

Wednesday 16 November 2016.

St Johns Hall. Amberley

Meeting: Third meeting of the Hurunui Science Stakeholders Group.

Attendees:

- Environment Canterbury: Ian Whitehouse, Ned Norton (consultant technical lead), Maureen Whalen, Adrian Meredith, Mike Bennett and Lisa Jenkins.
- Zone Committee: John Faulkner, Michele Hawke, James McCone, David Bedford and Cynthia Roberts
- Ravensdown: Kelly Morris
- Balance: Rebecca Hyde
- Whitewater NZ: Doug Rankin
- Jet Boating New Zealand: Vaughan Ingram
- Amuri Irrigation (AIC): Alastair Rutherford, Andrew Barton
- Aqualinc: Peter Brown
- Cheviot Irrigators Group: Robb Macbeth
- Ngāi Tahu Forest Enterprises: Edwin Jansen
- Beef and Lamb NZ: Julia Beijeman
- Dairy NZ: Justin Kitto
- Federated Farmers: Lionel Hume
- Fish and Game NZ: Scott Pearson
- Forrest and Bird: Jen Miller
- Hurunui Water Project (HWP): Alex Adams

Background

The Hurunui Waiau Zone Committee, with Environment Canterbury, is starting the development of a long-term water management solutions package for the zone – “Healthy rivers – productive land”. This includes review of the planning framework. As part of the solutions package, a new plan framework will be notified in mid-2019.

To assist this process, the Zone Committee wants widespread buy-in on the technical information, models and assessment results, thereby improving the focus on the value judgements needed and lessening the contest over technical matters in the RMA Hearing on the plan change. To achieve this, a Science Stakeholder Group has been established. This meeting is the third meeting of that group. The agenda for the meeting was:

1. Welcome and introductions
2. Opportunity to correct significant errors with notes of the second meeting
3. Presentation from ECan staff on ground & surface water quality & land use in the Waiau River catchment.
4. Consider schedule and content of meetings in early 2017
5. Identify non-ECan water quality information relating to Hurunui, Conway and other parts of the Zone that have not yet been provided to ECan.

What was discussed?

Following the welcome and introductions, Ned Norton introduced the presentation setting out the purpose which was to:

- share what we know, stressing that the entire SSG will need to share knowledge
- identify and plan to fill knowledge gaps
- reach a level of comfort with the science message so that the group can inform the Zone Committee and the wider community.

Maureen Whalen presented on what monitoring data is telling us about groundwater quality in the Waiau catchment. Groundwater uses in the catchment:

Most of the groundwater we use is for irrigation and water supply.

There is a network of groundwater sampling wells.

- We have good spatial coverage relative to other parts of Canterbury.
- Records are variable in length.

The key messages were:

- Groundwater quality is good overall
- Vulnerable to bacteria impacts
- Some wells with elevated nitrate
- Note upward nitrate trends in the Culverden Basin
- It would be useful to compare to data from other organisations

Maureen asked if any other organisations have data relating to groundwater quality, could it please be shared.

In relation to the long-term groundwater quality monitoring wells, it was identified that a new monitoring well has been located at Emu Plains. John Faulkner also mentioned that Meridian had done some monitoring (bores drilled when scoping for Isolated Hill project) and asked if that is available – Whit undertook to follow that up.

In relation to *E. Coli* Andrew Barton indicated that the two Amuri Plains bores were likely affected by point source discharges (a piggery near the 18m bore and septic tanks near the 5m bore) and Robb Macbeth indicated that there is likely a point source discharge near the 22m bore located between Cheviot and Parnassus. John Faulkner mentioned that Fonterra monitor water supplies at individual dairy farms and may be able to assist with additional data.

In relation to nitrate-nitrogen trends, Maureen provided trend analysis of wells at Amuri Plains and Parnassus and asked the SSG if anyone has data from nearby wells that could be used to provide a comparison. Peter Brown indicated that he has knowledge/data on N trends near Rotherham.

In relation to the Amuri Plains well, Andrew Barton indicated that the trends align with the idea that as water use becomes more efficient, contaminant concentrations are less diluted as groundwater is not recharged to the same extent. The trends show this with nitrate-

nitrogen increasing at Amuri Plains from 2007 where border-dyke irrigation was upgraded at the point source (pig farm).

Whit spoke to a slide provided by CPH that set out findings from protozoa testing in community drinking water supplies. Tests for protozoa are done regularly at Amuri and Cheviot and no protozoa have been detected during years sampled. This is notable because protozoa are very difficult to remove with treatment.

Most wells monitored meet the drinking water standards, with some exceptions from nitrate and *E. Coli*. Overall this is assessed as not too bad from a water quality perspective.

Fonterra do a water quality sample on all of their dairy farms water supplies (annually) – this may be a useful compliment to information we already have. Maureen reiterated the key messages. Jen Miller questioned the assessment that the groundwater quality is good overall, especially given lack of data, and exceedances or upward trends. Maureen accepted this and acknowledged that 'good' was relative to other parts of the region.

Adrian Meredith presented information in surface water quality in the Waiau river catchment, covering:

- Life supporting capacity
 - Temperature, DO, sediments
- Overall Ecosystem Health
- Periphyton
 - Biomass, cover, green algae, cyanobacteria
- Drivers of Periphyton
 - Nutrients and flow
- Swimmability

With regard to aquatic ecosystem health, the key messages were:

- All sites, except the Leader at SH1 meet the minimum plan objective
- Leader River impacted by low flow, sedimentation/embeddedness, nuisance periphyton growth and warm temps
- Analysis not yet done for streams like Lowry Peaks and Rotherham Stream.

Life supporting capacity

Water temperature must be <20C and dissolved oxygen >90% to support aquatic species. We have really only done spot monitoring around the middle of the day. These parameters are significantly affected by flows – which is probably why many of the hill fed rivers can have more issues.

Sediment is a parameter of growing concern. Sediment smothers benthic sediments – more commonly a problem in streams and drains.

Aquatic Ecosystem Health

Monitoring of macroinvertebrates with a score against species present to indicate stream health. QMCI should be above 6 for a water body to be determined to be in good health.

Queried – why is the Leader low relative to the others? Adrian – probably reflects a combination of low flows, increased algal growth or sediment, increased temperatures and loss of habitat/lower oxygen which lead to poorer habitat quality. This sampling is normally carried out in November or December before critical heat periods kick in.

Leader is different – it doesn't really have high rainfall areas in its catchment and is very prone to low flows. Jen Miller asked Adrian if the leader is naturally a low flowing river. Adrian replied that that is a question for the wider SSG to determine, and Robb Macbeth said he believes it is.

With regard to periphyton, the table shown indicated a range of results, from good to poor. Adrian was asked if he considered the indicators are good or bad overall. Adrian said they are sitting just below national bottom lines and would probably receive a "c" grade.

We distinguish between filamentous algae and mat algae, which have different issues. Different rivers often have quite different susceptibility to growing filamentous green algae.

Mason River is only just above national bottom line for periphyton and exceeds 2 out of 5 year, but Waiau doesn't seem to be susceptible.

Cyanobacteria

Cyanobacteria is toxic and potentially odorous. It appears to have different drivers to filamentous green algae – it likes high nitrogen and stable beds from which it can extract phosphorus. Is often more common in swifter waters and can be quite patchy through the river, so exactly where we sample can be significant.

Edwin mentioned that research is showing that low nitrate concentrations are more likely to result in cyanobacteria blooms, and that it does well in a low phosphorus environment. Peter Brown asked why cyanobacteria mat covers are low at the Waiau at Leslie Hills road bridge – is it because nitrate concentrations are low at this part of the river? Andrew Barton indicated that the river has changed quite a bit at Leslie Hills in the last few years. Lionel Hume mentioned that cyanobacteria can fix nitrogen. Ned asked that the conversation be parked for the time being as we have a specific meeting set aside (Wednesday 15 February) to look solely at cyanobacteria. Local observations suggest that side braids of Waiau River, and immediately below streams and drains have a denser cover of mats.

Key messages for nutrients and periphyton in large tributaries were:

- Nitrogen concentrations adequate
- Phosphorus concentrations higher
- Tributaries susceptible to nuisance growths as flows and nutrients more stable
- Tributaries susceptible to growths of both types of algae

Key messages for nutrients and periphyton in the Waiau river were:

- Periphyton risk increasing downstream in Waiau with increase in nitrogen
- Phosphorus not high but adequate for periphyton growth
- Waiau River more susceptible to black mats
- Sediment bound nutrients may enhance black mat growth

- Drain and small streams may be important.

Key messages for nutrients and periphyton in drains and streams were:

- Drains and small streams not currently analysed
 - Hermitage drain, Home Stream, Lowry Peaks Drain and Rotherham Stream
- Nitrogen, phosphorus, and sediment loads may be important for growths in side braids and downstream in the Waiau River
- This component will need more scrutiny of AIC and ECan data

Adrian indicated he would like to talk to AIC to see what data they have on Hermitage drain, Home Stream, Lowry Peaks Drain and Rotherham Stream. John Faulkner suggested that Adrian should also talk to the salmon farm owners as they will have some data.

Key messages for nutrient toxicity were:

- Nitrate and Ammonia toxicity for hill and alpine fed rivers does not exceed the A band for NOF
- Indicates no toxic effects from nitrate and ammonia
- Limited spring-fed stream data indicates potential species loss or growth effects
- Does not take into consideration the lower nutrient thresholds for nuisance periphyton

Andrew Barton asked if all creeks have to achieve national bottom lines, or can this be applied at the FMU level? It was indicated that this would need to be something that was worked through.

Key messages with regards to wadeable and swimmable water quality were:

- All sites meet Wadeable bottom lines and categorised by NOF band A
- Leader River and Waiau River at SH1 do not meet minimum acceptable state for Swimmability
- Suitability for recreation monitoring only carried out for Waiau River at Waiau = insufficient data required to grade site
 - Preliminary data indicates this site meets swimmability requirements

Robb Macbeth queried the swimmability data based on his observations of the Waiau at SH1 vs the Leader. Waiau River at Waiau is based on weekly samples over the 15 week summer bathing season.

Adrian finished by indicating other monitoring data that is needed or is underway:

- Plan Monitoring sites – 9 additional tributary sites being monitored for tributary nutrient load determination (plan requirement)
- Gap Filling – monitoring commencing of drain and small streams entering the Waiau River
- Other data - Source and coordinate with monitoring carried out by other agencies (AIC), particularly on drain and small streams entering the Waiau River

Ned presented a few slides covering current land use and estimates of both “source” and “in-river” nutrient loads.

The key message was that the SSG need to recognise the difference between source loads and in-river loads and help us to verify those.

Regarding the next steps to improve information we currently have regarding loads Ned identified the following steps:

- Current land use patterns – local ground-truthing & adjustment?
- Local help with assumptions - current versus past & future practices e.g. where are we at compared to 'good management practice' (MGM)?

John Faulkner indicated that this would also require information from dryland farmers.

A regional land use map has been produced, but there has not been input from locals at the local level yet.

Patterns of land use – information from various sources (agri-base, landcover database, irrigation layer, consents database), with logic-based rules in terms of how much weight to give them and establish base farm enterprises.

N-loss (i.e. Source Load) has been estimated at a regional scale a GIS tool using various layers.

The assumption is that these farms are at MGM.

'In river' loads based on monthly samples taken at each of these three sites. Loads are highly variable from year to year, particularly in response to flow.

Differences between source loads and in river loads

- Method (modelled vs measured)
- Attenuation (uptake of nutrient, de-nitrification, uptake by plants in or by side of river)
- Time lags (between source and in-river)
- Assumptions (current vs past and future practices – i.e. where are we compared to GMP estimates)

Additional questions can be sent through to Ned and the tech team will work with the SSG to answer them.

Whit thanked Edwin Jansen for providing reports.

The meeting concluded with participants reminded of the next meeting on Wednesday 30 November; 4 – 6pm at St John's Hall, Amberley.