 = 50% stable substrate and macrophytes/periphyton present*	*10 = 50% cobble/gravel with leaves and small wood with 25% periphyton/macrophyte cover* *6 = 30% cobble/gravel with leaves and small wood, with >40% periphyton/macrophyte growth*	*5 = 25% gravel rest of stream covered in unstable sands* *1 = 5% gravel rest of stream covered in silt/mud*
SCORE ___ **x 2**	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1
3. Fish cover	Abundant and diverse >70% fish cover in reach *and* Wide variety (≥4) of persistent fish cover providing spatial complexity such as woody debris, root mats, undercut banks, overhanging/ encroaching vegetation, macrophytes, boulders, cobbles	Common and adequate 40-70% fish cover *and* Moderate variety (3) of fish cover types providing spatial complexity; woody debris and overhanging vegetation or undercut banks score higher if persistent	Patchy and limited 10-40% fish cover *and* Limited variety (2) of fish cover types, woody debris, overhanging vegetation or undercut banks are rare; only larger cover elements are persistent	Rare or absent <10% fish cover *and* Fish cover rare or absent; few hiding places or interstitial spaces
Example score	*20 = 95% of habitat favoured by expected fish community, lots instream and bank complexity* *19 = 90%, 18 = 85%, 17 =80%, 16 = 75%*	*15 = 70% of habitat favoured by expected fish community, o/hanging veg/banks stable* *11 = 40%*	*10 = 40%, fish cover is boulders and logs in water* *6 = 10%*	*5 = 8%, fish cover is a few seasonal macrophytes instream* *1 = 0% fish cover, uniform substrate*
SCORE ___ **x 2**	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1
4. Hydraulic heterogeneity	Wide variety (4+) of hydraulic components such as pool, riffle, run, glide, chute, waterfalls (appropriate to gradient of the site) *and* Variety of pool sizes and depths (appropriate to size of stream)	Moderate variety (3) of hydraulic components, scores lower if riffle habitat relatively scarce *and* Deep and shallow pools present (pool size relative to stream size)	Limited variety (2) of hydraulic components (e.g. a run and a riffle) *and* Deep pools absent (pool size relative to stream size)	Uniform depth and velocity *and* Pools absent (includes uniformly deep streams)
Example score	*20 = riffle run pool and backwaters with shallow and deep pools* *16 = riffle run pool, backwaters hard to find*	*15 = runs pools riffles* *11 = runs pools but less riffles*	*10 = run riffle but pools only after riffles* *6 = no deep pools*	*5 = mainly run/glide, pools or riffle hard to find* *1 = no pools*
SCORE ___	**20 19 18 17 16**	**15 14 13 12 11**	**10 9 8 7 6**	**5 4 3 2 1**
5. Bank stability	High Banks stabilised by geology, vegetation cover and/or deep roots (1-2x bank height) *and* <5% recently eroded, mainly scouring	Moderate Banks stabilised by geology, moderate vegetation cover and/or root depth *and* 5-30% recently eroded, mainly scouring	Low Uncohesive bank materials, sparse vegetation cover and/or shallow roots (< bank height) *and* 30-60% recently eroded, mainly slumping	Very low Uncohesive bank materials and few roots *and* >60% recently eroded, mainly slumping
Example score	*20 = mature bank vegetation, no sign of erosion* *16 = younger bank vegetation, limited erosion at water line*	*15 = 5% erosion scars at water line* *14 = 10%, 13 = 15%, 12 = 20%, 11 = 25%*	*10 = 30% erosion, slumping of bank above water line* *9 = 40%, 8 = 45% , 7 = 55%, 6 = 60%*	*5 = 65% erosion scars, slumping of bank above water line* *4 = 75%, 3 = 80%, 2 = 85%, 1 ≥ 90%*
Left bank	**20 19 18 17 16**	**15 14 13 12 11**	**10 9 8 7 6**	**5 4 3 2 1**
Right bank	**20 19 18 17 16**	**15 14 13 12 11**	**10 9 8 7 6**	**5 4 3 2 1**
SCORE (mean LB&RB) ___				

6. Bank vegetation	Mature native vegetation, with diverse and intact understorey and groundcover	Regenerating native vegetation or mature with damaged understorey or dense mature exotic vegetation or dense mature flaxes/sedges	Shrubs or sparse tree cover with little understorey vegetation or long grasses or early-stage planted trees	Heavily grazed or mown grass or bare ground or impervious cover
Example score	*20 = mixed age and height vegetation within 5 m of wetted width, 16 = mixed veg but less mature trees, gaps in groundcover*	*15 = young native veg, 14 = native but understorey damage obvious, 13 = low native veg only, 12 = mix mature exotic trees and native, 11 = mature exotic trees dominate*	*10 = mix native and exotic young veg, 9 = mix with some high trees, 8 = mix mainly shrubs, 7 = mix veg mainly grass, 6 = mainly young exotic*	*5 = mainly exotic grass, 4 = mown grass, 3 = bare ground, 2 = impervious cover, 1 = no bank veg*
Left bank	**20 19 18 17 16**	**15 14 13 12 11**	**10 9 8 7 6**	**5 4 3 2 1**
Right bank	**20 19 18 17 16**	**15 14 13 12 11**	**10 9 8 7 6**	**5 4 3 2 1**
SCORE (mean LB&RB) ___				
7. Riparian buffer (width)	Continuous parallel vegetation with dense groundcover or thick litter layer and all livestock excluded e.g. fully fenced *and* Wide (>15m)	Mostly continuous vegetation with moderate grass cover or medium litter layer and limited stock access or human impacts e.g. single-wire fence and/or vegetation barrier *and* Moderate (>5m)	Grazed grass or sparse litter layer and pathways present for stock access to stream at watering points e.g. unfenced but may have vegetation barrier *and* Narrow (<5m)	Bare ground with high soil compaction or uncontrolled stock access or human impact obvious *and* Absent or infrequent
Example score	*20 = fully fenced, mature and dense veg >20m wide, 19 = 20m wide, 18 = 15m wide est veg, 17 = 15m wide recently planted/fenced, 16 = 15m fenced but no new veg*	*15 = 10m wide potentially not permanent fence, mixed stage veg, 14 = 10m wide new planting, 13 = 8m wide mix veg, 12 = 5m wide mix veg, 11 = 5m wide new veg*	*10 = 5m wide unfenced but dense mix veg, 9 = 4m wide mix veg, 8 = 4m wide scattered veg, 7 = 3m wide scattered veg, 6 = 2m wide scattered veg*	*5 = unfenced some scattered large veg mainly grass, 4 = grazed grass, 3 = regular watering hole for stock, 2 = bare gound, 1 = impervious or highly modified streamside zone*
Left bank	**20 19 18 17 16**	**15 14 13 12 11**	**10 9 8 7 6**	**5 4 3 2 1**
Right bank	**20 19 18 17 16**	**15 14 13 12 11**	**10 9 8 7 6**	**5 4 3 2 1**
SCORE (mean LB&RB) ___				
8. Riparian shade	Vegetation (or banks) provide substantial shading of wetted width at baseflow (>70%)	Moderate (40-70%)	Minimal (10-40%)	Little or no shading of wetted width at baseflow (<10%)
Example score	*20 = ≥ 90% average canopy cover throughout day, 19 = 90%, 18 = 85%, 17 =80%, 16 = 75%*	*15 = 70%, 14 = 65%, 13 = 60%, 12 = 55% 11 = 50%*	*10 = 40%, 9 = 35%, 8 = 25%, 7 = 20%, 6 = 15%*	*5 = 10%, 4 = 8%, 3 = 6%, 2 = 4% 1 = 0%*
SCORE ___	**20 19 18 17 16**	**15 14 13 12 11**	**10 9 8 7 6**	**5 4 3 2 1**
9. Channel alteration	Natural stream bed and bank form unmodified *or* Stream with natural channel profile and sinuosity	Natural stream bed, some evidence of bank stabilisation (e.g. near bridges). No instream structures or embankments alter natural flows. *or* <20% of channel length straightened, widened or deepened	Significant proportion of stream bed or banks altered by man-made materials (e.g. concrete lining, wooden boxing, riprap or gabion baskets). Or embankments constrain major floods within channel *or* 20-50% of channel length straightened, widened or deepened	Stream bed or banks altered over most of their length or natural flows significantly altered by instream structures (e.g. weirs, culverts) or embankments. *or* >50% of channel length straightened, widened or deepened
Example score	*20 = unmodified bed, bank, sinuosity, 16 = evidence of historical channel straightening but mainly unmodified*	*15 = natural in stream substrate some man-made bank materials up to 5% channel alteration, 11 = 15% alteration*	*10 = 20% channel alteration, 20% in stream/bank man-made materials, 6 = 50% channel alteration, 50% in stream/bank man-made materials*	*5 = 60% channel alteration 60% bank dominated by man-made materials, 1 = ≥75% channel altered ≥75% man-made structures*
SCORE ___	**20 19 18 17 16**	**15 14 13 12 11**	**10 9 8 7 6**	**5 4 3 2 1**
TOTAL (sum 1 to 9) ___				

5. ACKNOWLEDGEMENTS

Thanks to the following:

- Sandy Haidekker (Hawkes Bay Regional Council) for championing the Envirolink proposal to develop a standardised national protocol.
- All workshop attendees and those were unable to attend the workshop yet provided feedback on draft protocols, especially Carol Nicholson, Jonny Horrox, Mark Hamer and Alton Perrie.
- The Ministry for the Environment for hosting the workshop
- Bay of Plenty Regional Council, Waikato Regional Council and Environment Southland for providing bridging funds.

This project was mainly funded by Envirolink medium advice grant 1433.

6. REFERENCES

Barbour MT, Gerritsen J, Snyder BD, Stribling JB 1999. Rapid bioassessment protocols for use in streams and wadeable rivers: Periphyton, benthic macroinvertebrates and fish. U.S. Environmental Protection Agency; Office of Water. EPA 841-B-99-02.

Clapcott JE 2012. Review of Rapid Habitat Assessment Protocols. Prepared for Hawke's Bay Regional Council. Cawthron Report No. 2267. 33 p.

Harding JS, Clapcott JE, Quinn JM, Hayes JW, Joy MK, Storey RG, Greig HS, Hay J, James T, Beech MA, Ozane R, Meredith AS, Boothroyd IKD 2009. Stream habitat assessment protocols for wadeable rivers and streams of New Zealand. University of Canterbury Press.