Combined Kaituna and Pongakawa-Waitahanui Freshwater Futures Community Group Workshop 9 Notes: Surface water quality

The Orchard, 20 MacLoughlin Drive, Te Puke

Wednesday, 26 March 2019 commencing at 9.00am

Members present:	*Kaituna Community Group* - Barry Roderick (Chair), Brian Thomas, Hendrik Metz, Hohepa Maxwell, Ian Schultz, Jon Fields, Julian Fitter (both community groups), Manu Wihapi, Maria Horne, Mary Dillon, Morgyn Bramley, Murray Linton, Nick Webb, Richard Fowler, Warren Webber *Pongakawa-Waitahanui Community Group* - Wilma Foster (Chair), Andre Hickson, Darryl Jensen, Dennis Walker, Grant Rowe, John Cameron, John Garwood, John Meikle, Kepa Morgan, Matthew Leighton, Mike Maassen, and Councillor Jane Nees
Apologies:	*Kaituna CG* - Claudia Hellberg, Cor Verwey, Jeff Fletcher, Jessica Dean, John Fenwick, Peter Ellery, Vivienne Robinson, Councillor Paula Thompson *Pongakawa-Waitahanui CG* - Bernie Hermann, Bev Nairn, Colin McCarthy, Geoff Rice, Kevin Marsh, Melv Anderson, Stavros Michael, Paul Van der Berg
Others present: **Observer:**	Kirti Chandarana & John Rapana (accompanied Kepa Morgan for Ngāti Makino) Rani Dhaliwal (University of Waikato PhD student)
BOPRC Staff present:	Pim de Monchy (Relationship Manager), Nicki Green (Principal Advisor, Policy & Planning), Rochelle Carter (Principal Advisor, Science), Stephanie Macdonald (Facilitator), Kerry Gosling (Facilitator), James Low (Team Leader Water Policy), Jo Watts (Senior Planner – Water Policy), Jose Crawshaw (Environmental Scientist), Alastair Suren (Environmental Scientist) (part of the day)

Related documents previously circulated:

1. Workshop paper: Surface Water Quality – potential policy options

This paper and the workshop presentation are available online here – Kaituna and Pongakawa-Waitahanui. Key workshop content is outlined below and in the linked attachments.

- Essential Freshwater central government work programme
- Region-wide water quantity (plan change 9) – summary of appeal topics (see pages 187 - 203)
- Estimated contaminant load reduction report – (see pages 55 – 104)
- Ecological and water quality conditions of drains and land drainage canals in the Rangitāiki and Kaituna Plains - committee report (see pages 105 – 113) - Full report

1. Welcome

Manu Wihapi opened workshop 9 with a karakia. Wilma welcomed everyone and introduced Kepa Morgan, Kirti Chandarana and John Rapana from Ngāti Mākino Iwi Authority.

Barry also welcomed the combined community group back noting that the information provided in the briefing note contains some pretty big numbers which highlight the scale of reduction in nutrients needed to improve the health of the estuaries. He acknowledged there will be some people in the room feeling concerned. Barry asked that all members treat each other with respect so we can work through this together remembering this is just the start of the conversation and there may be some pretty tough discussions and debate along the way.

Steph noted Councillor Nees was present, as well James Low, Team Leader Water Policy who is responsible for delivering the freshwater policy plan changes. Rob Donald, Science Manager will also be coming shortly.

1.1 Purpose

The group was reminded that the purpose of the Freshwater Community Groups is to help Council implement the National Policy Statement for Freshwater Management for the Kaituna, Pongakawa & Waitahanui water management area (KPW WMA), in particular to:

- confirm values, express preferred objectives
- provide input and feedback on limits and methods for freshwater quality and quantity
- provide input to and feedback on solutions for managing activities to meet those limits
- advise Council in their decision-making for plan change 12

1.2 Agenda

Nicki introduced the agenda and key outputs sought from the day which included:

- A brief national and regional update relevant to this work
- Information on estimated contaminant load reductions required in the catchments feeding into Maketū and Waihi estuaries
- Information on lowland water quality and ecology issues
- Discuss the extent of the change we need to achieve, and potential ways to achieve it (early policy options for consideration)
- Discuss water quality issues in Waitahanui and potential policy options

The briefing note contained a number of questions which the workshop activities were based around. Links to the detailed reports were provided in the briefing note and above if you are keen on the detail. Nicki acknowledged that these are two pieces of science members have been waiting for some time for. We understand they raise challenging questions as Barry touched on. Potential policy options haven't been discussed with Councillors yet. This is just the beginning of discussion about policy options and solutions.

1.3 Outcome sought

Outcomes sought for workshop 9 are:

- Community Group members understand findings, limitations, and implications of recent science reports about estuaries and lowland water bodies;
- Community Groups have considered and provided initial feedback on potential policy options for surface water quality management;
- Staff gain an understanding of the Community Group members' perspectives and feedback which will be considered when preparing policy options and public discussion materials.

Staff don't expect everyone to be scientists but do want to provide members the opportunity to ask questions of the scientist in order to understand the information. Members are part of the community and will have the same or similar concerns and questions as the wider community. Members were asked to take the opportunity ask questions.

2. National and regional updates

- Essential Freshwater work programme
- Regional update
- Progress and next steps

2.1 Essential freshwater

The government has signalled there are potentially significant changes in freshwater policy coming up which are outlined in their 'Essential Freshwater' document. The government is also working on the Three Waters (drinking water, wastewater and storm water) review. Both will have a bearing on the work we are doing here.

The government has indicated policy in the making will come out in the form of public discussion documents for feedback in July/August 2019. Minister Parker has been clear that he wants to: stop degradation of water quality and loss of nutrients, address past damage and look at allocation issues. It is fair to say the governments work programme is ambitious and there is still uncertainty about the detail of the policy options to be put forward. Staff are keeping a close eye on discussion document material.

2.2 Regional update

Nicki provided a brief update on Plan Change 9 (Region-wide water quantity) (PC9):

- PC9 is a 'hold the line' interim step for managing water quantity until catchment specific water quantity and quality limits are set for the Kaituna-Pongakawa-Waitahanui water management areas as part of the Plan Change 12 process.

- PC9 decisions have been made by Council. Fourteen appeals have been lodged with the Environment Court and twenty six parties have joined the appeals, which are all on Council's website.

- Council staff are starting to meet appellants to clarify issues and resolve or narrow down the scope of appeals. James can answer questions about PC9.

2.3 **Progress and next steps**

- Timeline / calendar
- Modelling update

We are in the solution building part of the process for KPW WMA and will be drafting policy later this year. Timeframes depend on a number of things including: Council elections in October, the extent and timing of national direction and legislation changes in the freshwater and three waters policy space, modelling delays, and progress resolving PC9 appeals.

Next workshop 10 will be about surface water quality and will look at the good practice modelling results, explore sources and causes and continue working on potential policy options. Potential dates in May / June.

Sharing with the wider community We are currently working on short key messages about estuary and lowland issues and early policy options for wider community discussions which will be ready soon. Community Group members will be invited to share this with their peers, neighbours, friends and family.

Engagement with tangata whenua – Staff are progressing engagement with iwi which is on-going. We have met with some iwi once or twice and others several times but are still to hold first meetings with others. We are working on summarising what we have heard to date in a discussion document about tangata whenua values and interest which will be checked with iwi we have spoken to before distributing to others including community groups.

Modelling update – There aren't many companies throughout NZ that can do this type of modelling work and they are under heavy demand which is resulting in delays. We are working with the modellers to finalise the technical report which outlines assumptions and limitations to help answer some of the questions you and others have been asking about the modelling. Generation of sediment from forestry was one of your questions which we have been working on. Indications are that we are unlikely to need to make changes to the biophysical model but we will do some more sensitivity testing. Importantly, we know some members are waiting for the detailed modelling report. This has not yet been received and is well over due. It will be circulated before the next workshop.

We have been working with industry about the Good Management Practice (GMP) scenarios as we don't have good information about what good management practices are already in place within these catchments which means we have had to make assumptions. We are seeking verification by industry groups that our assumption are appropriate before running the model to determine how far GMP would get us towards the improvements needed.

We are working on provided results in terms of contaminant loads by Freshwater Management Unit (FMU) which we intend bring to next workshop.

Questions:
Kepa Morgan introduced himself, John & Kirti. Nicki acknowledged BOPRC staff have held a first meeting with Ngāti Mākino about a month ago. Kepa highlighted that models are all flawed. Some provide insight some of the time. He noted he has asked questions about what data has been put into the model. In his view there are huge holes in the data set.

Rochelle confirmed that all data Council holds for the Waitahanui catchment has been provided to the modellers, which includes both continuous flow and all discrete water quality samples back to 1990. For the Waitahanui catchment, Council has one monitoring site which collects continuous data about water quality and flow monitored monthly. Two years ago Council added two sites further up the catchment and gathered data for one year which provided telemetered rainfall and flow data not continuous. Staff offered to keep the conversation going with Ngāti Mākino about data in the Waitahanui after/outside of the community group workshop.

Clarification was sought by a member about the statement made that 'big changes are unlikely'. This was in reference to changes in the way the biophysical model has been designed, not in relation to changes needed in the catchments to reduce contaminant load.

Steph introduced Rob Donald, Science Manager and Alastair Suren, Environmental Scientist who arrived 9.30am.

3. Maketū and Waihī Estuaries

Staff presented estimated contaminant load reductions needed to achieve moderate ecological health and started the discussion about what the information might mean for potential policy options.

Introductory points:

- While our core focus is about setting freshwater quality and quantity limits, we have to consider connections with coastal water and recognise that estuaries and lakes are much more sensitive to water quality changes than rivers themselves.
- Scientists were asked to estimate what sort of contaminant load reductions are needed for moderate ecological health and shellfish gathering in our estuaries which they have done in the report you received in the briefing paper.
- Maketū and Waihī estuaries are identified in the Regional Policy Statement (RPS) and Regional Coastal Environment Plan (RCEP) as having high biodiversity value, cultural and landscape values with objectives and policies in the RCEP recognising them. A member noted both estuaries are also designated as high biodiversity areas which are important for birds being one of only seven areas in the North Island.
- The Kaituna River Document, while primarily about the Kaituna River and its tributaries, does include some statements relevant to the Maketū estuary. In previous workshops the Community Groups have made statements about outcomes you are seeking for the estuaries.

Questions:

- Does the Community Group have a position on legacy inputs into the river noting the Rotorua Lakes Council wastewater application to the lake? There are specific risks with emerging contaminants from wastewater systems including chemo medication, metabolic steroids, drugs for example 'p' which don't get stripped through the wastewater treatment process which are considered legacy issues.

  A: No. Coastal scientists estimated contaminant loads for estuary health. The biophysical model and monitoring are used to estimate loads coming from sub-catchments (presented at the last meeting).The key thing this Community Group has been focussed on to date is nutrients and contaminants coming

from diffuse and point sources across the whole of catchment (nitrogen, phosphorus, E. coli and sediment) that have impacts on the estuaries. We haven't talked about point source consenting matters such as the Rotorua wastewater treatment plant application or emerging contaminants of concern. Josie can advise about the emerging contaminants programme currently underway.

3.1 Estimated contaminant load reduction

Josie, Environmental Scientist presented estimated contaminant load reduction slides. Ecological health in Maketū and Waihī estuaries is poor. Grading for macroalgae coverage, seagrass extent and soft mud aren't good. There are very small patches of seagrass left and a large increase in macroalgae in Waihī in particular. In addition to macroalgae growth, there has been an increase in cynobacteria in Waihī which resulted in a ban for recreation (swimming) and shellfish gathering this year.

Water quality for contact recreation is generally good to ok except for the Waihī estuary this year. At times the estuaries are safe to gather mahinga kai and others not. Maketū 27% of the time not safe, Waihī 59% of the time not safe based on *E. coli* levels. The swimming ban has been lifted now but is still in place for gathering shellfish – this is due to cyanobacteria. Variability in the population of cockles at particular sites is largely due to moving channels. We have been monitoring the size and location of cockles in the estuaries since 1990.

Key message: these reduction numbers are large and substantial change will be needed. Yes, there is uncertainty in the figures and yes, modelling will never be perfect or exactly right but the numbers are really big. We must still start on the path to improvement - the questions are how much should we do now and how long should we take?

Sediment

Our scientists haven't estimated the load reduction needed for sediment at this stage. There is currently no national framework for sediment. Scientists throughout the country are working on what the national sediment framework should be. The Regional Coastal Environment Plan has set a type of limit at "2014 sedimentation rate". We have some sediment plates in the estuaries gathering data, however, they need to be in place for 2 - 5yrs to be able to show us trends.

Questions:

- Is soft mud good or bad? A: Too much soft mud is bad and poor for ecological health.
- There is only a small amount of seagrass left. What did we do between 1940 – 1960 in Maketū where the graph shows an increase in the extent of seagrass? A: In the 1940's the river broke out and swept seagrass away resulting in reduced areas of seagrass, which recovered over time, peaking in 1950. Another river event removed seagrass in 1960 which repaired again but not to the 1950 extent.
- Is the major drop in seagrass extent because of a reduction in the size of the estuary? A: There has been no reduction in the area of the estuaries; however, there has been an increase in sediment and nutrients.
- What is causing the sediment? A: It is likely to be a combination of sources from land in the catchment, and also decomposing macroalgae in the estuaries.
- Is an increase in macroalgae good or bad? A: Not all macroalgae are bad, however, those mapped & graphed are those known to be a nuisance. The

type of macroalgae are not introduced species but mostly native and not a biosecurity risk.

- How do these estuaries compare with Tauranga Harbour? A: Tauranga harbour is a different size and flow than these estuaries so aren't easily comparable. The size of the harbour and the tidal flushing means it doesn't have the same issues with specific macroalgae. REQUEST 1.: Provide a comparison of other regions / catchments with estuaries.
- Is the bad quality at Waihī caused by septic tanks? A: The human proportion of *E.coli.* is less than 2% so only a small part of the picture. ACTION 1.: Staff to provide copy of report about proportion of sources of *E.coli.*

Maketū estuary changes underway

- When the re-diversion happens what is the impact on nutrient load for the estuary? A: There is a lot of monitoring in place to understand the effect of the re-diversion. In the shorter term we expect to see an increase in nutrient contamination and *E.coli.* , however, the benefits from increased flushing will outweigh the short term issues for the estuary.
- How does to the NZ Estuarine Tropic Index (NZETI) framework used compare with international best practice? A: The NZETI is based on international models which have been modified to reflect NZ conditions.

Nutrient loading

- We know the industry is working on better kiwifruit nutrient information. Will we incorporate that when we get it? A: Zespri are on track to provide results in June/ July which will be analysed to see how it compares with the modelling information.
- Will the difference between gold and green kiwifruit be factored in? A: The model uses one set of assumptions for all kiwifruit. Sensitivity analysis will help us estimate how the results would change if we changed those assumptions.
- The purpose of modelling the "natural state" is not to suggest we need to go back to pre-human times, but to estimate natural sources and causes of the nutrients so we can focus only on those caused by our (human) land use and discharges.
- Are the differences between the estimated figures for Maketū and Waihī because the existing groundwater has been assumed to be natural? - because they aren't. A: No. The groundwater catchment load is a small amount entering the estuaries – <5%. The two estuaries are completely different systems with different characteristics. We will be looking into the reasons for the differences when we look at sources and causes.
- What is the leading cause of N in the catchment? Why are we not talking about the big causes? There seems to be a reluctance to talk about the leading cause. A: We are concentrating today on reductions needed for estuary health. We do know land uses have different nutrient losses but the modelling takes into account not only the land use but, slope, soil type, geology etc. We still have questions of the modellers before we bring the material to you. The next workshop will be about modelling results, sources and potential causes by sub-catchment and land use.
- Why is the estimated natural state N load almost twice as high in Maketū estuary as the Waihī estuary? Kaituna/ Maketu catchment is 3x the size of the Waihī estuary catchment, while Maketū estuary itself is slightly smaller than Waihī estuary. Also there is a higher proportion of steep land in the Kaituna catchment which generates higher loss rates of N.

3.2 Group check in

- Have we explained this information/science well enough?
  pretty well
- In principle, do you accept the need to achieve the reductions estimated? Yes
- Any concerns and questions?

It would be useful to know the quantum of the issue compared to other catchments. Is there a relative ratio for example size of estuary vs land area.

REQUEST 1.: Provide a comparison with other regions &/or catchments where the receiving environment is an estuary of % load reductions and timeframes to reduce to acceptable levels as a frame of reference. Waikato region and Tauranga Harbour mentioned as examples.

3.3 Potential 'Hold the Line' policy options

Limits for estuaries have been estimated by scientists, in order to get to these limits there are options to work through and consider:

- Timeframes
- Targets (steps along the way)
- How we reach them
- Review points
- Costs and distribution of these
- Social, cultural and economic implications

There is a policy in the Regional Policy Statement that outlines criteria for identifying catchments at risk – on this basis, we advise that the two estuaries are catchments at risk. If this is the case, the RPS directs us to require consents for land use change to more intensive and to allocate nutrients to achieve reductions.

The first step is to "hold the line" - How do we stop continued degradation in water quality or 'hold the line' before we get the full policy in place? Government is also looking at whether there are changes they can make to legislation to be able to do this faster.

'Hold the line' options include:

1. Control change to more intensive land use - resource consent and mitigation requirements
2. Farm environment plan - good practice and standards
3. Benchmarking - estimating losses from properties now, so that we can more accurately address where improvements can be made, and can report those improvements.
4. Set land use performance range? Cap at benchmarked amount?

3.3.1 Consideration of 'hold the line' options

Activity outline

- *Four tables set up with each table titled with one of the four 'Hold the line' options.*
- *In two groups of Kaituna members and two groups of Pongakawa/Waitahanui members starting at one table and rotate around all four in your group. Using blue 'post-its' for Kaituna and green 'post its' for Pongakawa-Waitahanui*

individuals note pros, cons and big questions for each option as well as key messages.

- *At next rotation if you simply agree with what has been said tick the post-it.*
- *After last rotation one person to feedback general overview of feedback, maybe the thing that seemed to resonate with most.*

3.3.2 'Hold the line' report back

- What are the pros, cons and alternatives of each of the four 'Hold the line' options?
- What are your big questions about how they would work?
- What take away messages do you want staff to consider from the group?

1. Control change to more intensive land use resource consent and mitigation requirement

Pros: Increase in intensity is likely to be the trigger to increases in nutrients Provide the opportunity to show or demonstrate how land use will improve the ecosystem or the catchment.

Cons: Assumption that intensification is negative when the solution could be outcomes focussed
Impact on land value
Negatively impacts on those not already intensive

Big ?'s: Definitions of intensive land use – different in different sectors - forestry to drystock, or could be increase in losses
Who decides?

2. Farm environment plan good practice and standards

Pros: Change will be accepted if we all share the pain. Industry good practice is here and expected.
Farm environment plans are a key platform which can be integrated into the broader catchment plan.
Environment plans need to include continuous improvement written down.
Need recognised standard so all on same page and can be measured.
Can be audited and feedback can be provided from other like industries.
Recognised standard fieldwork.

Cons: Good practice and standards doesn't sound like we will be all sharing in the pain - the name should be changed to be Farm / Orchard Environmental Plan.

Big ?s: How do we build in feedback from other farmers especially what impacts on their farm.

3. Benchmarking estimating losses from the land

Pros: We must benchmark so we have good information as we can't manage what we can't measure.

Cons: Lack of suitable tools to handle all land use types not only agriculture but horticulture, urban, industrial etc and losses we need to measure such as *E.coli*.? Overseer only measures N.
Risk around gaming the system

Options: Great if industry led but does need to be audited

Big ?'s: Who decides the benchmark – industry or council and how would the benchmark accommodate all variations.

4. Set land use performance range? Cap at benchmarked amount?

Pros: Prefer a land use performance range rather than a cap at current benchmark. Suggest choosing a range first.

Cons: If you have a high benchmark you might not be doing enough improvement.

Big?s: Where does residential development fit? If development relies on non-reticulated effluent systems you would expect that to be factored in. Urban – point source water quality & quantity – three waters review.

Who chooses the range? For example the range for kiwifruit losses is x to y.

All 'post it' notes by group for each of the four 'hold the line' options are collated in Appendix 1.

Key discussion points:

- Nicki drew a load reduction vs time diagram on the white board to illustrate the discussion ahead of us about what is a reasonable timeframe to get to moderate estuary health and what the targets/steps along the way might be? What trajectory should we be taking? We will need to make choices about this, e.g., whether we do a lot at the start or a little, or go in a straight line. We will need to review progress at least over the lifespan of the regional plan which is 10 years. Regional plans can set objectives and targets out 30 – 40 years or more (inter-generational) but do need to be reviewed every 10 years.
- If everyone in the catchment was undertaking good management practice how far would that get us? The good practice scenarios we worked on in previous workshops are being modelled to help answer this, and will be presented at the next workshop.

3.4 Potential policy options to reduce contaminant loads

Key discussion points:

Nicki noted that staff are also starting think about options for 'reducing contaminant load' beyond hold the line options these include things like:

1. Water treatment technologies
2. Retirement of land
3. Wetlands
4. Allocation limits
5. Change of land use

These were not discussed further at this workshop.

4. Lowland water quality and ecology

- Difference between rivers and drains
- Water quality and ecology science
- Issues
- Policy options

4.1. Rivers and drains

Key discussion points:

- The difference between rivers (natural and modified natural (including land drainage canals)) and drains (artificial) is important as the NPS-FM and regional plan does not expect us to manage artificial water bodies/drains for

ecosystem health or so that we can swim or gather mahinga kai from them. They are classified and mapped in the RNRP.

- Important distinction:
  - we must set objectives for ecosystem health, contact recreation, and other values in natural and modified natural watercourses.
  - we must control the water quality of discharges from land to water (e.g., in to drains and rivers) and from drains and other point sources (e.g. pipes) in to rivers so that our objectives in the rivers can be met.
- Could the classifications be changed as part of the plan change? A: Technically yes, however, it would need good rationale for change and may need a change to the definition which would affect the whole region.
- If there is a stopbank on a river is it a modified water course? A: Yes. For example the Kaituna River is a natural watercourse for most of its length until it gets to the lowlands where it has been heavily modified – it is still a modified natural watercourse, not an artificial one.
- Who modified the rivers and created the drains? A: The large works to straighten and stopbank the rivers were enabled by the Land Drainage Acts. Land drainage canals are modified watercourses.
- Can you have a drain with a higher contaminant discharging into a river which needs a lower water quality under the national policy statement? A: Potentially yes, if 'after reasonable mixing' the discharge could meet the water quality classification of the river (current operative regional plan) or the new objectives (to be drafted under PC12). The point was made by a group member that dilution is the not the solution and the planning framework in the RNRP is therefore flawed for obvious science and cultural reasons.

4.2. Water quality and ecology science

Alastair Suren presented the slides about the water quality and ecology work he has undertaken in the lowland drains.

The Kaituna plains are a large flood area and one of the largest flat areas in BOP which naturally receive a lot of water. About 90% of the water bodies (rivers and wetlands) in the Kaituna plains have been modified. There were once huge wetlands which have been transformed into farmland. The Land Drainage Act allowed the draining of wetlands / swamps to enable people to earn a living from farming. If we only manage drains for drainage values we will have an inherent conflict with other values like ecosystem health and habitat.

Twenty sites were selected to assess habitat conditions in drains and land drainage canals using the Rapid Habitat Assessment (RHA) - 6 in the Kaituna and 14 in the Rangitāiki plains. The rationale for the survey work was to improve knowledge about these waterways, highlight potential 'hotspots' of poor water quality, improve understanding of effects on receiving environments and identify potential for improvements in drain management.

Key discussion points:

- Why 6 in the Kaituna and 14 in the Rangitāiki? A: We could have done 7 in Kaituna and 13 Rangitāiki but this is what we did. We worked within the budget and resourcing we had and randomly selected sites based on Fish & Game bird study sites.
- Lots of the drains have low / poor habitat. Some other sites have poor habitat as well so not just the drains.

- Poor invertebrate and fish habitat – little shade, straight canals, low flow variability, abundant plant growth, very commonly full of thick mud.
- Strong relationships between habitat and ecological health slide. Q: The graphs show a correlation - what is the standard deviation in the analysis? A: The standard deviations was 0.2 which scientists get excited about in ecological results
- How many of the sites were salt vs freshwater? A: All freshwater.
- Warm temperatures – only looked at spot temperatures which were very high in some places. One member noted the temperatures are too high to sustain even eels. At a maximum temperature of 26 degrees all species will have gone.
- Measures are in drain not from the drain into the waterway? A: Yes, that's right I haven't measured discharge from the drain into the river yet. We are working on point source discharges from drains now. ACTION 2.: Report on website – small pilot study mentioned in the report.
- We didn't measure *E coli*. as we don't swim in drains? A: *E.coli.* is not in the report but this can be done if needed. REQUEST 2.: Estimate / measure how much *E.coli.* is being contributed from the drains.
- What assumptions have been made about the water quality in the drains to calculate the catchment load? I've taken the concentration x flow using multiple flow. Day of sampling x the modelled medium flow. Drains have a very close link with the surrounding landscape.
- MCI: some are below 80. Government requires response if lower than 80 so ringing some alarm bells.
- Fish surveys not done due to Cyclone Debbie and Cook but have data sourced from NZFFD - 18 fish species recorded (shortfin eels, inanga, and mosquito fish) found at > 50% of sites. Species richness and Fish IBI: Lowest in drains.
- Pump stations may have substantial detrimental effects on migrating eels. We know these drains contain high #'s of short finned eel. BOPRC are looking to modifying the Diagonal Rd pump station to minimise eel mortality.
- Is that a drain or modified water course? A: It's a drain as defined. The point was made that fish don't know which have been defined as drains vs modified waterways.
- Did you do studies on seasonality to see if any of these characteristics improve in other seasons? A: Correlations are mentioned in the report - monthly seasonal pattern. Rainfall is connected with high ammonia. On the one hand the drains are doing what they are supposed to do to drain water but do take contaminants with them.
- What do you think the reason is for the very few small and very few big but more intermediate sized eels? A: Eels may migrate upstream in floods only but can't get back down. See hypotheses in the report.
- The observation was made that there used to be whitebait running up the Diagonal drain. Land has been drained more and is now a total pumping system rather than having gates open. A: The plains are sinking so the pumps need to be kept going to achieve the level which has been revised two times since 1980.
- Do we have a comparison between average DO levels and contaminant levels?
- Drainage operations don't have any budget to include monitoring of drainage sites. REQUEST 3.: Include monitoring of drainage scheme in drainage operations budgets.

In summary:

- Poor habitat at all sites, reflecting heavily modified channels, lack of bank vegetation and shade
- Poor water quality - high nutrients (ammonia in particular), high turbidity, low DO levels
- Low macroinvertebrate (MCI) scores - poor ecological conditions linked to high ammonia

4.3. Lowland issues and policy options

Key points from discussion:

- There is work underway to address hot spots. We will be changing the way we administer grants to landowners so that the focus is on improving hotspots with greatest need for intervention.
- Installing some fish friendly pumps. We have been working together with Waikato Regional Council (WRC) to improve friendliness of pump stations and have installed some fish friendly flap gates to hold the gates open for an hour or so on the incoming tide. It will take a while as there is a significant number of pump stations and cost of retrofitting is not cheap. WRC is trialling different speeds of pump stations to work out ways for the pumps to do their jobs but reduce eel mortality.
- We are trialling some drain management mitigations including good practise techniques and treatment to see what effect they may have and at what costs
- What are the common features of hotspots? A: We are looking at whether there is a big point source discharge in the catchment or not? Intensity of land use? Sometimes we just don't know. We have detected massive differences in what seem to be similar waterways.
- The key point is we need to be looking for comprehensive solutions as we work through options for plan change 12. We have some challenges ahead.
- Is there a timeframe to achieve this? A: No there isn't, we need to explore the appropriate timeframe to achieve what we need to. A member made the comment that not having a timeframe is not an easy way out, we need to act immediately.
- At the moment under the RMA, land use is permitted unless there is a rule controlling it. Drain discharges are the other way around. Discharges need resource consents unless it is permitted by a rule in a regional plan. The RNRP includes a permitted activity rule to allow land drainage discharges subject to certain criteria being met.

Actions:

- Do we have tonnages of what is coming out of the drains? Can we work this out? A: We don't have that at this stage. The modelling accounts for losses from the catchments not per drain. ACTION 3.: With concentration and modelled flow we can estimate loads coming from drains and will be certainly looking into that.

4.4. Lowland drain management activity

Activity outline

- *In your 4 groups – you will have approx. 25 mins*
- *Response sheet for each individual*
- *Spend 5 minutes considering the questions on your own and note your own responses*
- *As a group discuss your thoughts and make further suggestions - a staff member will note the group report back*

Activity questions

1. Do you agree that we need to focus on lowland drain and land management, and pump station discharge management?
2. What options are there to improve the water quality and ecology of lowland water bodies, and the water quality of drain discharges? What are the challenges, pros and cons?
3. What further information do we need to inform this?

Group report back about lowland drain management options, pros, cons and challenges are set out in Appendix 2 as well as individual members responses collated by groups

24 of the 30 members present agreed we need to focus on lowland drain management and pump station discharge while 1 disagreed and 5 did not indicated one way or the other.

5. Waitahanui catchment

Nicki acknowledged that the Waitahanui catchment is in the heart of Ngāti Mākino's rohe.

5.1 Recap values, water quality and ecology

Water quality issues in Waitahanui catchment differ from the rest of the water management area particularly because it doesn't have a very sensitive estuary.

Monitoring shows:

- a rising nitrate trend that needs to be addressed, but currently no nitrate toxicity problem, and no algal bloom problem is indicated.
- Sediment loads are substantially higher than estimated natural loads.
- *E.coli* monitoring indicates it is in the government's C band in the lower reaches which is still safe for swimming, but worse than the B or A bands the Community Group has indicated would be an appropriate objective.
- Invertebrate monitoring at one site indicates invertebrate health is currently good.

Key points from discussion:

- Kepa shared with the group that Ngāti Mākino manage the upper 40% of this catchment which has 50km of waterways within it. They have an agreement with forestry leasees to set aside and plant in native vegetation an additional 20m buffer on both sides of waterways which result in more than 20ha of planting to improve water quality. Ngati Mākino are interested to know where their land is in relation to the monitoring / modelling points.

- He also noted the diagram of the Waitahanui catchment (on slide 80) is a different shape to the one Ngāti Mākino has which uses satellite imagery.
- Kepa raised concern with the accuracy of the average annual TSS load graph slide – does community group realise it is modelled data? Rochelle confirmed the three points shown are modelled, but calibrated to 3 monitored sites.

Actions

- Check the shape of the BOPRC and Ngāti Mākino's Waitahanui catchment to determine the reason for the difference.
- Science to work with Ngāti Mākino to better understand data showing steep increase in sediment. Upper catchment sediment - when and where monitored? Ngāti Mākino would like to see key raw data.

5.2 Policy Options

The same 'hold the line' policy options for the Kaituna and Pongakawa were outlined. Bearing in mind there are only one or two members in the Waitahanui including Ngāti Mākino we didn't break into groups but had a chat amongst members on each table and indicated in a fist of five:

1. Whether you agree with the focus issues above?
2. Whether you agree with the policy direction considerations above?

Steph checked in asking the group for a fist of five about the general direction, are people feeling comfortable? Seeing lots of 3's and 4's so not so comfortable.

What outstanding concerns and questions you have?

- One member expressed concern that we are being asked the question without enough information. I don't know the catchment, it doesn't look too bad but I don't know. The general feeling that there is not enough information to be comfortable answering the questions being asked.
- If the upper two thirds of the catchment are in forestry are these annual high sediment loads accurate? An idea of what proportion of the catchment is in forestry compared to other land uses may give us better context. We would expect there to be more sediment losses for forestry in the year or two after harvesting but much less in the twenty years between harvests.

  Note: The graph shown was modelled TSS load in the river, calibrated to actual monitored load. It was not a yield map, that is, it was not an estimate of sediment losses per hectare from certain areas or land uses in the catchment. Yield maps were presented at the workshop 8 and will be at the next workshop 10, along with some commentary on the forestry assumptions.

- Concern was raised that there aren't enough sediment monitored points. Only the end point is based on monitoring data the rest based on a model. The Total Suspended Sediment (TSS) data is only modelled outputs with its limitations not based on fact.

  Staff confirmed we have monitoring data and points in the catchment which have fed into the model. Three monitoring data points – One long term down at the coast and two more further up in the catchment of one year worth of monthly data. The TSS load graph is modelled, but calibrated against these monitored data points. The scenarios are estimates of future land use. We haven't got the final modelling report yet but will circulate it when we do.

6. Closing / next steps

Steph provided a brief overview of what we have covered. Wilma provided her final thoughts for the day. She was really impressed, we have looked at some technical and hard numbers with no blaming going on 'us and we' not 'you and they'. Barry's closing words echoed the same sentiments noting at the end of the day he is still here sitting between two dairy farmers. We have respected each other even where there are differences of opinion. We have agreed there needs to be change and scale of the problem is large for the Kaituna and Pongakawa catchments. There is still a long way to go and thinking to do about the options and timeframes for change.

We aim to include the following at the next workshop in May:

- Sources and causes
- Good practice scenario modelling – how far will that get us?

Staff will continue meeting with iwi and hapū and are working up discussion document material.

We are working on key information for the wider community discussion about estuary and lowland issues and early policy options which community group members will be invited to share with their peers, neighbours, friends and family.

Kerry ran through actions recorded on the flipchart which are reproduced below.

Manu closed the workshop with a karakai at 3pm.

7. Actions/Requests noted

Actions

1. Provide copy of report about proportion of sources of *E. coli*. (agriculture, avian, human etc)
2. Provide link to report on website about point source discharges from drains – small pilot study mentioned in the report.
3. Estimate loads coming from drains using concentration and modelled flow.
4. Check in with Ngāti Mākino about Waitahanui catchment extent, sediment data and land use information etc

Requests

1. Provide a comparison with other regions &/or catchments where the receiving environment is an estuary of % load reductions and timeframes working towards to reduce to acceptable levels as a frame of reference.
2. Estimate / measure how much *E.coli.* is being contributed from the drains.
3. Include monitoring of drainage scheme in drainage operations budgets.

Appendix 1 'Hold the line' policy options – pros, cons, options and big questions

1. Control change to more intensive land use - resource consent and mitigation requirements
2. Farm environment plan - good practice and standards
3. Benchmarking - estimating losses from the land
4. Set land use performance range? Cap at benchmarked amount?

x2 = this statement made by 2 people and x3 statement made by 3 people etc

1. Control change to more intensive land use - resource consent and mitigation requirements

	Pros	Cons	Options	Big questions
Kaituna	• Allows monitoring of resources • Move towards certainty for landowners and council • Environment will benefit • Common approach which allows mitigation through consents • Needed to reduce/halt degradation • Increases monitoring points • Set standards – indicators / thresholds • Accountability • Collaboration – council/ iwi/ landowner/ community • Buffer zones • Riparian planting x 2	• Intensity does not mean greater loss of nutrients • Cost of consenting x3 • More costs for what gain? • Likely to add time and cost to transitions • Who pays • Does monitoring increase and who pays • Responsibility of land use change needs to be determined by all industry (along with council) regardless of what the change is. • Science incorrect? • Industry drives best practice and land use rather than resource consents and conditions • Can disadvantage some land owners • Council 'rules' may be against market forces • Disadvantage for current low intensity? • Change in land value • May obstruct optimum land use and can be demotivating • Likely resistance to change • Potential for gaming the system • Māori land in forestry • Enforcement • Devil is in the detail of the consent • Retrospective abilities in the term of the consent?	• Avoid any intensive change as mitigation measures can't really mitigate in full and long term cost of the damage is irreversible. • Mitigation at local level or point • No land use change permitted or approved if can't be mitigated • Can have some artificial structures, especially in undulating terrain • Forest to clear fell should be avoided • Only mature trees should be removed so some tree cover is left to prevent erosion. • Control land use change to reduce nett impacts on ecosystem • Target reduction 20%	• Is our information robust enough? • Should all land use need consenting? x2 • What if the mitigation doesn't work? • Ensure land use is better than existing use for all aspects of mitigation to improve water quality. • Intensity – definition? Within the sector and between sectors? • Effect on land use values?
Pongakawa Waitahanui	• Real time monitoring supported • Have control over change • Identified land use • Agree resource consent is needed to intensify land use – consents case by case • Receive better information with resource consent application • Better control and efficient practices • Yes control intensification • Better monitoring / streamlined process • Holds the line to limit any change for the 'worse' • Must be able to measure to manage	• Could become unwieldy • More consents less scrutiny • Stifle economic growth • Land uses • Cost of monitoring to check mitigation • 'Rush' on existing rules • Cost • Disincentive to makes 'positive' land use changes if you need a resource consent for everything • Distorts land values • Industry has different methodologies ie. farming compared to forestry • Time and cost when already trying to do the right thing	• Promote good practice • Provide education, publicity, mapping of land, design of planting, wetlands, trees etc • RMA amendments may support control of land • Land use and industry need to up their game • Minimum Discretionary activity • Increase and impact not acceptable • New consents focus on best 'limits' • Better sustainable choices are better for the environment • Needs to be farm by farm not paddock by paddock • Control forestry to dairy, no Wairakei pastoral (?) • Encourage conversion of dairy to kiwifruit • Do we need to use all 4. Options • Consider development impact & harvest impact • Regulate and consent required for activities with major impact • Major impacts established by benchmark / measurement	• How to measure • Target? Who says less intensive not having an impact • What is 'intensive' needs clear definition to provide certainty to owners • Should it be based on N/P/ecological loss rather than intensive land use • How to define increased intensity? • Overload the system?

2. Farm environment plan - good practice and standards				
	Pros	**Cons**	**Options**	**Big questions**
Kaituna	• Can improve farm operation (with farmer consent) x3 • Holistic model that takes into account clear indicators x2 • Local level mitigation plan for farms x2 • May improve values and productivity • Outlines process to meet compliance now and future x2 • Recognised process	• Lack of rural professionals affects quality of advice and independence x2 • Cost of implementing the plan can be high x2 • Compliance cost for monitoring and development x3 • Recommendations must have knowledge that it works x2 • Too many different organisations doing the same thing x2 • Consistency of standard or plan • Audit cost	• Needs a 5 - 10 year timeframe not 1 - 2 year x2 • No mitigation advice gives an absolute outcome • No mitigation at other locations is acceptable • Integrated parameter modelling to determine riparian planting requirements • Property environmental plans x2 • Needs individual property assessment x2	• Who is the expert? • What are the indicators of good practice? • What are the thresholds for NZ standards? x2 • Who will monitor the plans – industry or council? x2 • Is the plan based on title or farm entity or land use type? • Who is accountable scientific evidence / controls / plans?
Pongakawa Waitahanui	• Encourages farm improvement • Mitigation practices can be case by case • Implement industry practices, levels, standards, minimums and maximums • Support environmental plans / impact assessments with effective strategies and review periods • Yes • Agreed previously as necessary • Certainty of control, plan outcome • Increased monitoring • Easily incorporated into Fonterra / Zespri industry templates using best practice • Ties in with greenhouse gas tax • Incentive to redesign your farm/orchard system to minimise nutrient loss & max profit	• Only based on best practice not what is best for the farm • Limits thinking and innovation • Lack of suitably trained people to do them	• Determine catchment load to meet target 1. allocate permissible nutrient loss per ha on the basis of biophysical attributes (natural capital) 2. reject allocation by sector or current land use (but allow a pragmatic transition period of perhaps 25yrs) 3. gathering of necessary data requires per property nutrient modelling 4. emphasise 'best practice' throughout timeline • Sub-catchment approach • Best practice farm environment plans • Community effort measuring main waterbody, while modelling individual farms eg. with Overseer • Resource consenting • Point source monitoring • Kiwifruit part of global Good Agricultural Practice (GAP) • Dairy – Fonterra lead • Forestry – best practise process for harvesting & sediment control • Best practise changes with new science and requirements x2 • Rolling improvement x2 • Industry led – incentives, win/win for everyone • Essential to build in increased profitability x2 • Needs to be ongoing • Should be mandatory and include management plan of how to meet targets • Standard documents with timeframes x2 • Less stock • Efficient disposal methods • Model financial impact black before green	• Equity/ fairness obligations 1. Accurate modelling of current for each property – status 2. Adopt of 'best practice management 3. Transition to sustainable load 4. Obligations & farm environment plan per property 5. Nutrient allocation on a natural capital basis – LUC & Lidar • Farm specific or catchment / community plan? • How to demonstrate implementing the plan? • What is the acceptable baseline? • Community input about what is best practice

3. Benchmarking				
	Pros	**Cons**	**Options**	**Big questions**
Kaituna	• Starts the annual recording process about inputs stock# fertiliser • Measures trends • Fair, everyone shares the pain • Identifies excessive fertiliser use • In no benchmark no change of collective outcome x2 • Need to know what you are doing x2 • Benchmarking will bring in to line excessively intensive and discharging contaminants • Sets measurements	• Grand parenting provides no encouragement for good management practise for status quo land management • Accuracy of the benchmarking tool • Lack of consistency	• Start using tools to benchmark now and keep improving the tools • Regionally consistent model • Every land use needs to do its bit • All nutrients and sediment • Holistic framework that identifies tools used ot benchmark various standards – N, P, sediment • Works if a range rather than explicit x2 • Must acknowledge cumulative effects x2 • Benchmark subject to 'review' as more information is obtained over time	• Audit? • Definition of property important – title or farm entity? • How will it cope with multiple land uses on one property • Need nationwide sediment standards included.
Pongakawa Waitahanui	• Easy to do Overseer already in use • Starts the annual recording process about inputs stock# fertiliser • Farm / property specific • Measures trends x4 • Inter Climate Change (ICC) requirements • Climate change mitigation & N loss tied together • Fair, everyone shares the pain • Identifies excessive fertiliser use • Yes • Consistent, reliable, objective – tool dependent • Improvement driver x2 • Sustainable practises introduced over time • Less discharge consents granted yay for the river x2 • Increase regional council data collection to set 'benchmark'	• Industry influence • Lobbying • Estimates only • Needs to be based on contour, LU system, intensiveness • Best in class vs worlds best? • Determination of the comparators critical x3 • Potential to 'game' the system • Additional cost for landowners • Cost of implementation & audit Need to be verifiable / audited • Models not available for all land uses x2 • Requires individual monitoring • Lack of tools other than Overseer • 'sensitivity of info' commercial sensitive for each property\ • Calibration of model	• Recording & measuring within a range 10 – 15% • Land use to include pesticides, herbicides, fertiliser • Start using tools to benchmark now and keep improving the tools x2 • Regionally consistent model • Every land use needs to do its bit • Mandatory, audited, timely, constant monitoring, automatic x2 • Farming dairy effluent >1km from river & estuary ie. inland from waterbodies • Monitoring of farm drain discharge • Essential • industry led • Worth considering further • Site specific, land use specific & combination of the two • Regional council need DWP budgeting for drains • Need to come up with a fair system (between & within industries) x2	• Estimates only - how does the real data feed into this? • Audit? X3 • Seasonal peaks & troughs • International, national or regional data used to set benchmarks?

4. Set land use performance range? Cap at benchmarked amount?				
	Pros	**Cons**	**Options**	**Big questions**
Kaituna	• Set clear expectations • Communicate clear benchmarks • Allows move towards better understanding of cause & effect • Certainty at farm level • Ranges works better	• Range may limit 'exceptional' example • Limits growth / development potential • Need science to set range • Nutrient use efficiency not considered • Can create 'bad' behaviour eg. Taupō - selling of nutrients etc	• Ranges work better – customised to industry / farm • Can we lease surplus nutrients? • Work from top of catchment and work down at the benchmark set • Land use standards must be uniform all over the country base on various parameters • Base on parameter values. Decide the eligibility of various land use.	• Environmental buffers between properties • How do we benchmark small blocks and urban? • How do you accommodate cumulative impacts? • How does performance benchmark accommodate variable conditions such as slope, soil, geology, climate etc. • How do new 'industries' get measures or assessed? • Performance requires best practice but who determines? • If land use changes what benchmark is used – historic or new? • What is benchmarked – losses, use, efficiency? • Are you benchmarking losses or use?
Pongakawa Waitahanui	• Encourages action • Encourages reductions • Set cap per ha • Means those doing good practice have less pain than those show are greater 'polluters' • Setting cap allows a lot more land use change • Both – initially cap then reduce to best practice as benchmark	• Expensive • Time consuming • Grandparenting cap rewards higher historical dischargers • Broad brush approach – does not allow for innovation and use of small operations making better use of small areas within a particular land use designation • Audit process costly	• Both set range and sinking cap with narrow range • The performance range for land use should be such that good / high water quality is the target • Best practice needs to be standardised • No grandparenting policy • Cumulative change must meet benchmark (sum of change = benchmark model) • Absolute cap per ha consistent across all similar land uses • Cap at current level? • Cap at % of current level • No grandfathering • Identify best performers • Orchard / dairy benchmarks • Orchards in • We need both • Cap has to include contour/system/production • Promote positive performances – fencing / planting • Find a balance – start at a fair cap, identify polluters through evidence, penalty imposed	• Soil and terrain type considered?

Appendix 2 – Lowland drain management

Group discussion report back:

1. Do you agree we need to focus on lowland drain management, land management and pump station discharge management?
2. What options, pros, cons and challenges to improving the water quality and ecology of lowland water bodies, and the water quality of drain discharges?

Options	Pros	Cons	Challenges
Blue group - Yes agree we need to focus on lowland drain management, land management and pump station discharge management			
Back flowing drains for habitat improvement. But results in a pulse of contaminants and costly to do. Good to look outside the square about the role of drains.	Habitat improvement	• Pulse of Contaminants • costly to do	Concerned about the limited actual data, reliance on modelling. Need to continue science. Great work, indicative good start.
Restrict spraying drains during whitebait season		Need to manage flow and ensure no blockages	
Improve buffers adjacent to drains	Plant for shading, fence further back	• Ongoing maintenance • health and safety issue	
Saltwater intrusion	manage immediate area of threat to become wetland then eventually brackish		
Green group - Yes agree we need to focus on lowland drain management, land management and pump station discharge management			
• Treat lateral drains – wetlands or bioreactors • Shaded and maintain bank vegetation • Removal of farmland from lowland areas in long term, buy back, flax (not just water quality but also sea level / saline intrusion • Effluent treatment plant - Before we discharge we should treat the drainage water • Improve monitoring • Test cost effectiveness of interventions			
Yellow group - Yes agree we need to focus on lowland drain management, land management and public station discharge management <u>but need to consider whole catchment</u>			
• Reduce diffuse inputs • Reduce direct inputs • Increase buffer zones • Fence northern edge and plant	• Increased efficiency	• Planting will reduce digger access • Reduce productive land	Balance values
Red group Yes agree we need to focus on lowland drain management, land management and pump station discharge management. Need to know further date before N, P & Ecoli & % of total load at the point drains discharge to rivers. Not all drains are equal – identify those which have potential ecological values			
Increase fencing and riparian buffer margins	Shade	Reduce area which can be farmed	
Improve on farm effluent treatment and treatment before leaving drains	• Better water quality • Improved habitat	• Cost of treatment system, maintenance and compliance	• Requiring consents for existing drains • Who is the applicant? • Who pays?
Reduce ammonia levels in soils adjacent to surface water x2	Improve fish and invertebrate life	Related to intensity of land use, N fertiliser and urine	Timing and economics
Improve on farm effluent treatment and treatment before leaving drains	• Better water quality • Improved habitat	• Cost of treatment system, maintenance and compliance	

Collation of individual member responses by group

Do you agree we need to focus on lowland drain management, land management and pump station discharge management?			
	Yes	**No**	**Why**
Blue group (7)	7	0	• Effects estuaries which are important, have the poorest water quality area in regions (except for urban areas) and have greatest loss of biodiversity • Significant problems created by a narrow focus on land productivity that is not sustainable. Drainage has exacerbated impact of sea level rise as when inundation occurs it will be irreversible given settlement of drained lands. Proactive response would be to retire use now and recreate wetlands before becomes salt marsh • Improve the long term viability of out estuaries • Yes, but need a lot more science to base an investment on 18 measurements to base a model on! Concerns re drainage discharge flows and what is actually entering the network. • Concerned about the limited actual data, reliance on modelling. Need to continue science. Great work, indicative good start.
Green group (8)	6	1	• Due to monitoring results being below water standards • Low quality discharged into high quality waterbodies • It is the major water quality issue and cause. Better to prevent discharge that fix the result • Lowlands can suffer from higher runoff – pugging in winter or wet periods • Water quality seem to be quite bad • The damage that has and is being done to the waterway discharged to • Change drain design and management may give immediate benefit • Yes but need to work across the range. Water quality impacts on downstream water quality values. We obviously have a bit problem and need to address it.
Yellow group (7)	5	0	• To understand what the options are to improve water quality while maintaining drainage capacity • Discharges from these sources eventually end up in the main waterways carrying the contaminants we are trying to eliminate • Improve water quality resulting in improved health of estuaries, increased biodiversity, better water quality for cultural and recreation purposes • They are a source of high contaminant load , restrict fish passage and low water quality • Because the crap is getting pumped into our waterways • It is important for the receiving environment but don't loose track of where contamination comes from – 'ambulance at the bottom of the hill' • Yes but need to consider whole catchment
Red group (8)	6	0	• Yes should be working towards this • Need to have regard to sustainable management of drained wetlands including establishment of sustainable land / water levels in long term • Drainage enables economic use of land, discharges from drains impact on river, pump stations impact ecology. • Unless this happens, there will be no meaningful outcome of long term restoration of our river and estuaries • At this stage I don't' have the information needed. What is the total N & P and Ecoli discharged from lowlands and contribution to the estuaries? • Its valuable land, production of food requires drainage. Drain water tables and health are both priorities • Essential for lifting water quality of the rivers • The effect lowland drains have on receiving waterbody and contribution they can make to enhancing ecological values – eg. fisheries, tuna, inganga
Total 30	24	1	5 members did not indicate yes or no

Collation of individual member responses by group - What options, pros, cons and challenges to improving the water quality and ecology of lowland water bodies, and the water quality of drain discharges?

x2 = this statement made by 2 people

Blue group	Pros	Cons	Challenges
Shade drains x2	Improved discharge from drains reducing load to the estuary Reduces temperature	Cost Inconvenience of shade for drain clearing Could affect drainage and harder to clean	Getting buy in by property owners
Planting of drains on northern and western sides	Increase shading Reduce water temperature Provide habitat Enables management of drains	Cost and management	Loss of grazing land
Fish friendly pumps/ gates and slipways	Improved health of drainage system	cost	Public reaction to BOPRC rates increase
Maintain water levels in drains to minimise land level shrinkage			
Regular flushing of drainage network (summer)	• Remove sediment • Improve water quality • Provide habitat for biodiversity • Raise base water level for grass growth	Pulse of nutrients / contaminants into receiving environment	• Landowners buy in • Cost for rivers and drainage
Retire high impact land use. Reinstate wetlands for ecological benefits and use to off-set negative impacts of land continuing to be used in an unsustainable way. If wait until saline intrusion has occurred, land value in any sense will be permanently compromised	Increase buffer against saline intrusion and mitigate impact of other land use	Retirement of land use means change for those farmers	Explaining for greater good as needs of many outweigh those of the few
Wait for sea level rise to retire land use. Significant missed opportunity to act earlier, as saline intrusion is not reversible in terms of impact	Economic activity prolonged allowing voluntary ignorance of inevitable consequence	Perpetuates head in sand attitude of mythical right to any land use regardless of cost	Status quo and economic prerogative, so may be acceptable until disaster happens
Retire all lands drained under the Drainage Acts. Allow recovery of processes essential for ecosystem services – nursery for marine ecosystem, water quality, buffer for flooding, lungs for atmosphere, kidneys for waterways, vegetation. Cultural uses	Ecosystem focussed	Not economic outcome focussed	
Increase wetlands and increase flood plains	Slows and cleans discharge	Loss of productive land	Buy back of land acceptance?
Improve farm practice	Improve water quality	cost	What is best practice?
Best practice fencing and buffer zone planting	People can make stepwise change over time	Loss of land, slows drainage especially where flat	Farmer change challenges
Land use change – retirement of some farmland	Creation of wetland areas can be used for recreation	Cost, loss of productive land forever	The land areas we choose
Treatment at pumping stations – could discharge go back onto land when not raining?	Localised effort with combined farms	• Investment and agreement • Cost and management	As per cons
Backflowing drains	Good for habitat / pasture	Creates a pulse of contaminants Cost	
Spraying drains	Manages flows / ensures no blockages	Restricted during whitebait season	
Buffers – plant for shading, fence further back		Management then a health and safety issue	
Saltwater intrusion	Manage immediate areas of threat as wetland which will eventually turn brackish		

Incentives for good practice			
Manage land use in lowland areas	Could address the issue	Bureaucratic, costly	
Bylaw			
Green group			
Treat lateral drainage points first using wetlands or bioreactors (x3)	• Reduce ammonia & rainfall effect • A series of small manageable steps	Short term cost	• Test the cost effectiveness of interventions • Perception of landowner
Treat discharge before discharge point – effluent treatment plant x3	• Could work well • Expect clean water to be discharged	• Costly to do • Stormwater events	• Volume of water in major events • Cost sharing
Shade and maintaining bank vegetation x2 Possible hydro seeding of appropriate species	• Provide shade, positive impact on ecology and water temperature etc	• Management required • May impact ongoing maintenance	• Cost • implementation
Removal of farmland from lowland areas in long term, buyback, flax – not just water quality but also sea level / saline intrusion	• In long term, buyback, flax	• sea level / saline intrusion	•
Remove land from productive use x 3	• Reduces area of drainage land. Could be uses to treat discharge from remaining land • Total effective	• Cost of achieving, who pays for the land • Economic issue, by back etc	• Making sure it will work • Livelihoods, history unpalatable
Manage as a collective & purchase a lowland property to created wetland / filter for a large number of properties	• Spread through a number of landowners. • Take out the hotspot	• High capital	• Identifying the correct area • Care in valuation of buy back methodology
Improve monitor across drain / discharge points /watercourse networks x2	• Understand various levels of variants in each drain • Comprehensive action plan to address problem areas • Will be clear about actual issues and where the hotspots are • Will enable informed action	• Capacity • Will take time to implement	Cost of monitoring / budget
Find alternatives to discharge into rivers and streams	Cleaner waterways	All in agreement	Mechanisms Whole agreement – iwi / community
Only treated water will acceptable quality allowed to mix with natural water bodies	Prevention rather than cure	May seem costly at the start (but not really)	Have sufficient infrastructure to treat the water
Try to reduce the source by altering practices	Really good option	Seems very difficult / not achievable	Need to change mindset
Government may put ban on some of the products	Really optimistic	Unlikely	
Control stock numbers (intensity of farming) Manged grazing in winter and wet periods Reduce stripping of vegetation and spraying of banks	Fewer cows = less discharge	Lower production, values may fall	Enforcement difficult with push back
Winter grazing off farm or in sheds	Takes stock off land during periods of high runoff	Costs, work load	
Fish and eel stairs mandatory			
Yellow group			
• Wider riparian strips • Planting drain edges • Filtration	• Improved water quality • Improved biodiversity • Aesthetics	• Cost • Poorer drainage – reducing productivity	• Cleaning drains • Keeping trees / shrubs off fences

Retention bunds at critical points to capture stormwater during heavy rain	Drop out P, Ecoli & N?	Expensive Take out areas of productive land	Require regular maintenance
• Stronger policy controls on drain and other discharges. May need to control loss of contaminants from land to drain and also control drain management • Get rid of direct contamination into waterways			
• Reduce contaminants leading into drains and waterways • Use treatment wetlands • Reduce intensity of farming and horticulture and use of chemicals	• Increase biodiversity • Clean swimmable rivers	Perceived economic issue	• Convincing farmers of the benefits • Changing bad habits
• Reduce diffuse inputs • Reduce direct inputs • Increase buffer zones • Fence northern edge and plant	• Increased efficiency • Balance values	• Planting will reduce digger access • Reduce productive land	•
• Prohibit direct / point discharge of drains into 'rivers' • Use treatment on ALL drains	• Improved water quality • Improved biodiversity	None	Cost
• More sustainably farming methods • Lowering stocking rates	Improved profitability	None	Convincing farmers of the benefits
Plant drains on northern side	• Provide habitat • Reduce water temperatures • Reduce contaminants • Reduce weed growth	• Digger access • Drain maintenance	Convincing farmers of the benefits
Planting / fencing • Set best practice • Have advise available • Minimum riparian margins	• Temperature • Filtration	• Cost • Land loss • Access	• Buy in from landowners • Variability of planting
Increasing distance from fence to drain edge	• Filters more contaminants in flood events • Reduces the number of dead cows in drains	Reduces grazing area	Convincing farmers of
Improve fish passage at pumps	Better fish movement	Reduce pump efficiency	Cost
Reconfigure pump stations	• Allow for constant flow • Increase fish, eels access	• Technically complex • Expensive	
Larger buffers between farms and waterways – user pays stop abuse of waterways	Environment we can all enjoy and use		Some people won't like it
Spend billions of tax payer dollars on planting / management and consultants		Take too long	Some people won't like it
Look for alternative land use options	Good for the environment	Might be worse for the environment if not done right	Some people won't like it
Review drain maintenance – set maintenance rules and guidelines	Best practice	Cost	

Red group			
Increase fencing and riparian buffer margins	Shade	Reduce area which can be farmed	
Require consent to discharge from drain to river & then monitor x2	• Recognises the impact on rivers • Allows monitoring and measurement	• Does not directly require drain improvement • Potentially costly	• Requiring consents for existing drains • Who is the applicant? • Who pays?
All surface water discharges should require consent. Consent conditions required to mitigate – fencing, shading and vegetation control imposed.	Drains treated as an extension of land use. Ie. need a licence to operate, not make it someone else's problem	Numbers of consent and associated costs, admin, management	Land user / discharger resistance
Improve on farm effluent treatment and treatment before leaving drains	• Better water quality • Improved habitat	• Cost of treatment system, maintenance and compliance	
Better effluent management – FORSI type effluent recycling filtration system https://www.forsi.co.nz/	Could be spread over several	Expensive	Farmer cooperation
Treat using swamps / wetland pre discharge to drain & UV at point source	Reasonably effective	Expensive especially if lots of drains	Cost
Greater control of point discharges and on farm effluent treatment	Reduce nutrient load from land	Infrastructure cost	Technology available at reasonable price?
Reduce ammonia levels in soils adjacent to surface water x2	Improve fish and invertebrate life	Related to intensity of land use, N fertiliser and urine	Timing and economics
Filtering through wetlands if gradient permits / use holding ponds / tanks			• Land levels probably already unsustainably low • Climate change impacts (elevated coastal water levels)
Tree planting for shade & reduction in spraying banks	Increase potential liveability of drains	• Mechanical control of weeds may be required • Loss of flow through root systems	Balancing 'drainage' with ecological purpose.
Shade and riparian margins	Easy and looks good	Not sure how much effect	Farmer engagement difficult if not able to quantify effect
Treat drains the same as all other waterways	• Consistent approach • Requires increase in water quality	• Expensive • Not appropriate for operational water drains	Too difficult to implement
Action plan will need to include: • Control of loss of contaminants from lowlands, and • Control of drain management, and • Control of all discharges A comprehensive approach has to be taken using all the tools that are reasonably available	The plan will meet overtime the required outcomes for restored estuary health	Could take generations but should have annual targets and 3 – 5 year review	
Simple actions that can happen immediately Shading, fencing, wetlands	Success measureable Simple actions can be started immediately		All actions need to be overlaid by the issue arising from climate change
Pipe direct to the ocean – why not?	For the most contaminants drains this may be the least expensive option • Relieves the estuary of contaminants • Allows dairying to continue	• Expense • Resource consent to discharge to ocean	
Reduce dairy farms with low N, P farm systems / uses eg. annual crops, cut and carry, summer grazing	Reduce nutrient input	• Cost • Need to buy out existing farming systems	Getting farmer approval
• Tighter controls on existing farm systems	• Encourages innovation	• Requires co operation	

• Require all farms contributing to a drain to meet and mutually agree how their manage discharge to drains	• Personal responsibility	• Not easy to enforce	
• Regulatory controls based around fertiliser classification for lowland waterbodies. Ie Identify ones for better ecological outcomes	• Clarity / transparency • Benchmarking • Enhanced fisheries	More research required to classify drains and their characteristics	Land user resistance 'Point source dischargers' resistance
Reduce drain water temperature	Improve fish life	Hard to control	Increase flow, increase shade
Increase flow in drains	Dilute contaminants	Where does the water go	

Collation of individual members responses - What further information do we need to inform this?

- Nutrient loads/ *Ecoli* etc in drains for both public and private land drains
- Risk of inundation not known?
- Increased monitoring time intervals – costings and timeframes
- Effects on drainage from planting drains, ability to clean drains after planting
- Benefits on water quality and ecology
- Alternate crops more suited to the location – flax
- Nothing, just be real and address the elephant in the room!
- Need further data - N, P and *E coli* & % of total load at the point drains discharge to rivers
- Not all drains are equal, identify those which have potential for values
- Source discharges from drains needs to be studied
- International examples of where this has worked
- At this stage I don't' have the information needed. What is the total N & P and *E coli* discharged from lowlands and contribution to the estuaries?
- Need continuous monitoring of water quality, nutrients, volumes of discharge on all large drains