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The Hurunui District Landcare Group Catchment Stream Health Project

A project summary report for Access to Experts Project 90

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The Project

The Hurunui District Landcare Group's (HDLG) Catchment Stream Health project seeks to understand the health of the streams in the Hurunui and to build capability and knowledge about stream health monitoring among HDLG members.

The testing / training undertaken included the NIWA Stream Health Monitoring Assessment Kit (SHMAK) tool for assessing the health of the ecosystem, assessing the physical features and instream measures of macro-invertebrate abundance (MCI) and periphyton growth. This assessment was complimented with a Wilderlab eDNA (Taxon Independent Community Index or TICI) assessment of stream life and a Hill Laboratories water quality sample testing for *E. coli*, water clarity, forms of dissolved nitrogen (N) and forms of dissolved phosphorus (P) to set up a baseline stream health assessment at a representative sampling site in the subject rivers.

This report presents general information around project implementation including the level of participation and lessons learned. The results for each river / catchment have been reported separately to the HDLG to distribution back to the communities of interest.

What was undertaken and where

The project focussed on rivers that are not well represented in the regional council river monitoring network. The reason in part was to build up a local knowledge-base of river health that is not easily garnered from regional statistics. The other reason was to make the training locally relevant to the participants who farmed within the catchments – many of whom live and farm immediately adjacent to the chosen monitoring sites.

In total, 22 sites spanning 10 rivers and streams were sampled in November 2023 and February 2024.

Level of engagement

At least one HDLG Catchment Farm Advisor was present at all sites. The majority of the sites (19) had some level of community participation. High levels of participation, where five or more people attended the sampling over a given catchment set, were experienced at five sites, with two of those sites also having school participation. Generally, the first site on each river took approximately two hours with the second site taking about an hour and the third (where applicable) taking roughly 30 - 45 minutes. Where community engagement was high the time spent assessing the site was extended to allow for questions and participation. By the end of the day, participants who had been involved in two or more sites appeared confident with using the SHMAK methodology, taking water quality samples, and recording data.

Having school participation changed the structure of the site assessments with the focus shifting primarily to engaging the students while still ensuring the data collected was achievable, robust and relevant. The students were divided into four groups (4-6 students in each group) and each group rotated through four stations, two stations to sort and count macroinvertebrates, one station to measure water clarity and conductivity and one station to record physical habitat values. The physical habitat assessment was an abbreviated version of SHMAK focusing on vegetation cover and type, bank stability, presence of rubbish, shading of the river and a rough estimate of streambed composition.

What was achieved

HDLG now has four Catchment Farm Advisors who are well-versed in the use of the SHMAK methodology and water quality sampling.

HLDG has a new knowledge-base for rivers in the Hurunui District, building on existing knowledge with a local level of relevance.

Modest to high levels of community engagement has led to the training of a team of landowners across the district who may choose continue to monitor the sites assessed as part of the project, or who may begin assessing stream health and water quality of the stream and rivers running through their farms.

Comments from participants on the day indicated that they gained an understanding of the river ecosystem, what to look for when considering the health of the river and an appreciation of the effort required to monitor a river. This feedback indicated that the aims to build capability and knowledge were met.

Other feedback included the ability for farmers to meet FAP+ requirements.

An additional benefit, particularly arising from the inability to sample the Leamington and Leader is that there are willing farmers who have not yet been exposed to the SHMAK method, who are now aware that they can monitor a stream or river in their own time. The Catchment Farm Advisors can now provide support for those landowners who seek to use SHMAK at a later stage and at a time more convenient to them (or when the rivers are flowing!).

A report outlining the results for each catchment set was presented back to HDLG to distribute to landowners. Included in each report are broad level recommendations on where to go from here for each site and / or river. For the first river assessed, a summary of the report was also verbally presented, allowing for further questions or comments arising from the report to be directly addressed. It is anticipated that other landowners might be interested in a similar debrief once the reports have been digested.

Catchment-level commentary

As stated above, we have produced individual reports for each river/catchment. To put the stream health assessment information into context, the water quality results for each parameter are scored 1 (poor) to 4 (excellent). In the river-specific reports to HDLG, the median value across all sites within the catchment was used to indicate the overall health of the river. We found that this tended to hide specific issues associated with particular parameters and so we provide commentary and river-specific recommendations on monitoring and/or managing specific issues.

Reporting on the health of river ecosystems is complex and multifaceted due to the interwoven interactions between nutrients and the biotic environment, the multiple sources of contaminants and their relationship with flow and temperature. Also, the assessment is based on a single point assessment taken at each site, which limits the relevance of interpretation to the summer of ’23-24. So when looking across all sites, across all rivers to gauge general trends the interpretation of the results is highly limited by this.

In a very general sense, all of the rivers surveyed are impacted as evidence by one or more of the parameters measured, with impacts that generally correspond to pastoral land use. There were no district wide indications of one part of the Hurunui District being any worse than another. Each river stands out as atypical in contrast to others for particular parameters. Each river needs to be examined in isolation and over longer periods of time to determine the best approach for improving their in-stream health.

On the basis of the results, the only general recommendation that we can apply to all sites is to continue to work on excluding livestock from wide rivers and streams (where practicable) and to plant narrow streams with native trees that provide shade. Annual monitoring of streambed composition, conductivity, water clarity, water quality (N, P and E. coli) and eDNA / macroinvertebrates can be used to track changes in stream health.

The list below provides the salient points when looking across each parameter across all sites.

- When looking only at the median value for each river, most of the rivers are in excellent health. Three catchments are in good health.

- With regard to levels of phosphorus, the median DRP and Total P across the District is “excellent”. However, three sites had fair-to-good, fair, or fair-to-poor ratings.

- With regard to levels of nitrogen, the median nitrate (habitat), nitrate-n (toxicity), and nitrite is “excellent” at District level. The only site that bucks this trend rated fair for nitrate (habitat) and “good” for nitrate-n (toxicity). These results indicate that N-inputs are not a significant district-wide issue but may be a localised problem and/or the rivers have the capacity to assimilate the current N-loading (see comment for periphyton).

- With regard to *E. coli* (which is an indicator of potential sources of faecal contamination), the median *E. coli* level across all sites was “excellent”, suggesting that faecal contamination is not a district-wide issue. Three sites were rated fair and three were rated good.

  With the exception of two sites, livestock access and /or nearby sources of potential faecal contamination by dogs, pigeons, and/or people were noted, and it is possible that the contamination is from these local sources. However, the consistency of result from both upstream and downstream sites in all of these catchments suggests a potential wider catchment issue associated with livestock access and/or significant sources of farm run-off.

- The physical habitat assessment, which looks at, stream margin vegetation, shade, bank erosion, and stream bed composition, indicates that all of the waterways are impacted to some degree. The median across all sites is “good”. Four sites scored ‘excellent’ due to the high levels of overhanging vegetation, shade, and habitat complexity of the stream bed.

- Five sites scored ‘fair’, which can be attributed to a lack of shade over the river bed.

- Rubbish is not an issue at any of the sites.

- The physical habitat assessment generally identifies that the sites are not greatly shaded except those listed as having “excellent” (low) periphyton nuisance levels below. The median temperature across all sites “good” indicating that the water is warmer than desirable but not an extreme stressor to consider when interpreting the ecological health scores. The lack of shade and warm temperature are likely to contribute to excessive periphyton growth.

- High conductivity is an indication of dissolved salts present. This measure may indicate nutrient contamination and is correlated with increasing temperature. Most invertebrates can only tolerate low conductivity levels. All sites had “fair” to “poor” conductivity, except for two sites, where the conductivity was good. Given the generally low nutrient scenario, the high conductivity may be due to high levels of background solutes, particularly in catchments that feature limestone in the geological profile. Regardless of source the high conductivity is a stressor to consider when interpreting ecological health scores.

- Although the N and P levels are generally low, the median level for periphyton nuisance (level of algal growth) is “fair”. The results suggest nutrients are not a factor limiting growth. It is possible that the levels of periphyton (along with other macrophytes in the river beds) are high enough to assimilate N and P such the N and P values appear “excellent”. Three sites that buck the trend and are recorded as “excellent” for periphyton have elevated P and/or N. The cause of the lack of periphyton growth can be attributed to the generous overhead cover that shades these sites.

- *Macrocoleus* is a cyanobacteria that can be toxic to mammals. The levels of *Macrocoleus* throughout the sites was “excellent” (low to none) with the exception of one site. The “management” of cyanobacteria blooms and the human health risk is done though public health advisory to avoid the rivers when they are in bloom.

- Water clarity is also not an issue at any of the sites. This might be due to sampling over summer where the rivers were at base flow.

- With a median value of “good” (for MCI) and “fair” for (TICI), the ecological health is impacted at all sites. While temperature and conductivity are stressors to consider, the results at each site reflect a combination of factors particular to each site including the level of periphyton growth, physical habitat complexity, and flow.

- Two sites were identified as having sediment issues. Further monitoring is needed to determine if and when recovery from landslide events occur.

Other lessons learned

The first site at each river tended to be the time of greatest attendance with time constraints resulting in participants sometimes only attending one site (generally the first site). The first site therefore tends to be the most critical for spending time with participants to ensure that they are comfortable using the SHMAK methodology.

A group of four to six participants seems an optimal number for training.

School participation is great, but hard work and time intensive. Further thought needs to be given on which SHMAK parameters to measure, particularly with regard to trimming back the physical assessment to a few key messages about riparian health and instream habitat condition. Further thought also needs to be given to how the teachers can utilise that data back in the classroom for further extension learning. An abbreviated version focusing on the macroinvertebrates, riparian and instream condition, water clarity, temperature and conductivity will raise awareness of the measurement and assessment and still provide meaningful information to the students.

Sampling was undertaken over summer to coincide with the generally accepted time for macroinvertebrate sampling. For North Canterbury, this leads to a risk of encountering rivers at extreme low flow or no flow. Late spring is possibly a more ideal time, however, for the farming community this conflicts with key periods in the farming calendar. Local knowledge of river flow character is needed to identify the best and more representative seasons. Fitting training and monitoring into a farming calendar that fits with river flow is likely to require 1:1 effort from the HDLG Catchment Farm Advisors for farmer training.