Judges' Report
2016 New Zealand's Most Improved River Awards

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Why MCI?
This year's Most Improved River Awards have been made on the basis of improvements in the river ecosystem health indicator the 'Macroinvertebrate Community Index' or MCI over the last 15 years.

What are Macroinvertebrates?
Macroinvertebrates include a wide variety of freshwater insects such as dragonflies, mayflies, beetles and midges, as well as snails, aquatic spiders, worms and crustaceans such as koura. Macroinvertebrates are useful for assessing river health because their occurrence and abundance are determined by water and habitat quality, with some kinds thriving in polluted waters and others only inhabiting near pristine waters.

A biological indicator based on the macroinvertebrate community is useful because macroinvertebrates are influenced by water/habitat quality in the days, weeks and months preceding sampling, whereas spot measurements of water quality only reflect the quality of the water at the moment of sampling.

What is the Macroinvertebrate Community Index?
The MCI is a biotic index developed in New Zealand that uses knowledge of the habitat preferences of different types of macroinvertebrates to produce a single river health score. The MCI relies on prior allocation of tolerance scores to different kinds of freshwater macroinvertebrates based on their tolerance to pollution. Macroinvertebrates that are characteristic of unpolluted conditions and/or coarse stony substrates score more highly than those found predominately in polluted conditions and/or among fine organic sediments. MCI scores greater than 120 are indicative of clean water, while scores less than 80 are indicative of probably severe pollution. The simplicity of the MCI has meant that it is able to double as a tool for scientists to characterise complexity, and as a measure of stream health that is easily understood by non-scientists.

Measurement of the MCI involves sampling macroinvertebrates from the beds of rivers using nets. They then have to be sorted into species, in some cases counted. Most regional councils measure MCI at least once per year.

An increase in MCI over time in rivers draining modified landscapes is likely to reflect active management of land, waterways, and infrastructure (for instance waste-water treatment plants). Any combination of these activities may result in an increase in MCI over time. Improving riparian zones (e.g. through planting trees that shade steams and stabilise banks) can lead to significant improvements in MCI scores over time.

There are proposals to introduce the Index as a compulsory tool to provide national consistency for future river ecosystem health monitoring across the country.

The judging process
The latest information on macroinvertebrate species composition at monitoring sites around the country is compiled each year by regional councils for display on the Land, Air, Water Aotearoa (LAWA) website (www.lawa.org.nz). This dataset was used to determine the award winners.

We focussed on sites with at least one sampling of MCI per year (usually in late summer) and used data collected over the period from 2001-2015.
We assessed the significance and strength of trends in the data using a statistical test called the Mann Kendall Trend Test.

We considered rivers for a national award only if they showed a statistically significant upward trend in MCI over the last decade. From an initial MCI database of 820 sites, we found 62 river sites that had sufficient data and a significant trend for consideration. Of these we looked at 27 sites that had improving MCI trends that were statistically significant at a level we considered appropriate.

The final check on a site's suitability for inclusion in the award list was made following discussions between the Morgan Foundation, the relevant Regional Council and other stakeholders such as The Landcare Trust and Fish & Game New Zealand. This ensured that changes in land management and restoration initiatives on the river had taken place to an extent that we agreed would have been consistent with the observed improvement in the MCI scores. We recognised that improvements in MCI may be the result of a range of management initiatives. As in previous River Awards it was occasionally challenging to clearly identify initiatives responsible for observed improvements.

In some regions, macroinvertebrate sampling has not been undertaken for the full 10 years and thus a substantial number of sites and regions were excluded from potentially winning a national award. To recognise the effort involved in the monitoring we relaxed our data length criteria for regional award winners to 5 years, rather than the full 10 years. Again, statistically significant improvements in MCI were identified and sites with the most improvement over the data record were considered for awards.

We made our judgements from the results at single monitoring sites. For some of the larger rivers there may have been more than one monitoring site on that river. In the recommended awards we specify the site at which the qualifying measurements were recorded.