

Rangitāiki Freshwater Futures Community Group Workshop

6 Notes: Catchment modelling scenarios and use values

Galatea Hall, 50A Mangamate Road, Galatea

Wednesday 20 September 2017 commencing at 9.00am

Members present: Larry Wetting (Chair), Alamoti Te Pou (Deputy Chair), Kerry Snowden, Bill Kerrison, James Doherty, Nick Doney, Colin Maunder, Linda Conning, George Johnston, Christina Bunny, Matt Osborne, Councillor Bill Clark, Steve Brightwell, Ngapera Rangiaho, Craig Rowe, Cathy Brown

Apologies: Simon Stokes, Kirsty Joynt, Tom Lynch, John Gibson, Beverley Hughes

BOPRC Staff present: Kerry Gosling (Facilitator), Stephanie Macdonald (Facilitator), Nicki Green (Senior Planner – Water Policy), Santiago Bermeo (Senior Planner – Water Policy), Michelle Lee (Planner – Water Policy, scribe).

Observer: Richard Turner (for Trustpower)

Related documents previously circulated:

- 1 Workshop briefing paper – Catchment modelling scenarios and use values.
- 2 Workshop presentation.

Click [here](#) for these online.

1 Welcome/updates/focus of the day

James Doherty opened with a karakia.

Richard Turner was introduced as the Trustpower observer, who is standing-in for Kirsty Joynt.

1.1 Agenda, purpose and updates

Nicki explained the work programme and current progress. Kerry introduced the purpose of the workshop, and the agenda for today.

- Freshwater use values.
- Catchment scenarios and modelling.
- Check land use practice assumptions by sectors.
- Check future land use map by areas.
- Management options and criteria preview.

Questions/comments:

Restoring river beds: Following recent multiple flood events and engineering works within the river in certain locations, members are concerned about the damaged state of aquatic habitats. Members seek timely responses for river-bed habitat restoration. Thornton Lagoon was mentioned as an example, by a group member as a location that took 30 years to be re-opened.

Change of schedule: A member queried if parts of today's workshop agenda were planned for a sub-group. Staff clarified that due to the entire group's interest, those topics are now for discussion by the whole group. The member wants to ensure that others are given opportunities to discuss all elements during workshops. Staff noted the difficulty of covering all aspects of work within workshops, but all technical reports will be made available for members as they are finalised.

Engagement: A member questioned the necessity of engaging the wider community (scheduled tentatively for March 2018) given the group already represents the community. Staff explained water management may have wide implications, so wider consultation is needed, and is a legal requirement under the RMA. Regional Councillors are to decide the final content for Plan Change 12. Members also discussed the role of the Rangitāiki Tarawera Advisory Board, which includes representatives of those ratepayers who contribute to special river drainage scheme rates. A member noted that unlike that Board, this community group is focused on freshwater management. A member also asked to be informed about the Rangitāiki River Forum's work.

Actions:

- 1 Council staff to share an update about in-river habitat restoration associated with post-flood engineering works after ex-cyclone Debbie.
- 2 Forum members to be informed about Rangitāiki River Forum's work and the interaction between different groups/board/forums.

2 National updates

A brief outline was given of changes made to the National Policy Statement for Freshwater Management 2017. Refer to fact sheets on the Ministry for the Environment's web-site [here](#). Stock exclusion regulations have not been progressed by the government at this stage.

3 Freshwater use values

Staff explained how freshwater use values are being considered in the process of setting freshwater objectives, limits and methods.

Staff outlined the sources of information they are using to identify water quality and water volume needs for various water use values and asked members whether there were any other sources they knew of.

Members expressed their concerns about the cumulative burden of regulations (environmental or otherwise) and possible negative economic implications, compliance cost, impacts on economic returns, and affordability, particularly for small scale farmers. Staff explained that when management options are considered in more detail later in the process, each will be assessed against its costs and benefits.

Question/comments:

River needs: A member pointed out that the water quality and volume needs for natural habitat is important and should be discussed here. It was explained that an extensive discussion on in-river values and needs had been carried out in previous workshops (three and five).

Forestry: It was suggested that the National Environmental Standard for Plantation Forestry (NES-PF), due to come into force in 2018, provides a good reference point for what would be standard practice for the forestry sector in the Rangitāiki. The Timberlands web-site also details Timberland's practices.

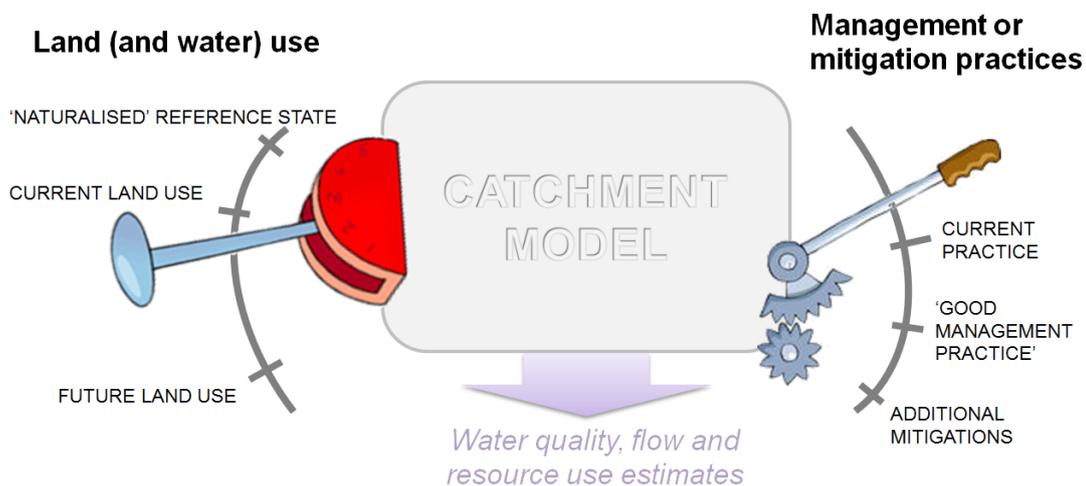
4 Catchment modelling

Staff discussed how land use impacts on waterbodies are not directly evident. The purpose of modelling is to identify the key sources of contaminants, to determine which are caused by humans and which are not, and to estimate what will happen to waterbodies if land-use and management practices change in the future. The model looks at both water quantity and water quality (in terms of nitrogen, phosphorus, sediment and *E. coli*).

The model only looks into bio-physical aspects. Economic implications will be assessed separately once we narrow down potential management options.

The diagram below is a conceptual description of the model, in which the two main "levers" are land use (and associated water use) and management practices in the catchment. The model outputs are estimations of water flow and quality in the river at certain points, which will enable us to assess which "lever settings" provide for use and in-river values, and which do not.

Throughout the course of this workshop, staff asked group members to help define each "notch" for both levers in more detail.



Key presentation slides are shown in Appendix One of this workshop note. A list of notes and assumptions of the [scenarios](#) was handed out to members. These are:

- Reference State - No human land or water use and land cover is only native bush or wetlands. It estimates the background levels of contaminant and flow profiles in water bodies; important to bear in mind that the water bodies would naturally contain some nutrients and sediment. This is somewhat akin to the "control setting" in a science experiment.
- Baseline scenario - Current land and water use and management practices
- Development scenario - the likely future land and water use

Management or Mitigation Practices

- Current Practice
- Good Management Practice
- Good Management Practice and Additional Mitigations

Staff hope to be able to present outputs of modelling for the reference state, baseline, and potentially development, scenarios at the December workshop. The group is set to discuss the mitigation scenarios next year.

Questions/comments:

Natural land cover: A member noted a large part of Rangitāiki catchment is currently in a natural state, so we should have a fair idea for what water quality is like based on those areas. Staff noted that the catchment includes different soils, geology and slopes which might generate more or less contaminants than the forested portion of the upper catchment, so we model a reference state.

Climate events: Members asked about how the model accounts for flood events, such as recent events, and changes in the course of the river. While the model captures changes of rainfall over time; it assumes the river course stays the same instead of predicting how the river shape may change.

Land use types: Staff noted a higher level of uncertainty is involved with more novel land uses as we don't necessarily know the water use and discharges for new crop types are, therefore more assumptions are required.

5 Current land and water use scenario

5.1 Assumptions about current land use practice

Staff explained how the Current Land Use Scenario is based on the current land use map, which members have previously given feedback on (Workshops one and five). The model estimates contaminant generation based on some land (and water) use practice assumptions from published research papers. In some cases the model assumptions for a particular land use may be different to local practice. While no two farms are the same, staff asked members, stakeholders and farm consultants to check if the assumptions are reasonable for the average farm/orchard for each major land use type across the catchment.

Members were grouped by sector (dairy, forestry, kiwifruit, maize, sheep and beef, vegetable). All members were invited to join a land use group. An additional group was created to represent the interests of landowners who do not directly manage land use. Groups were provided with a list of land use practice assumptions (file A2801041), and a worksheet to consider and work through. The key questions are:

- 1 Do the assumptions reflect what is going on in the catchment, on average?
- 2 Which assumptions should be changed? Explain where and how practices differ. Can you point us to information/evidence that will support your opinion?
- 3 Is practice in one part of the catchment so different from another part that we should have two different sets of assumptions for the same land use?
- 4 What other information will be helpful?

The output from this activity is listed in Appendix Two.

Action:

- 1 Council staff to clarify how to categorise deer and respond to member.
- 2 A member from dry stock farm will seek more detailed information from Sheep and Beef owners.

Current water use practice

Current water use assumptions are based on either actual metered or estimated use. This work is yet to be completed by Council.

Comments/questions:

Consenting: New resource consent applications for water use are required to document use purpose and efficient use. A member noted that domestic water users should consider using rain water for grey water use. It was noted, that hydro power scheme use should have been listed, that operators monitor water use.

6 Development scenario by area

Staff have talked to Dairy NZ, kiwi fruit industry, and Central North Island Iwi Land Management Ltd (as the largest landowner in the catchment) representatives to understand future land use change patterns. The proposed Development Scenario maps used for this exercise also drew information from previous workshop exercises (Workshops one and four). In summary, the proposed scenarios suggest that in the lower Rangitāiki, sea level rise and higher water tables may result in some land below Edgecumbe becoming unsuitable for agriculture. The area above Edgecumbe to the bottom of the dam would see some conversion from dairy to kiwifruit.

The Kāingaroa Forest has a relatively large amount of land that would be suitable for more intensive or higher value land uses (based on Land Use Capability class). The challenge for CNI Land Management, as the land-owner, is that they do not know too far in advance where within their forest land is going to become available for conversion as harvesting decisions are undertaken by their lessee and respond to market conditions. Once areas of the forest are re-planted, these are likely to be locked into that land use for 30 years. Carbon liabilities under the Emissions Trading Scheme are another obstacle to converting from forestry. Nonetheless, for the purpose of this exercise, it was proposed that an area of about 30,000 hectares of land to the west of Murupara, straddling SH38 would be converted into horticulture or pasture.

No future land use changes were suggested for Waiohau, Galatea, Minginui, Rerewhakaaitu, the top of the catchment or Te Urewera/Whirinaki.

Staff also noted that Landcare Research had looked into land use change as part of an exercise based on ecosystem services at the end of 2016. Although the model and approach used was different, that exercise still produced various versions of the future, which could be adopted as a future land use scenario in our catchment model.

Members were asked to identify what the future land-uses might be in different parts of the catchment. During this activity, groups considered maps of current land use by areas of the WMA (Upper Rangitāiki, Rerewhakaaitu, Minginui, Kaingaroa Forest, Galatea, Waiohau, Te Teko, Lower Rangitāiki). Each group was also provided with land use capability information and proposed future land use for the lower Rangitāiki and part of the Kāingaroa Forest.

Groups were provided with a worksheet to consider future development scenarios. The two key questions are:

- 1 Which future land uses should be changed and why?
- 2 Other comments?

Comments/questions:

Climate Change: Members commented that climate change may bring different crops. Landowners know what their land is capable of, but not sure of the markets. For example, organic plants and farming depend on the global market at the time, which could determine land use decisions.

The outputs from this activity are listed in Appendix Three.

Actions:

- 1 Council staff to share Landcare models
- 2 Member to send Forest Management Plan to staff

7 **Management options and criteria**

During this activity, members were asked to provide feedback on a draft list management options. The options were based on community group input from previous workshops (from workshops 5 and 5b), with all community group members (i.e. including Kaituna and Pongakawa, BoPRC objective file A2701751) and staff research.

Management options have been categorised by the attributes (sediment, nutrients, quantity and pathogens) they address. BOPRC has also further categorised the options into 'in-scope' or 'out-of-scope' of the current Plan Change 12 (Freshwater quality and quantity) project. The list of management options is still draft for members to provide further feedback and add new ideas. Note that in later workshops, more filtering and assessment will occur based on criteria, which community group members also provided input to during workshop 5.

Members were asked to work in groups and to consider the list of management options, and particularly whether any options should definitely be considered or definitely not be considered.

Key feedback from this activity is listed in Appendix Four.

Staff noted that initial model outputs would be critical to determine where contaminants are coming from, and therefore which management options should be considered in more detail and where.

Comments/questions:

Cr Clark queried how far back do we have *E. coli* monitoring records and what do they show?

Staff were mindful of the importance of management options and the limited time to consider all sections. An online survey exercise on management options could be circulated ahead of the next workshop to get more feedback from community group members. We expect to discuss this in more detail at the future workshops.

Actions:

- 1 Council staff to respond on the period and indications of *E.coli* monitoring records. For informing the contaminant source in the past and present
- 2 Members to provide further feedback to staff on management options through online survey exercise
- 3 Allow time and space for members to discussion management options further.

8 **What's next**

Kerry advertised the "Hands on Water Expo" occurring Thursday 9 November 11 – 2pm, Redwood Valley, Allport Road, Pongakawa. RSVP to Kerry.Gosling@boprc.govt.nz by Wednesday 1 November.

The next workshop is planned in December. We will look into the modelling outputs for: reference state, Current Land and Water Use Scenario, and hopefully, Development Scenarios (future land use). Modelling outputs for mitigation practices scenarios are expected to be available in January/February next year. At the next workshop we expect to have further discussion on management options and mitigation practices.

Members reflected more discussion needs to happen amongst the group members, however, the workshop format seems to be staff presenting to the group for feedback after a lot of work had been done. Members feel there were good discussions, and welcomes further discussion and better understanding of each other's perspective. The discussion is really important.

Kerry checked the members' preference for an on-line forum. Most members prefer face to face discussion.

Action:

- 1 Consider more opportunities to allow group members to have discussions among themselves.

Workshop ended at 2.36 pm with a karakia.

Appendix One - Key presentation slides

A full copy had been distributed in the workshop. Click [here](#) to see for complete version [online](#).

Purpose of this group

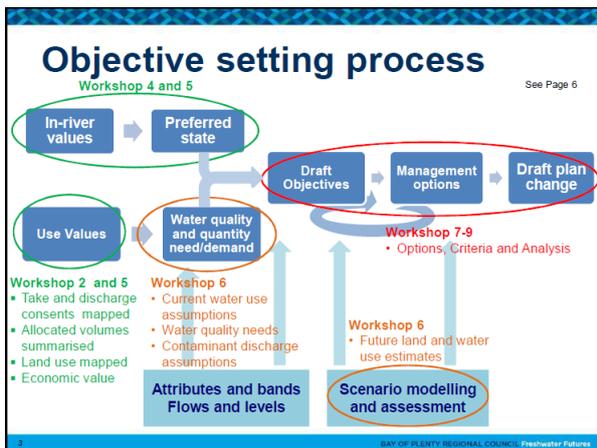


To help Council implement the National Policy Statement for Freshwater Management:

- confirm values, express preferred objectives
- provide feedback on limits for freshwater quality and quantity within this Water Management Area
- provide input to solutions for managing activities to meet those limits
- advise Council in their decision-making for Plan Change 12

Outcomes sought today

- Community group comfortable that we are appropriately considering use values
- Feedback/agreement on purpose and assumptions of catchment modelling scenarios:
 - Baseline land and water use assumptions
 - Development scenario – future land and water use
 - Reference state
- Start discussion on possible management options and assessment criteria



Use values

– workshop 3

Blue -NPS
Black- Additional values

Draft Regional Freshwater Value Set – Use Values

Irrigation, cultivation and food production
Animal drinking water
Municipal and domestic water supply
Treated wastewater discharge
Urban storm water drainage and discharge
Commercial and industrial use
Hydro-electric power generation
Flood water conveyance

Use values – what we need to work through

Covered so far:

- ✓ Identified and mapped consented use values (take, use and discharge), and land use
- ✓ Summarised consented takes and discharges by industry
- ✓ Estimated economic values of those activities

Yet to cover (starting today):

Estimates

- Actual and “reasonable” use and discharges
- Water quality needs – in the water body

Scenarios

- Future use and discharges – water quality and quantity needs

Modelling

- Will water quality and quantity provide for current/future use AND in-river values?
- If not, what needs to change?

Understanding current water quality and quantity needs

Use Values	Quantity	Quality
Municipal water supply	Consents and monitoring	Drinking water standards
Domestic water supply	Estimates	
Hydro-electric power generation	Consents and monitoring	Consents and monitoring
Animal drinking water	NZCP1 for dairy	NZCP1, ANZECC
Irrigation, cultivation and food production	Consents and monitoring, model estimates	ANZECC, GAP, NCP1 for dairy
Commercial and industrial use		
Treated wastewater discharge	Consents and monitoring, codes of practice material, modelling estimates	
Urban storm water drainage and discharge		
Flood water conveyance (+ drainage and discharge)		

Proposed assessment criteria

1.	Effectiveness – environmental outcomes
2.	Effectiveness – socio-economic outcomes
3.	Distribution of costs and benefits
4.	Practicality
5.	Adaptability for landowners
6.	New entrants, and development by existing users, allowed for within environmental constraints
7.	Tangata whenua assessment
8.	Consistency with other initiatives and obligations
9.	Resilience to climate change
10.	Administrative/staff resourcing costs

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Next steps

- Catchment model outputs
 - Water quality now and future
 - Water quantity now and future
 - Contaminant sources now and future
 - Water users now and future
- What does this mean for in-river and use values?
- Mitigation scenarios
 - aim to serve all values
 - in reality, there will be costs and benefits to weigh up

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Appendix Two - Sector groups land use assumptions

The group discussed seven land use sector assumptions in small groups. These sectors include: landowner, dairy, maize, vegetable, forestry, kiwifruit, and sheep and beef.

Landowners

- Land use not fixed. That 99 year lease is a less preferred option
- Interested in diversifying land use
- Access to water for economic purposes needs to be available, and left for whānau, hapū and iwi to determine for themselves
- Allocation should be fair to all rather than the current 'first-in-first-served' basis
- Pressure on RMA
- Māori land remaining in Māori land title with multiple owners. Contrary to some views, Māori land owners do care about land value – it plays a role in setting lease values.
- Lease agreements in the future will seek to mitigate negative environmental effects of land use
- May leverage land when necessary.

Maize

- Could there be a shift to mānuka? Bay of Connection is pushing mānuka in the Bay of Plenty
- Maize takes quite a lot nitrogen to fill it out. Uses more N than dairy.

Vegetable

- Vegetables could use a lot N in one hit, more than what a dairy farm use for a year. 50 kg/ha fertiliser at planting seemed light
- Kumara, asparagus, potatoes (leased). Te Teko: sweet corn, water melon, kamokamo and had previously tried onions.

Sheep and beef

- Different practices on large stations
- Deer – mapped together with sheep and beef - deer is a huge part of Rangitāiki Station, but not represented separately in the land use map.
- The two stations are huge and it is important to get the assumption right. Some members will seek more detailed information from owners.

Kiwifruit

- Gold vs green variety – different crop loading
- Te Teko – Zespri monitor farm should be used to develop assumptions
- Bud numbers vary for gold and green – current numbers are wrong
- Fertilising green tip, flowering and post-harvest. Timing wise, the bud break and the flowering depending on the timing of the frost
- Water used for irrigation in summer

- Water used for frost protection in winter
- Winter drainage in could be an issue in this part of the region
- Land use change coming – new orchards need more N
- If a resource consent is needed for water take for irrigation, it's likely to use that bore/spring water for frost protection. But if it is just for frost protection only, it's probably not economical
- Zespri will have more information.

Forestry

- Current assumptions incorrect
- NES-PF will determine standard practice to a large extent.
- Summary of management practices showing what 80% of the forestry industry does, responded to altitude and climate
- Winter (not summer) planting
- 800/ha in the north of catchment and 1,000 per ha in south - depending on altitude. For Rangitāiki the division is near the belt with denser planting in the north (map drawing A2709685)
- Terrain and soil types (eg flat pumice vs steep ash) affect practice, eg pumice flat have very little run off, but the steep ash land more subject to storm damage.
- Some cultivation occurs on less steep land due to compaction at felling
- The research and science for cultivation on 20° slope is constantly evolving
- Setbacks from streams – the results will be seen in future (10 years) when harvests
- 25 year rotation – harvest period probably most impact on water quality
- Roading and sediment cause the biggest effects based on LUC. Forestry NES is stricter.
- Second and third generation plantings will have less earthworks for new roads so less effect on waterways. The fourth rotation has now started
- Machines compact soil
- Humus layer building up with needle layer
- Hand application of N at planting only – possibly more use in future – research underway on good practice.
- N leach from plantation pine leaches less than native forest (2.5 kg or 1.5kg? - compared to 3 kg). When converting farm to forest there could be more N leaching, but it will reduce in the second rotation
- Gorse and broom leaching N
- Forestry monitors water quality. There is international certification process, which sets strict standards for chemical use
- Summary of management practices contact Timberlands
- Desiccation – Nicki to get spraying details directly from Timberlands.

Dairy

- Stocking rates in the catchment typically range from 1.5 to 4 per hectare.
- The soil type determines farm practices. Eg Lower Rangitāiki commonly shifting herd in winter. The sand soil in Galatea provides the lighter soil to winter on (or winter on cropping paddocks). Similarly different practices apply to area that is irrigated, and to effluent patches
- Infrastructure also changes farm practices, ie herd homes, feed pads
- Rerewhakaaitu farmers have an Environmental Plan, including carrying out a pilot scheme. Using Overseer to drop N leaching. There are certain level of N leaching that is acceptable and more is not acceptable.
- New Pasture species and fodder crops is also a farm management tool, such as Rye grass, several types of Lucerne, earlier brown top, Fodder beet, new Plantain (similar to chicory). There is new grass coming out every year. Farmers can use different crops within pasture and rotations to build healthy top soil. Some crop reduces N leaching, in diet or in soil
- The nitrogen content in urine varies throughout the year, generally high level in Spring
- There are new bull/sires variety with lower level nitrogen
- Science has been a key in providing solutions
- There have been big changes in practice, eg. effluent management.
- How are irrigated vs. non-irrigated paddocks addressed by the model? Also, fertiliser application on effluent irrigation paddocks is very different from non-effluent paddocks.
- Not much use of fodder beet in Rangitāiki (2-3 in Galatea). Mainly turnips and oats.
- Ryegrass is predominant. Some return to Lucerne (used to predominate 15-20 years ago). 1980s brown-top used.
- Significant increase in soil organic matter in last 15 years with increased stock and effluent addition.

(file A2704216)

Appendix Three – Development scenario by areas

General comments:

- GMOs may be a consideration in the future and potentially more covered horticulture.

LOWER

- Need to cope with floods
- Dynamic land activities
- Estuarine
- Big wetland/marina
- Tunnel house
- Aquaculture – tourism, prawns, crabs, whitebait
- Rice, but could be too water demanding
- Mānuka honey, blueberries, dairy
- Above Edgecumbe – horticulture (kiwi and avocado)
- Horticulture on higher land. Some of the horticulture could be in-door

MID Rangitaiki

- Tuna
- Ethanol bio-fuel crops
- Waiohau – growing bio-food. Waka training
- Milking goats farming in Murupara
- Horticulture diversification
- Forestry – processing facilities
- The process and the facilities to have the industrial land to support the land use. Such as in the Murupara area

UPPER

- Tourism.
- Meat alternatives.
- Mānuka – Kaiangaroa.
- Rerewhakaaitu: insect farming

MINGINUI

- 700 ha pine is being reverted to native plantation for niche market.
- Eco-tourism - walking tracks available in the Minginui area.
- Niche market for native timber.
- Te Whaiti – no major change expected until lease expires. Then, different land use may be considered.

(file: A2704215, A2704217)

Appendix Four - Management Option and Criteria by attribute

Generally

- Land use change could be generational change due to cost and mortgage, some changes may be forced by nature
- Managing land for appropriate use based on LUC
- Responding to markets
- Good practice approach. Incentives and education works well for land owners, yet it has to be landowners' own decision.
- Not clear the meaning of 'morphology' in this context. Members are concerns about hydro scheme ramping rate frequency, so could it be interpreted as more rock walling and hard engineering?
- The cost of responding to climate change could be huge – both high country and lower country. Not sure how land owners will respond to land inundated under sea level. Some farmers are still affected by recent storm event that changed the river course now flowing through their land.

Sediment

- Thinking inundation in Lower Rangitāiki – could see landowners asking to be bought out.
- Sediment that came with flood causes damages that cost Galatea farmers
- Managing hydrology and morphology could've had flood protection in mind.
- Flooding a problem in many towns in district – housing may move to arable land.

Pathogens

- Land use change or mitigation of current land use change.
- Mindful of good management practice and appropriate land use.
- Struggled with waterfowl – less previous. DOC is working to increase Whio numbers in Whirinaki/Te Urewera which would increase pathogens.

Quantity

- Too big a kaupapa for a short conversation
- Water takes – want development in future
- Identifying who gets water
- Use plain English to rewrite some management options (4B rules)
- Groundwater bore
- More focused discussion is required for this one
- The discussion around water takes should be in-scope, that's currently in out of scope.

Nutrients

- Wetlands
- Wetland could have multiple benefits
- De-stocking
- De-stocking – wintering off practice is different in different part of country
- Cropping management - Maize
- Low application irrigation based on soil moisture deficit. Big opportunity for more efficient water use and less N loss.
- Export N
- Appropriate effluent storage – seal in some cases.
- Key innovation area – focus on feeding soil health and biology, not grass