Combined Kaituna and Pongakawa-Waitahanui Freshwater Futures Community Group Workshop 10 Notes: Surface water quality

The Orchard, 20 MacLoughlin Drive, Te Puke

Wednesday, 29 May 2019 commencing at 9.00am

Members present:	*Kaituna Community Group* - Barry Roderick (Chair), Brian Thomas, Hendrik Metz, Ian Schultz, Jon Fields, Julian Fitter (member of both community groups), Matthew Leighton, Mary Dillon, Nick Webb, Cr Paula Thompson, Richard Fowler and Warren Webber *Pongakawa-Waitahanui Community Group* - Wilma Foster (Chair), Andre Hickson, Bev Nairn, Colin McCarthy, Grant Rowe, Cr Jane Nees (part of meeting), John Meikle, Kepa Morgan (present for modelling Q & A session only), Paul Van den Berg
Apologies:	*Kaituna Community Group* - Claudia Hellberg, Cor Verwey, Hohepa Maxwell, Jessica Dean, Jeff Fletcher, John Fenwick, Manu Wihapi, Maria Horne, Morgyn Bramley, Murray Linton, Peter Ellery, and Vivienne Robinson *Pongakawa-Waitahanui Community Group* - Bernie Hermann, Darryl Jensen, Dennis Walker, Geoff Rice, John Garwood, John Cameron, Kevin Marsh, Melv Anderson, Mike Maassen, Stavros Michael
Observer:	Esther Kirk (Pukehina Ratepayers Association)
BOPRC Staff present:	Pim de Monchy (Relationship Manager); Stephanie Macdonald & Kerry Gosling (Facilitators), Nicki Green, Jo Watts, Sue Simpson & Santiago Bermeo (Water Policy), Rob Donald, Paul Scholes & Daniel Tingey (Science), Josh Mawer (Contractor, Williamson Water & Land Advisory (WWLA)) and Nicki Sunderland (Communications, morning only).

Related documents previously circulated:

1. Briefing Note - Workshop 10: Surface Water Quality
2. *Draft* Bay of Plenty Regional Council Kaituna & Rangitāiki Catchment Models – SOURCE Catchment Modelling Analysis - 10 May 2019

The briefing note and workshop presentation are available online here – Kaituna and Pongakawa-Waitahanui. The following factsheet was handed out at the workshop for members to provide to community members interested in the freshwater policy work currently underway.

- Factsheet: Contaminant Loads in the Waihī and Maketū Estuaries

1. Technical modelling Q & A (Optional session before workshop)

Some members at the last workshop indicated they would like to read the detailed technical report about the SOURCE biophysical catchment model. The draft report (dated 10 May 2019) was made available to all members, but was certainly not compulsory reading. Staff will let members know of any amendments and will make the final report publicly available.

Key discussion points, questions and answers from the technical modelling session held with the Williamson Water and Land Advisory (WWLA) modeller, Josh Mawer, are recorded in Appendix 1.

2. Welcome

Kepa opened the workshop with a karakia. Barry and Wilma welcomed the combined community group to workshop 10 and also Esther from the Pukehina Ratepayers Association (PRA). Esther shared with the group that the PRA represents around 350 ratepayers who are interested in collective action to restore the mauri of the Waihī estuary.

Wilma acknowledged BOPRC staff present including Daniel working with the science team and Nicki Sunderland from the Communications Team, who is shadowing Pim and making small videos about the catchment. Pim and Nicki G. confirmed the footage would only be used for its purpose (showcase catchment work) without audio.

Sending the previous workshop notes out the night before hadn't allowed people enough time to read them. Staff apologised and agreed they would be sent out earlier in future.

Actions

- Staff will make sure the previous workshop notes are sent out as early as possible.
- At the beginning of each workshop the group should accept the previous workshop notes or amend if needed.
- Workshop 9 notes to be amended to reflect changes requested in Kepa's email to the group the morning of the workshop and resent to the group - Done.

3. Purpose of the day

Nicki and Steph reminded members the purpose of this group is to help council implement the National Policy Statement for Freshwater Management (NPS-FM), confirm values, express preferred objectives, provide feedback on water quality and quantity limits and provide input and advice to council on solutions to manage activities within the limits.

There are a lot of parts to this freshwater puzzle. This workshop's focus was on good management practice modelling results and your feedback on these.

The purpose of the workshop is for group members to:

- gain an understanding of the good practice mitigation modelling results and implications,
- approve in principle the management options being explored.

The main focus was for members to explore and consider the modelling results and implications of how far good management practice (M1 mitigation), when applied to each of the scenarios, would take us towards reducing contaminants for moderate estuary health. Agree in principle to staff progressing assessment and consideration of further policy options and / or providing advice on conclusions drawn.

4. National and regional updates

Central Government is working on a large policy proposal *Essential Freshwater* to:

- Stop degradation and loss
- Address past damage
- Address allocation issues

BOPRC's chairman and chief executive are on the Essential Freshwater Regional Sector Group which is one of several groups providing advice to the government on emerging policies. Staff have provided input to the regional sector groups advice. Proposed changes are expected to be released in July/ August for public consultation.

The government has indicated it will follow a streamlined process for receiving and considering submissions. An independent advisory panel will consider submissions with no hearings. Advice from the panel and consultation notes will be presented to government in October. Government intends to make decisions in November and draft legislation changes to come into force before central government elections next year.

A rural package of changes is expected which is likely to include a new National Environmental Standard (NES). Changes may include:

- Farm Environment Plans and good management practice
- Stock exclusion
- Standards for high risk land use activities (intensive winter grazing, hill cropping, feedlots)
- Rules on agricultural intensification in at risk catchments

NES rules would apply over the top of regional plans or in some places in the interim until regional plans have implemented the NPS-FM. ACTION: Staff will send links to the Essential Freshwater consultation material as soon as it is released by the government. Regional council will be carefully considering the implications for the freshwater policy work we are doing, including in the KPW WMA and will be making a submission.

Questions:

- Q: Why has the rural sector been singled out over others? A: There are two main freshwater work programmes government is tackling. As well as the Essential Freshwater package government is also progressing the Three Waters review which will largely focus on urban freshwater issues – drinking water, stormwater & wastewater.

  Cr Thompson advised there are also other government initiatives such as changes to the National Policy Statement for Urban Development Capacity. Nicki noted it is a massively busy time for national changes with biodiversity, climate change, potential changes to the national coastal policy statement all in the mix.

- Q: Will we have enough time to consider the impacts for this work? A: ACTION : Staff will provide links to the consultation material as soon as it is available and will consider bringing both the KPW and Rangitāiki community groups together for an information session about the proposed changes once released by the government.

4.1 Regional update

Nicki provided a brief regional update:

Proposed Plan Change 9: Region wide water quantity appeals

Council is meetings with groups of appellants to clarify matters of appeal, with a view to addressing some of those matters out of Court, and narrowing those matters that need to go to Court. No Court dates have been set.

Information for the community

Staff handed out the factsheet mentioned at the last workshop which explains the contaminant loads in the estuaries for the public. Members can provide it to people you are talking to about the work we are doing. It provides key messages, and contact details.

We had intended engaging with the public in the second part of the year but have decided not to advance policy options discussions with the wider community at the same time as national changes are being consulted on. Implications of proposed national changes may change priorities and the timeline.

Focus catchments

Council's Coastal Catchments team now manages catchments by prioritising smaller catchments and sub-catchments based on risk. The selected catchment areas will be small enough to enable the impact of interventions to be measurable. Waitepuia stream catchment, Kaikokopu Canal catchment, and all of Waihī Estuary catchment have been provisionally selected as some of the region's focus catchments.

Questions:

- One member questioned the portal access. ACTION: Staff will check any issues with accessing the portal.
- Q: Will the NPSFM changes introduce anything about estuary health? A: The Essential Freshwater document released in Oct 2018 flags that NPS-FM amendments may include measures to better protect sensitive downstream environments eg. estuaries. We haven't seen any policy proposal detail indicating this is being addressed. It would make sense to.
- Cr Thompson shared with members that the Regional Direction and Delivery Committee (RDD) agendas are a good source of information about changes. There is always a freshwater update as well as information about any national changes going on. ACTION: Make a link in the briefing notes / and workshop notes to RDD freshwater update papers. All council agenda reports and minutes are on Council's website and are available here.
- Is there a plan for wider community engagement? A: We have the factsheet which is starting the message about contaminant loads in the estuaries and provides contact people and links to join 'Freshwater Flash'. In terms of wider publicity we haven't planned that yet given the national changes.
- Members are finding there is interest from others in the catchment about what the group is up to, what stage we are at and next steps. A: ACTION: Members could direct enquiries to the website community group pages. Pim will work with Barry and Wilma to prepare a statement about the contribution the community groups are making. Work undertaken has revealed there is a bigger change needed to restore moderate health to the estuary.

Actions

- Staff will check the portal.
- Make a link in the briefing notes / and workshop notes to RDD freshwater update papers. All council agenda reports and minutes are on Council's website and are available here.
- Staff to send links to the Essential Freshwater consultation material as soon as it is released by the government and will consider bringing both the KPW and Rangitāiki community groups together for an information session.

5. The story so far – Knitting the story together

During the last nine workshops we have worked on values and interests, monitoring data, consenting material, reviewed science, gap filling to establish the key issues for each of the water management areas. The relevant information is on the website.

5.1 Water quality and ecological issues

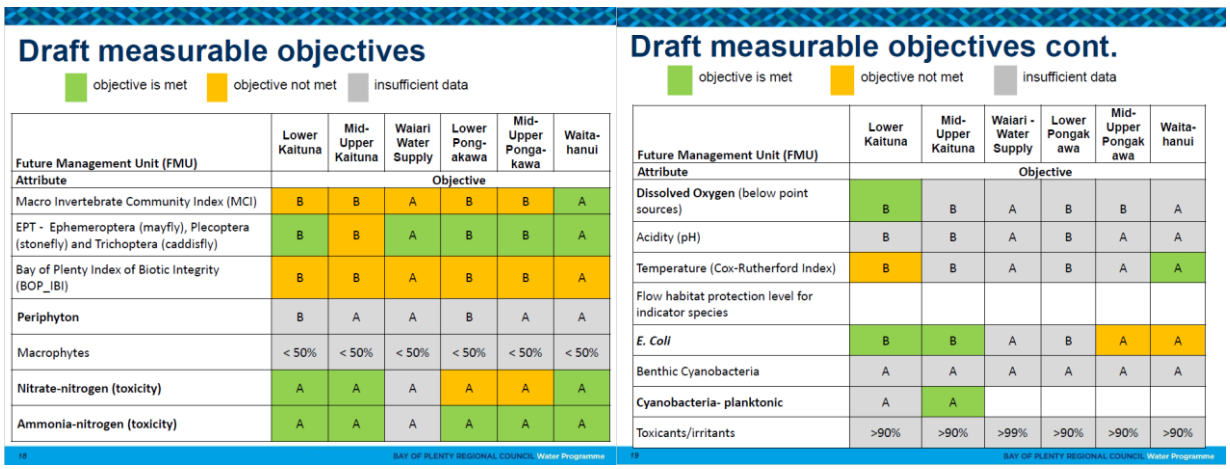
The big issues to be addressed are outlined in the presentation slide about water quality and ecology issues. Contact recreation is compromised some of the time. Algae growth in rivers and streams are generally not an issue. Nitrogen and ammonia are not at a toxic level in rivers apart from in some of the lowland drains. However elevated levels are contributing to unsustainable loads in the estuaries.

Scientists have recommended attributes and bands, undertaken gap filling data, provided advice on lowland drainage health and estimated contaminant loads for moderately healthy estuaries. We have also worked up two future scenarios C & D and three mitigation bundles – M1, M2 & M3.

5.2 Draft measurable objectives

Late last year, we provided a summary of draft measurable objectives that would support the in-river values and preferred states you communicated to us in Workshops 4 and 5, and those expressed in the *Kaituna: he taonga tuku iho – a treasure handed down*. Draft measurable objectives for rivers are summarised in Table 1 in the briefing note. In addition, Total Phosphorus, Total Nitrogen, Total Suspended Sediment, and *E. coli* need to be managed to support the values of Maketū and Waihī estuaries, and also the objectives set in the Regional Coastal Environment Plan.

We talked about in-river values in Workshop 5 and summarised what the groups have said, and also what the river doc *Kaituna he taonga tuku iho* says. Science staff married the values with the attributes and bands set in the NPS-FM and have recommended other regional ones. Science gap filling was undertaken, monitoring streams which are more likely to suffer from periphyton. River and stream beds in these catchments are mostly pumice which makes them less susceptible to periphyton blooms.



Draft measurable objectives

objective is met | objective not met | insufficient data

Future Management Unit (FMU)	Lower Kaituna	Mid-Upper Kaituna	Waiari Water Supply	Lower Pong-akawa	Mid-Upper Ponga-kawa	Waita-hanui
Attribute	Objective					
Macro Invertebrate Community Index (MCI)	B	B	A	B	B	A
EPT - Ephemeroptera (mayfly), Plecoptera (stonefly) and Trichoptera (caddisfly)	B	B	A	B	B	A
Bay of Plenty Index of Biotic Integrity (BOP_IBI)	B	B	A	B	B	A
Periphyton	B	A	A	B	A	A
Macrophytes	< 50%	< 50%	< 50%	< 50%	< 50%	< 50%
Nitrate-nitrogen (toxicity)	A	A	A	A	A	A
Ammonia-nitrogen (toxicity)	A	A	A	A	A	A

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Draft measurable objectives cont.

objective is met | objective not met | insufficient data

Future Management Unit (FMU)	Lower Kaituna	Mid-Upper Kaituna	Waiari - Water Supply	Lower Pongakawa	Mid-Upper Pongakawa	Waita-hanui
Attribute	Objective					
Dissolved Oxygen (below point sources)	B	B	A	B	B	A
Acidity (pH)	B	B	A	B	A	A
Temperature (Cox-Rutherford Index)	B	B	A	B	A	A
Flow habitat protection level for indicator species						
E. Coli	B	B	A	B	A	A
Benthic Cyanobacteria	A	A	A	A	A	A
Cyanobacteria- planktonic	A	A				
Toxicants/irritants	>90%	>90%	>99%	>90%	>90%	>90%

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Refer to slides 18 and 19 above. We are aiming for A & B bands. Green – shows the objective is already met. Orange – the objective isn't met. Grey – insufficient data to know if the objective is met. There is a lot of 'grey' where we don't have enough data. In some cases this is because we don't have a framework or monitoring in place yet, and in other cases we are waiting for central government to set national standards, for example for sediment, clarity. Our scientists considered coming up with our own bands, but do not want to duplicate effort if the government is already working on this.

With nitrate, the bands under the NPS-FM's National Objectives Framework are set for freshwater toxicity but it will be the estuarine receiving environment which will determine whether 'A' is good enough as that is where the issues are.

Q: You can be in the 'green' band but with a declining trend which means 'maintaining' A will still mean action is needed? A: Yes, the objective may be met now but if the trend is worsening, without action it could slip. REQUEST: It would better to show that the Objective is to maintain 'A' and also an arrow showing the trend to get a better sense of what is happening.

5.3 Have we captured all the issues in your view?

Nicki noted that the Rangitāiki community group have worked through a similar exercise and have agreed in principle that the issues and their draft measurable objectives are about right.

Questions:

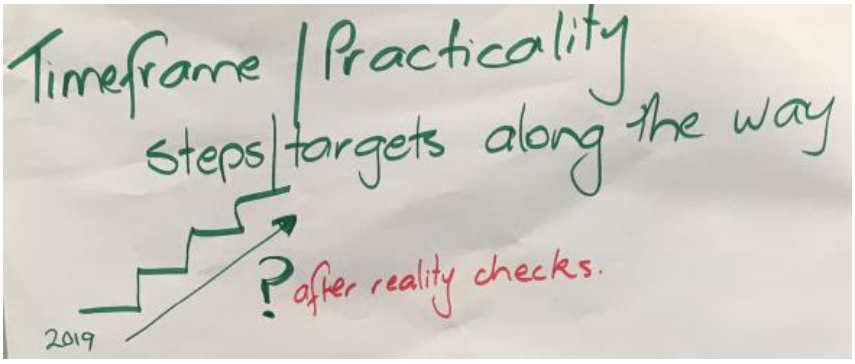
- Are there any improving trends? A: Ammonical trends are improving in some places, which signals improvement in effluent management within a catchment.
- What do A & B bands mean? A: A = near natural, B = impacts of human activity is showing but still in a good state, C = impacts of human activity obvious - still acceptable in terms of NPS-FM but impacted. D = unacceptable impacts - needs improvement.
- Why are there different objective bands set for the same river? A: If you are in an 'A' band you can't go backwards to a 'B' under the NPS-FM. As you go down a catchment some of the rivers are much more modified and may be in lower bands than higher up in catchments. In a highly modified river, striving for a near natural state may not be an appropriate objective to set. For example, invertebrates are impacted by different factors in different parts of the river. We have suggested setting bands to be practically achievable.

5.4 Estimated contaminant reduction

Some of you were concerned last time that the estimated load reduction didn't seem right as it was so similar to the natural load. We have discussed this with the scientists. The natural estimated load is if all the land in the catchment was in natural vegetation eg. if all existing land uses were changed to native vegetation. It isn't the estimated natural load if the whole system was returned to a pre human natural state. All the lateral flow would have seeped through the wetlands originally but the natural load has been modelled assuming the current stream configuration (i.e. directly channelled into the estuaries, rather than filtered through wetlands).

Questions:

- Is the change required unrealistic? It seems a daunting task if the improvement needed is to effectively change all current land use to native vegetation in the whole catchment because of the extent of wetlands lost from the catchment over the years. A: Yes it is a daunting task. We need to have further discussion about appropriate timeframes, targets or steps to get there. Or alternatively, whether it is appropriate to revise the desired objective the community group worked up and the river document have set.



- If the current catchment load of N is so high for the Kaituna, why are we diverting the Kaituna river water back through the estuary?
  A: Since 1979 people have been asking for the return of estuary flushing. The benefits of the flushing will have a bigger positive effect on ecology in the estuary than the increase in nutrients. The re-diversion will return 40% of the river's water through the estuary. *E. coli* concentrations were high in the mid 1990's. There has been a 500% decrease in *E. coli* since that time.

Tidal flushing around the estuary, taking out the causeways and re-creating 20ha of wetland will all contribute. The short answer is yes, there is a little bit of an issue with increased nutrients coming into the Maketū estuary as a result of the re-diversion, but the large flushing effect outweighs the negatives for the estuary. Waihī estuary still has streams flushing it.

There was some confusion with the nutrient loading estimates to the estuaries as Barry referred to a 2018 BOPRC memo[1] which gave preliminary loads, these estimates have now been updated. It was noted that the "Current catchment N load" of 534 mg/m^2/day tabulated for Maketū Estuary assumes the diversion has already occurred.

ACTION: The most recent memo about estimated contaminant loads for estuaries is here (pages 63 – 92). Staff will also make it available on the community group pages.

5.5 Management focus – water quality and ecology

As noted in workshop 8, scientific monitoring using these indicators, and modelling of nitrogen, phosphorus and *E. coli* indicates:

1. Sediment, phosphorus and nitrogen loads from human activities (i.e. productive land uses and discharges) contribute to current poor ecological health (like loss of native plants and fauna) and significantly affect recreational and mahinga kai values of Maketū and Waihī estuaries.
2. Water quality is safe for contact recreation / swimming at monitored freshwater sites, but worsening in Lower Pongakawa. Modelling indicates water quality may not be acceptable for contact recreation in some lower catchment water bodies. Science also indicates that Maketū and Waihī estuaries are affected. There may be localised *E.coli* hot spots in the WMA.
3. Current nitrate and ammonia concentrations do not pose significant risk of toxicity to aquatic life, but these nutrients can promote plant, weed or algal growth in the estuaries.
4. Algal growth in streams is generally not an issue.
5. Macro-invertebrate monitoring indicates ecological health is compromised in some lowland water bodies.

The results suggest the focus of water quality work should be on the following:

- Arresting increasing concentrations of nitrate and phosphorus
- Reducing sediment, nitrogen and phosphorus loads entering the estuaries, with a focus on reducing that generated by human activities, particularly in the lower catchments.
- Continuing improving trends (e.g, Ammonia in Kaituna River at Te Matai).
- Arresting worsening *E. coli* trends in Pongakawa catchment and water bodies with D or C band.
- Managing the risk of increasing *E. coli*, nitrogen, phosphorus or sediment generation if land use and/or practices change in the estuary catchments.
- Action planning to improve ecological health in lowland water bodies, as measured using MCI in particular.

[1] Stephen Park (2018): State (health) of benthic ecology in Waihi and Maketu Estuaries. Objective ID A2892930.

Maintain is what the NPS-FM say we must achieve or should we be aiming for improvement everywhere? In the Rangitāiki group, iwi members are asking why we aren't setting our aspirations higher to improve. Unfortunately, we don't have any iwi members present today.

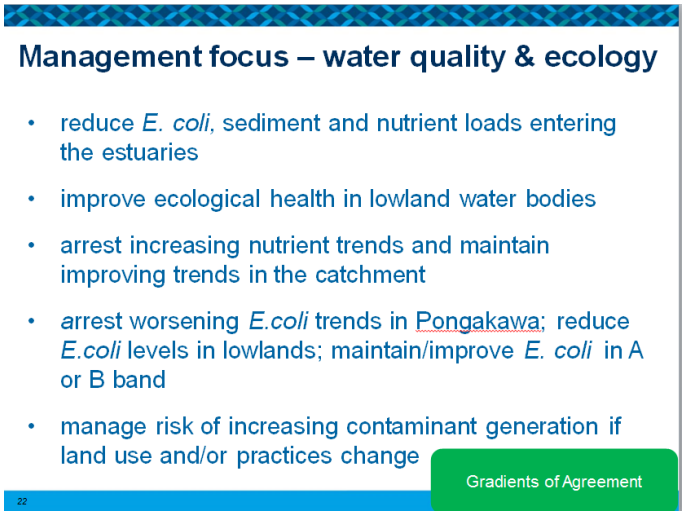
Questions:

- How often is source testing done for *E. coli* – eg. % avian vs non avian? A: We only undertake source testing at a few hotspot sites such as Kaiate Falls & Uretara Stream because it is extremely expensive. If there is an issue where *E. coli* needs to be reduced, the source will need to be determined for change to be effective. The DNA library is expanding. Maybe in 10 years' time we will be able to measure pathogens in water so testing for *E. coli* as an indicator will be redundant.

  How much of the *E. coli* is coming from avian sources vs other? A: Source testing tells you which DNA are present but not what % is caused by what. Ie. You will get an avian signature but not what %. Does it test for human sources? A: Yes but human sources are not usually a significant contributor.

5.6 Gradients of Agreement

What is your comfort level with this summary of issues and water quality management focus? After a couple of minutes chatting with neighbours, can we have a show of hands to gauge where we are at with the management focus outlined in slide 22.



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Most group members have a sense of where we are at, with 4 of the group in whole hearted support of the focus, 6 agree with minor points of contention and 7 support with reservation.

Those who are 3's (support with reservations) – what are your reservations?

- Data gaps – Is it all worth it given the extent of change needed. How far will we need to move to achieve it / how realistic is it? Re-evaluate the implications/ timeframe stretch – 25 – 30 years?
- Vagueness of management focus statements - what do they actually mean? At the end of the day it will be a tug of war about where the rubber hits the road. We will need to be specific.
- Agree with focus on improving estuary health and direction of travel but unsure about over what timeframe.
- Our brief as a group was to be realistic. 60% reduction in nitrogen can be done but the economic and social impacts are huge and too optimistic in a 10 year timeframe. We need a target for 10 years but longer to achieve the whole lot.
- Agree if it is an iterative process and takes longer but shouldn't lose sight of the goal.
- Reservations around the gradient of effort and impact around arrest/reduce/improve. The solution will require some really hard decisions not fiddling around the edges.
- Is there a model which is able to predict the speed of change needed? Can we identify the speed of degradation / improvement?

  A: We don't have good data on historical change. We can use historical photo analysis but it is very time consuming. We have gone back to 1939 aerial photography for land use in and around Maketū to inform the re-diversion work but haven't done that for the whole catchment. We also did this for Lake Rotorua catchment because of the long groundwater lag time. Lag time in the KPW maybe 30 years in this catchment as opposed to the much longer lag time in the lakes.

5.7 Summing up

In principle at a high level, community group members are generally in agreement about the focus but some have reservations about the implications - what we need to do, how long it should take, what are the economic and social consequences.

Actions

- The most recent memo about estimated contaminant loads for estuaries is here (pages 63 – 92). Staff will also make it available on the community group pages.

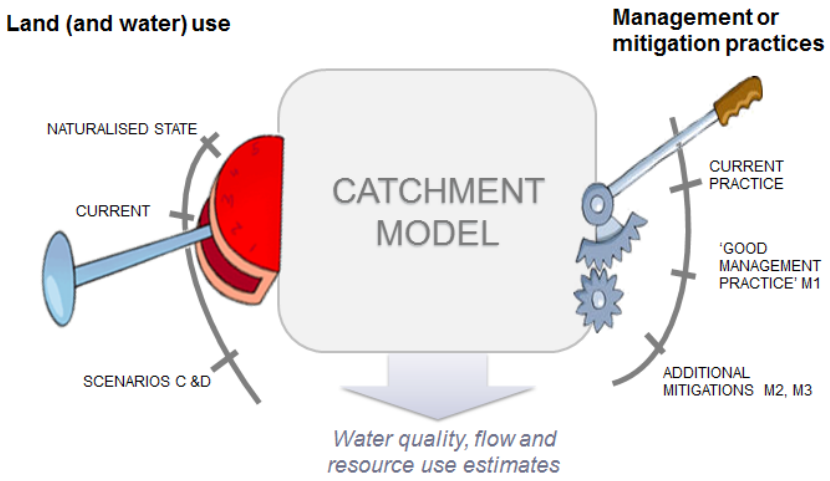
Requests / Suggestions

- It would be better to show that the Objective is to maintain 'A' and also an arrow showing the trend to get a better sense of what is happening.

6. Recap about Scenarios

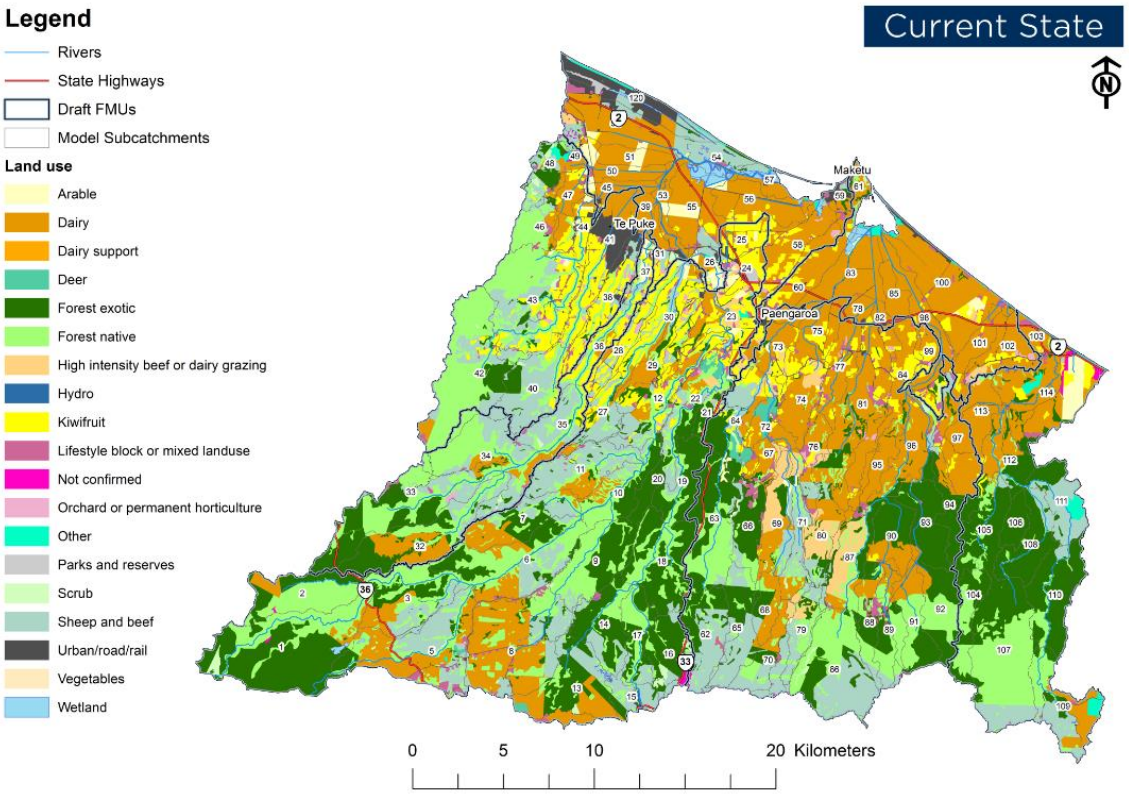
Santiago provided the group with a brief recap on each of the scenarios – natural, current and potential future land use scenarios C & D. Scenarios C & D are two alternatives of possible future land use. They were reviewed by staff, community groups and industry groups and have been used in the model to test the impact of land use change. In a general sense, we test what would happen when land use changes in the future or when people change the way they undertake these land uses in the future. It wouldn't be smart for us to set limits assuming no change in land use or practices. Members will remember the levers diagram.

Scenarios: exploring alternative futures

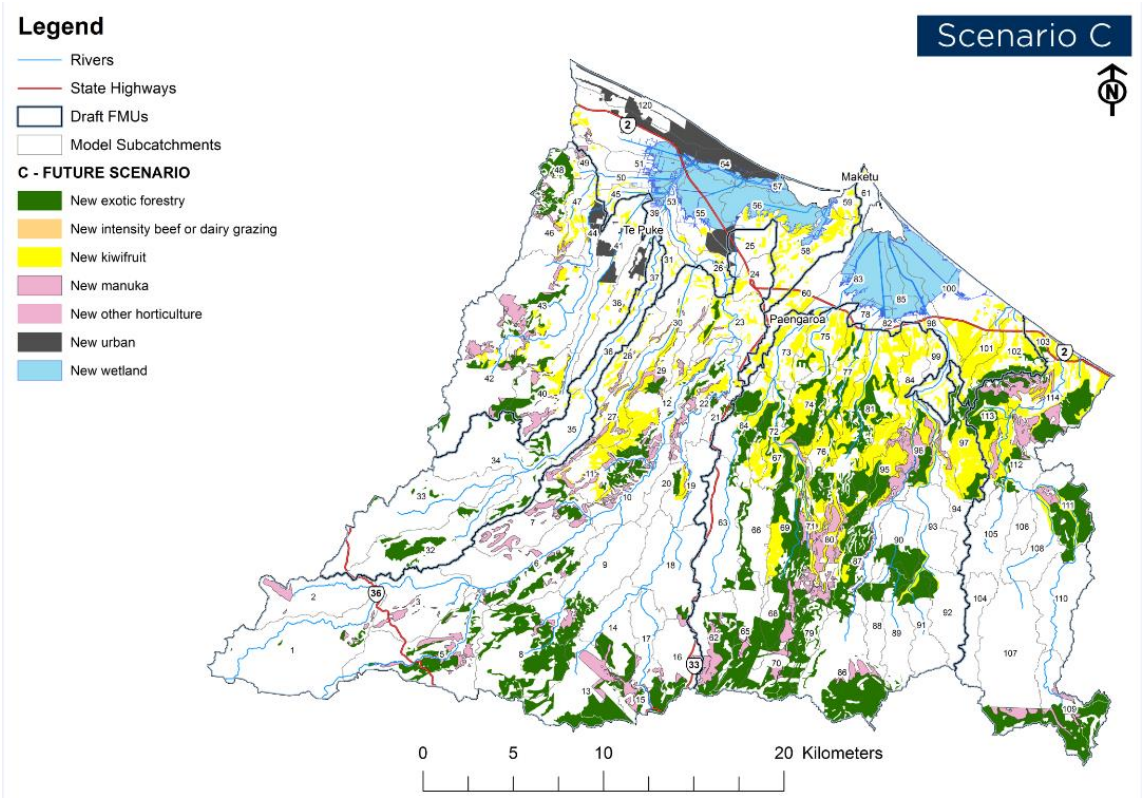


We are testing what happens to water quality and quantity (flow) under different land uses and practices. Ie. what happens if we move the levers in the diagram.

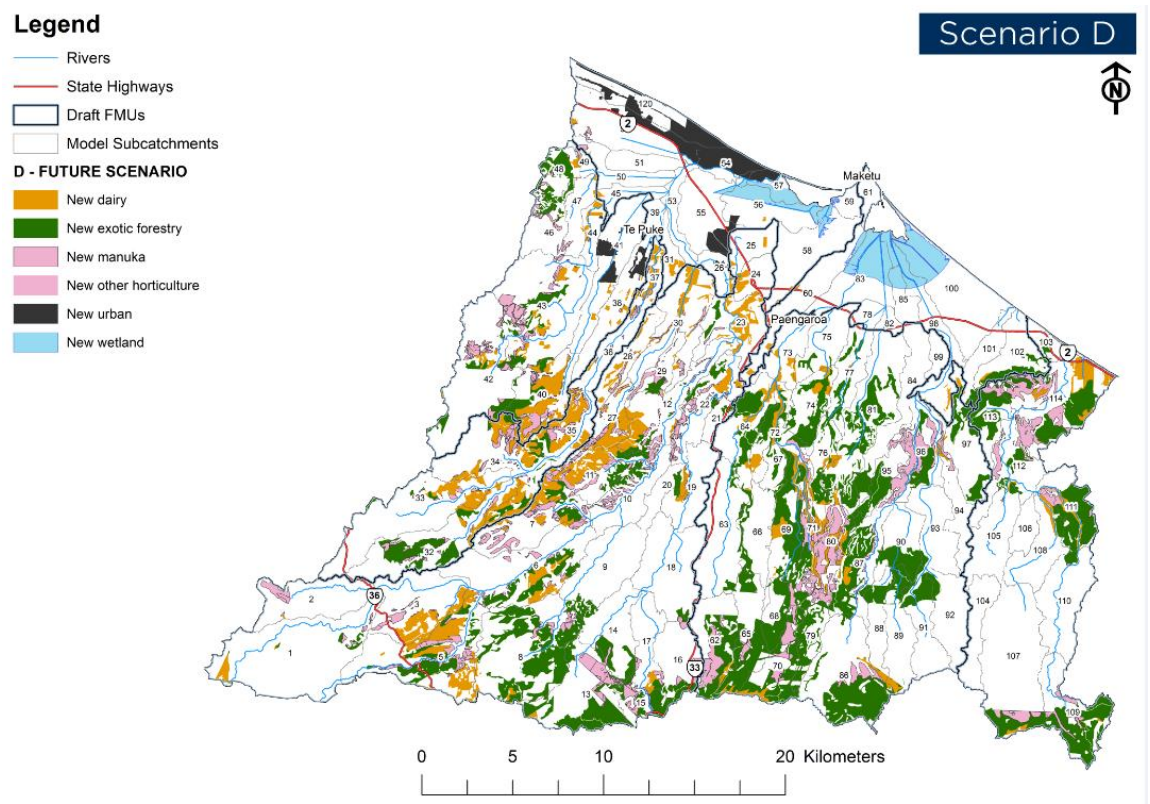
The following map below show the current land use - 2017.



The following map shows the difference in land use from Current (above) to Scenario C. **Scenario C** - expansion in urban growth, horticulture (kiwifruit), forestry and mānuka with wetlands extending over the full extent of estimated ~2050 sea level rise.



The following map shows the difference in land use from Current (two maps above) to Scenario D. **Scenario D** - expansion in urban growth, dairy, forestry and mānuka, with wetlands extending over part of the estimated ~2050 sea level rise.



Santi shared his diagram of the catchment model on the flipchart, illustrating that contaminants reach waterbodies through surface flow (N, P, sediment and *E. coli*) and base flow (N and P), and the scenarios described above.

6.1 Good practice mitigation scenario

In workshop 7 community group members looked at a range of management/mitigation practices that farm/horticulture enterprises could do to reduce sediment, phosphorus, nitrogen and *E.coli* coming from the land and entering water. The group helped to categorise these into lists based on whether they thought these practices are:

- Standard current practice
- Good practice that should really be expected of every farmer/horticulturalist – Mitigation 1 (M1)
- More advanced practices that might be more expensive or difficult to implement, but should also be quite effective - Mitigation 2 and 3 (M2 and M3)

Based on community group, industry organisations and professional advisors input, Council has developed a good practice scenario M1. Mitigation M1 has been modelled which is the focus of the results shared during the workshop. M2 & M3 haven't been modelled.

Mitigation costs and effectiveness have been summarised by Perrin Ag and Landcare Research (LCR), using Overseer. What are realistic assumptions about what good management practices are already in place? We have asked the community groups and also industry, and made some assumptions about that in the model.

Questions:

- Q: Are we still waiting on nutrient losses from kiwifruit? A: Yes, we are expecting to have information from NZKGI shortly.
- Q: Is Scenario D relevant anymore as the law is making it impossible to increase dairy footprint. Scenario C is already happening. A: Point noted. Purpose of scenarios is to test impact of alternative land uses rather than to accurately predict the future.

7. Modelling results - good practice mitigation scenario

The modelling results for good practice mitigation M1 were presented at the workshop for Total Nitrogen, Total Phosphorus and *E. coli*, alongside all of the results the group have seen before. We haven't presented sediment results yet because staff are awaiting sensitivity testing and further industry advice about the sediment losses from forestry. Staff also presented key conclusions based on the modelling, and asked members to consider and provide feedback on these.

At the last workshop some members were keen to understand the source of the contaminants causing issues. A broad summary of modelled data showing percentage load by land use for the whole of the water management area, as opposed to by each catchment, was provided. We acknowledge that some, including Ngāti Mākino, would find more useful percentage load by land use by catchment.

In looking at the numbers it is important to bear in mind this is a broad summary, total sediment loads are still subject to review after sensitivity analysis and information from the forestry industry and further information has also been sought about kiwifruit nutrient losses.

Questions:

- Q: What does the definition of 'lifestyle'; include? A: Primary land use rural / residential in nature < 4ha

7.1 Activity: Exploring modelling results

Each member was assigned to one of three groups according to the coloured dot on their name badge. Groups had 15mins at each of the three modelling results displayed on the wall:

- Total Nitrogen
- Total Phosphorus
- *E. coli*

Groups explored the modelling results with a scientist to explain what the maps were showing and record general discussion and questions:

Appendix 3 shows photos of the activity and all modelling result maps and text displayed on the walls. Raw notes / comments from the good management practice activity are recorded in Appendix 2.

Key discussion points:

- Do the results and conclusions seem about right to you?
- Would you draw other conclusions?

In summary:

E. coli

- Concern about model outputs and uncertainty and how the information will be used
- Some thought the results looked as they would expect, others felt specific sub-catchments needed further looking into. Sub-catchments 31, 52 and Kaikokopu Stream sub-catchment results did not seem right to some.
- Lowland drainage pumping not being taken into account by the model was considered an issue – reality vs modelled.

Nitrogen

- SUGGESTION: Could the modelling results be available in a GIS tool such as in google earth so results can be overlayed on an aerial photo to show difference in results going from current back to natural state or forward to scenario C and D and add mitigation 1.

- Noted social change needed in rural area – Scenario C compared to current requires a doubling of forestry and a reduction by one third in sheep and beef as well as dairy
- Low assumed leaching rate for kiwifruit in the model may be overestimating positive change achieved by scenario C and underestimating the impact if kiwifruit leaching is actually greater than modelled.
- Timing of best practice?
- Maybe we have assumed mitigation in place is better than it is
- Modelling can it go down to specific crops – can do but we haven't yet
- Modelling isn't showing much change from these mitigations. Is the modelling underestimating the impact of mitigation? If the model is right we'll need land use change as good management practice isn't making enough difference, to the point some members were wondering whether they are in fact worth doing.

Phosphorus

- Questions about hotspots. There is a level of information missing from the map such as slope, geology etc.
- Is SC8 right? It is currently dairy. Why is sub-catchment 77 high in natural P?
- SUGGESTION: It would be good to have maps showing tonnages. We can do that but having two spatial maps (yield and load) could be confusing. A member suggested perhaps load could be shown as a line graph not spatial map.
- Difference between current and good practice mitigation 1? All you see is grey which indicates no change, however, there are small changes in the right direction which aren't obvious because of the scale on the maps it appears as if there is 'no change'.
- Model doesn't incorporate potential short term bump in nutrients and sediment in forestry set up
- All looks about right
- Helpful to have sequential series if we add each of the parameters change
- How much P loss coming from each land use type?

7.2 Summary of group advice and feedback

1. Have we explained this information/science well enough? Group consensus was yes, staff have explained the material pretty well.
2. In principle, do you accept the need to achieve the reductions estimated? Yes
3. Any concerns, questions or suggestions?
   - ACTION: Can the maps be made available for the group in the notes. A: Yes - Done
   - SUGGESTION: for wider community engagement: Can maps have key features added – state highways, main rivers and roads to give people their bearings.
   - SUGGESTION: Some of the changes shown seem counter intuitive because of the scales and colouring used on the maps. Darker colours mean better on some maps but worse on others. Think about colours and scales on maps to be presented to the wider community.
   - Staff noted the challenge of communicating key messages with the wider community without the benefit of the time we have taken to explain the content with the community group members.
   - Are there industry agreed good management practices (GMPs) for each industry? A: Yes there are for most but council does not have a good level of data on who has taken up GMPs for each industry sector within catchments at an on farm scale. Some industry bodies such as Fonterra probably have good data but it is private unless permission is provided. We have asked industry to verify assumptions we have made about uptake of GMPs. At this stage we only have a broad estimate not benchmarked data.

Actions

- E. coli – check sub-catchments 31, 52 & Kaikokopu Stream results
- Phosphorus – check sub-catchment 8. It is currently in dairy. Why is sub-catchment 77 high in natural P?
- Make the modelling results maps available for the group in the notes. - Done

Requests / Suggestions

- Show modelling results in a GIS tool.
- Consider providing maps showing tonnages or show tonnage on maps as a line graph not spatial map.
- Suggest for wider community engagement: Add key features to maps such as state highways, main rivers and roads to give people their bearings.
- Consider scale and colours when presenting material to the wider community - some of the changes shown seem counter initiative because of the scales and colouring used on the maps. Some maps look like there is no change because small positive changes are all 'grey'. Darker colours mean better on some maps but worse on others.

8. Implications and conclusions

Nicki presented the material on the implications and conclusions slides. It is clear from the modelling results so far that requiring good management practice across all land uses can make a positive change, but not enough to reduce the nutrient reductions needed to achieve moderate estuary health.

Further nutrient reduction options will need to be considered including:

- actions requiring more substantial investment
- changes in farm systems/land use
- regulation and/or public investment in land/works.

Are you comfortable we start progressing assessment of 'hold the line' options and also advance consideration of 'reducing contaminant load' options?

There was general agreement from community group members present that staff need to do the work on good management practice options. They should also advance options for reducing contaminant loads to understand 'what's it going to take to get there' and over what period of time, focussing beyond the short term. Staff will work on these and put together policy options papers for the community group to consider further.

Some members felt that, without having the social and economic costs analysis, they could only agree in principle with the direction of change required.

Key discussion points:

- Q: Will we be considering options about what land is best suited for long term land use? A: There is discussion about optimal land use, however, regional councils have traditionally avoided going down the path of telling landowners what you can and can't use your land for. While we can see the benefit of using land use capability / optimal land use for environmental reasons it is harder to justify being so directive for economic and social reasons.

  A member noted councils would need to consider buying or constraining land use if you want to effect optimal land use change. Who pays, fairness, etc. all coming into considerations.

- Q: If we have accepted to go to M2 & M3 then move beyond that to achieve further nutrient reductions, how will we allocate nutrients? – natural capital is a whole other can of worms. A: If we are going to set load limits for the catchment and mitigation can't get us there, we will need to consider allocation.

- Q: Has anyone set limits / allocated nutrients? A: Yes, there are different examples of N allocation – Rotorua Lakes (Lake Rotorua catchment Plan change 10), Canterbury, Taupō, Waikato & Waipa catchments (Plan change 1 – first step benchmark / highest 25% land use within each sector).

- The cheapest option may be to buy the leakiest farms.

- Organic / biological system improvement, alternative agriculture could be a solution.

- Regional council could provide bonds to finance land use change.

9. Next Steps

Nicki noted that staff are also working on the next steps and sought the group's agreement to progress draft material about:

- options for "holding the line" and "reducing the load"
- options for targets and timeframes
- initial assessment of costs, benefits, affordability, social/cultural/economic/environmental impacts
- implications of national policy proposals
- uncertainties/information gaps and implications for decision making
- and also to progress further engagement with iwi/hapū and Te Maru o Kaituna and analysis of community group and community feedback to date

Next workshops

- Surface Water Quantity
- Groundwater Quantity - MODFLOW results
- Options assessments - 2020

Information for the public - Timing has not been set at this stage, bearing in mind implications of national policy proposals will need to be considered by staff.

Barry requested an update on Te Maru o Kaituna (TMoK) and iwi engagement. Jo let members know TMoK are working on their action plan to implement the river document. The river document needs to be recognised and provided for in the plan change we are working on. The objectives and desired outcomes in the river document are aspirational, and generally align well with the NPS-FM and the work the community groups are doing. Some members from TMoK are on the community groups and some community group members regularly attend TMoK meetings. TMoK are provided regularly with freshwater policy information including what the community groups are working on so both are aware of what each are doing in this space.

Working with TMoK does not replace iwi engagement. Staff have been progressing iwi engagement and are working on a summary document about tangata whenua values and interests. We will be checking with iwi that they are comfortable with the document before sharing it with TMoK and community groups.

10. Closing

Barry closed the workshop thanking everyone for coming together to work collectively on this freshwater work. He noted that several around the table may be standing for the up-coming local body elections and freshwater will be one of the big issues going forward.

He thanked staff for the willingness to having the Q and A session with the modellers. It showed clearly that there is a genuine commitment by staff to share this complex stuff with open and honest discussion about the assumptions and limitations of the monitoring data we have and the modelling undertaken.

Wilma also thanked everyone for their constructive and positive participation. Looking around the table and who is not present, she noted we have people that consistently attended and need to check in with those who are consistently not attending: ACTION. We have lost all our iwi members for today's workshop. Kepa came for the modelling Q & A session but unfortunately could not attend the workshop.

Steph closed the workshop with a karakia at 3pm.

11. Actions/Requests noted

Actions

1. Send notes of workshops out as soon as possible
2. Community groups to accept or amend the previous workshop notes at the start of the next workshop.
3. Correct workshop 9 notes as per Kepa's email and resend to the group – Done.
4. Send links to the Essential Freshwater consultation material as soon as it is released by the government and staff to consider bringing both the KPW and Rangitāiki community groups together for an information session about the proposed changes.
5. Check any issues with accessing the portal.
6. Make a link in the briefing notes / and workshop notes to RDD freshwater update papers. – Done. All council agenda reports and minutes are on Council's website and are available here.
7. The most recent memo about estimated contaminant loads for estuaries is here (pages 63-92) Staff will also make it available on the community group pages.
8. E. coli – check sub-catchments 31, 52 & Kaikokopu Stream results
9. Phosphorus – check sub-catchment 8. It is currently in dairy. Why is sub-catchment 77 high in natural P?
10. Make the modelling results maps available for the group in the notes. - Done
11. Check in with those who haven't been attending and consider filling representation gaps.

Actions from the Q & A session:

12. Can we learn any lessons from Hawkes Bay's (HB) use of SOURCE? WWLA did the modelling for HB so have included lessons learned. Staff could request some high level input from Nic Conlan, Jon Williamson or directly from Hawkes Bay RC about how they used the model in their decision making.
13. Provide Ngāti Mākino monitoring data for the Waitahanui - Done

Requests / Suggestions

1. It would better to show that the Objective is to maintain 'A' and also an arrow showing the trend to get a better sense of what is happening.
2. Show modelling results in a GIS tool.
3. Consider providing maps showing tonnages or show tonnage on maps as a line graph not spatial map.
4. Suggest for wider community engagement: Add key features to maps such as state highways, main rivers and roads to give people their bearings.
5. Consider scale and colours when presenting material to the wider community - some of the changes shown seem counter initiative because of the scales and colouring used on the maps. Some maps look like there is no change because small positive changes are all 'grey'. Darker colours mean better on some maps but worse on others.

Appendix 1

Key discussion points, questions and answers from the technical SOURCE modelling session for the Kaituna-Pongakawa-Waitahanui water management area

- Q: Is APSIM part of the model? A: Yes, the SOURCE model includes APSIM. We used APSIM (Agricultural Production SIMulator), to simulate nitrogen leaching from different land uses which were incorporated into the SOURCE model.
- Q: Does it also model water quantity? A: Yes that's right, it includes quantity as a water balance component. Council is also using MODFLOW to model groundwater quantity which is separate to this modelling at this stage.
- Help me to understand how it fits with environmental flow? A: This workshop is about surface water quality. There are other models such as MODFLOW which are specifically about water quantity. The next workshops about surface water and groundwater quantity will be more about environmental flows.
- We are using the SOURCE catchment model, is it used anywhere else in the country? A: Yes, it is an Australian model which has been used extensively throughout NZ, Australia and further afield for catchment modelling. WWLA have used SOURCE in Hawkes Bay, Gisborne, Northland and other places.
- How has water flow been calibrated in the model? A: We use all the BOPRC monitoring data. In these catchments there are 10 continuous flow gauging sites. We match modelled or simulated water cycle data against observed or monitored data, then if need be, we alter or calibrate the model to more accurately reflect the actual data at the monitored points and rerun the model. We don't do specific testing at all the points.
- How long has the SOURCE model been out there? Has it been reality tested or proved to work? A: Catchment model software has been more commonly used in the last 5-7 years. We have lots of long term actual data sets to match model simulations against. Where there have been good predictions of land use change, models have demonstrated they can produce reasonable results. We can't always predict land use change accurately which creates a source of uncertainty.
- Is the model BOPRC has selected the best for this purpose? A: Yes we looked at about 20 different models. This one was selected as it is commonly used across NZ and overseas, is open source (so we are able to look under the hood) and it can handle complex scenarios and catchments. Cost didn't discount the best model for the job.
- What is the typical standard deviation? A: These are in the technical report, and are expressed as descriptors about how good the calibration is for each of the four contaminants – very good, good, satisfactory and not satisfactory. E. coli has the poorest deviation mostly not satisfactory.

  It is important to understand what the model is good at and what it is not so good and be careful to use it as a tool at a catchment scale to inform policy decisions. The catchments have a mix of land use, geology, slope, rainfall, etc. which we are trying to model through a very complex set of parameters. On top of that we are modelling expected land use change.

  There is uncertainty. We don't have a full understanding of all of the biophysical processes, monitoring data is limited to specific points, mostly monthly over 20 years and we can only best guess land use change into the future.
- Is there more uncertainty within small catchments? A: Not necessarily, there are so many variables. Small catchments may have less or no actual data so assumptions are made based on similar catchments but that doesn't necessarily mean more uncertainty. Small catchments may have fewer land uses which is likely to result in more certainty.

- How do we make sure the model remains a tool and doesn't become regulation? A: How we use the model results is important. Policy planners will be taking advice from scientists and modellers about how we use it to assess policy options. A critical part of the process is to assess whether we know enough from the model or research to inform decisions to go down this path or that.
- It is important to note this model provides catchment scale results which aren't suitable at a property by property scale. You would need to use Overseer or similar for property scale analysis. A key limitation is the data we have. We don't fully understand E. coli and need to understand why the E. coli calibration in the model isn't great.
- How is the model going to be updated to take into account E. coli modelling limitations? A: If we compare catchments in forestry versus dairy, we are confident the model is providing general trends but not to the point of predicting E. coli loads accurately.
- Does E. coli reproduce itself in the environment? A: E. coli is a complex attribute. Yes, it can regenerate in the environment if a number of factors such as temperature are right. Q: By the time it gets to groundwater E. coli it would be dead wouldn't it? A: Again that is complex, it depends on the flow path it takes to get there. For example, as E. coli makes its way through the ground it can be absorbed into sediment but would generally be absorbed and die off if the E. coli stays in groundwater for any length of time.
- What timeframe is the model working to? A: The model has been calibrated using monthly monitored data over the last 5yrs, which is likely to be most representative of current land use. For the previous periods there is a lack of data for some aspects such as older land use layers.
- How does it handle peak flows? If data is only collected monthly are we potentially missing the peaks? A: We are confident the model will predict peak flows as there are enough continuous flow gauges in the catchment which the model has been successfully calibrated to. The model provides daily and sub-daily data but it is limited by the monthly quality data points. Some peaks will be missed if they fall between monthly data samples which will mean some loading will be missed.
- Can we learn any lessons from the Hawkes Bay? A: WWLA did the SOURCE modelling for Hawkes Bay (HB). We have used lessons learnt from that work, however, HB have different physical parameters, different mix of land uses (horticulture mainly grapes), data, sensitivity testing, etc.

  Performance of the model - How did HB use the model in their decision making process? Hawkes Bay may have used it in a different way.

  ACTION: Nic Conlan was heavily involved in the Hawkes Bay as was John Williamson from WWLA. We could get some high level input from Nic, John or Hawkes Bay RC directly. SOURCE is still being used in Hawkes Bay, Waikato and Wellington.
- There are multiple catchments within the model. Can it provide results for individual catchments, and if so, what is your confidence in it? Do you have sufficient data in the Waitahanui catchment to make any reliable conclusions?

  A: Yes, sub-catchment specific results can be provided. Confidence varies between contaminants and catchments and all the detail is reported in the full technical report. Modellers are reasonably comfortable with the model's performance and calibration in the Waitahanui. Response by member: Unless you have pretty good data, a model's outputs and reliability are compromised. You can't claim confidences of any sort. You can't develop a trend line with one point. Confidence levels should be referred to specific catchments. ACTION: Ngāti Makino asked for the data last time and haven't been provided it yet. A: There are three monitoring data points in the Waitahanui

catchment in the locations shown in the technical report. We haven't provided the raw data which isn't in the report. We apologise for dropping the ball and will get that you.

- The model has all the sediment occurring in the upper 40% of the Waitahanui catchment even though the pines have been harvested. The model is showing 80% of the TSS being generated there based on no actual data. We are not happy with the calibration of sediment and *E. coli* and number of data points in the Waitahanui.

  A: The modellers have stated their level of confidence, expressed for each catchment and each contaminant which is in the technical report and have general confidence in the model. You can never have enough data on these projects, it is what it is. We are being honest about the data and model limitations and are undertaking further sensitivity testing regarding forestry harvesting and sediment. We have also shared with the group that the model isn't great at predicting *E. coli* loads.

- The land management teams are starting to focus their advice and support in catchments to improve specific water quality hotspots. This will include increased localised monitoring which will improve modelling and information over time.

- As time goes on, is there an intent to improve monitoring/data and will there be the flexibility to review and update the model over time. A: Yes there will be step by step reviews.

- Since we have been working on this project have we got further data? A: Yes we have undertaken some annual snapshots (monthly samples over a year) in some smaller tributaries where there were gaps.

- Is monitoring data from point source discharge consents being added in? That data must be useful and used. A: Yes some is useful and larger discharges have been used in the model. Continuous flow data does however result in a huge data increase.

- One member made the observation that if each individual property has to have a resource consent you would get property by property scale data for a catchment which would be useful but would be expensive and time consuming for property owners.

- Is it better to do one catchment properly rather than having bits and pieces all over the show? A: Focus catchments would have monitoring plans to show return on investment on targeted interventions. The NPS-FM requires council to set in place a monitoring plan appropriate to achieve the plan. Part of the planning process will be to identify monitoring points in each freshwater management unit (FMU).

- How do we propose to improve the model? Ngāti Mākino Iwi Authority (NMIW) is interested in using the Waitahanui as a pilot and consider it a good place to start. It is a simple catchment where NMIW have an influence over much of the upper catchment which means we can get good data to calibrate to the model. NMIW have nominated seven monitoring sites and are doing the work anyway. We have asked council to share the cost. There was a move to collaborate 3-4mths ago but higher up have put a stop to it. We aren't interested in going to court to prove we are right all the time but would rather put that effort into improving data to make the right decision.

  Reply: We acknowledge what NMIA are proposing and there is another conversation to be had about funding. The big issues we are seeing in this water management area are in the two estuaries.

- Does the model forecast storm events? A: We are using past data to date and haven't yet predicted into the future / climate change scenarios. Our scenarios C and D have increased sea level, increased extent of wetlands. We haven't factored in climate change at this stage but will be.

- The estuaries are in very bad order. Would it be appropriate to have more data down in the lower area? A: Not necessarily, good data in the higher parts of the catchment can be useful to determine the source of contaminants. If you concentrate all data points at the bottom of the catchment then you know the cumulative result but not how far up the catchment the contributions are coming from. Nirvana would be to have data at a property by property scale.

Appendix 2 – Notes from good management practice modelling results activity

E. coli – A-D band modelling results

- In places, results show a jump of two bands with mitigation 1 in place which doesn't seem realistic?
- Produce maps for economic impact of mitigation
- Results for sub-catchment 31 don't look right?
- E. coli band for the Kaikokopu seems wrong?
- Scenario C getting to the same amount of kiwifruit as 10 years ago and happening now.
- Please confirm E. coli yields from forestry – don't seem logical, what are the stocking rate assumptions?
- Sub-catchment 52 decreasing E. coli bands with mitigation changes which doesn't seem right
- This looks like a great outcome for estuary health & for community health.
- Does it go far enough? M2 & M3 needed
- Looks right
- Lowland pumping stations aren't taken into account
- Create a monitoring site at or along the Kaikokopu awa even to get an annual set of data, not at SH2 but closer to the estuary.

Total Nitrogen

- SUGGESTION: Could the modelling results be available in a GIS tool such as in google earth so results can be overlaid on an aerial photo to show difference in results going from current back to natural state or forward to scenario C and D and add mitigation 1.
- Noted social change needed in rural area – Scenario C compared to current requires a doubling of forestry and a reduction by one third in sheep & beef as well as dairy
- Low assumed leaching rate for kiwifruit in the model may be overestimating positive change achieved by scenario C and underestimating the impact if kiwifruit leaching is actually greater than modelled.
- Timing of best practice?
- Maybe we have assumed mitigation in place is better than it is
- Modelling can it go down to specific crops – can do but we haven't yet
- Modelling isn't showing much change from these mitigations. Is the modelling underestimating? If the model is right we'll need land use change as good management practice isn't making enough difference, to the point some members were wondering whether they are in fact worth doing.

Total Phosphorus

- Looks right
- Would be good to have total tonnage change from M1
- Why is sub-catchment 77 high in natural P?
- Short term effects after development are not modelled (eg. kiwifruit)
- Change from mitigation is not shown clearly because the scale is too big – all looks 'grey' = no change