Science and Technical Advisory Group (STAG) Meeting

Minutes

Thursday 18 October 2018 10am-5pm, Thorndon 1 Room, Terrace Conference Centre, Levels 2-4, St John House, 114 The Terrace.

Attendees: STAG: Ken Taylor – Chair; Dr Bryce Cooper; Dr Clive Howard-Williams; Dr Chris Daughney; Dr Bev Clarkson; Graham Sevicke-Jones; Prof. Ian Hawes; Prof. Jenny Webster-Brown; Dr Joanne Clapcott; Dr Jon Roygard; Dr Marc Schallenberg; Ra Smith (11am onwards); Prof. Russell Death; **Ministry for the Environment (MfE) officials:** Lucy Bolton; Jo Burton; Nik Andic; Ton Snelder; Vicky Addison; Jen Price; Helli Ward; Kirsten Forsyth; Oscar Montes De Oca Munguia (afternoon)

Friday 19 October 2018 9am-3pm, Ahumairangi Room (1C), MfE, 23 Kate Sheppard Place, Thorndon.

Attendees: STAG: Ken Taylor – Chair; Dr Bryce Cooper; Dr Clive Howard-Williams; Dr Chris Daughney; Dr Bev Clarkson; Prof. Ian Hawes; Prof. Jenny Webster-Brown; Dr Joanne Clapcott; Dr Jon Roygard; Dr Marc Schallenberg; Dr Mike Joy (11am onwards); Ra Smith; Prof. Russell Death (morning); **MfE officials:** Lucy Bolton; Jo Burton; Nik Andic; Ton Snelder; Vicky Addison; Jen Price; Helli Ward; Kirsten Forsyth; Stephen Fragazsy; Carl Howarth

Apologies: Dr Adam Canning; Dr Dan Hikuroa

Items: Thursday 18 October

1. **Welcome and introduction**

Ken Taylor welcomed the group members, thanked them for their participation and acknowledged the important work they are doing.

2. **Group introductions**

3. **Introductions:**

    a) Vicky Robertson – Secretary for the Environment, MfE
    b) Martin Workman – Director – Water, MfE
    c) Hon David Parker – Minister for the Environment

The Committee introduced themselves to the Minister.

The Minister thanked the group and talked about the role of science in informing policy and resolving controversy. He spoke about areas of focus in the current Essential Freshwater programme such as sediment, wetlands and estuaries.

Questions from the Group included:

- What is the Government's appetite for risk and uncertainty? The Minister mentioned the need for a precautionary approach and talked about management of sediment in Southland as an example. We need to make a call and take action. Adjustments can be made at a later date if required.
- How do we go about fixing past damage? The best solutions need to fix past damage as well as put into place policies going forward. In Southland for example, there is a legacy of wetland drainage and the landscape has little water holding capacity. There is a need for landscape scale management. This is also a social-economic problem. There is a limit to what can be achieved, e.g. major infrastructure such as airports cannot be moved. We need a spatial planning approach in these cases. How can we support regional councils to achieve this?

- What is the level of receptiveness to alternatives to attributes? Feedback from Regional Councils is "tell us what to do, and we'll do it, but don't keep changing what we need to do". We will look into a range of tools. But, if the current approach is working, we'll keep it.
- How do we deal with threatened species? The National Policy Statement for Freshwater Management (NPS-FM) doesn't address species extinctions. We need options for managing pest species, this is currently not in the NPS. The Minister said he would not oversee the extinction of freshwater species. The perspective of Fish & Game needs to be taken into account. No further introductions (i.e. range expansions) are being carried out. A spatial planning approach is needed to protect threatened species. The Minister is alarmed how out of control carp are.
- Is it the role of the STAG to make purely science-based decisions or take economic considerations into account? The Minister asked the group to leave the wider economic decisions to him. Swimmability of rivers is an example of where there is an overall target for all rivers to ensure that no river should decline in water quality.
- Lag times mean that even if we stopped all the pressures now, the state of freshwaters wouldn't improve within 5 years. The Minister responded that to see changes within 5 years, changes to inputs are required.

Further discussion points:

- Pests affect resilience of freshwaters, land use is not the only problem.
- Flow allocation is important. The river can't "flush itself" if there is no flow.
- The NPS – Indigenous Biodiversity is being developed and will be released soon, Jo Burton has a role in this work. There is a need to make sure the NPS-FM aligns with this.
- Climate change policy and the Emissions Trading Scheme will also affect freshwaters and may even have a larger impact than the NPS-FM. Officials need to inform STAG of climate change policy developments. Horizons hill country management plans were cited as an example of where the effects of climate change will overwhelm the effects of good practice.
- This group is not expected to reach consensus, and it's important that any disagreements are noted when advice is communicated to Ministers.

4. Terms of Reference (TOR), working with Freshwater Leaders Group and Kahui Wai Māori

Lucy Bolton gave an overview of the TOR, which are still in draft, and the STAG members were invited to comment. Discussion points included:

- A key point to consider is how STAG will work together with FLG and KWM – more detail is needed on this in the TOR.
- MfE will set up a regular newsletter as well as an online portal for discussions.
- There was discussion around whether the group should focus purely on science, noting that it is difficult to only talk about science without considering policy and economics. Policy analysts can play a key role in helping guide where discussions go.
- A key role for officials is to report back to the group with policy that incorporates science advice, to keep the group informed.
- Members serve in the group in a personal capacity and are not representatives of their organisation.
- There may be a role for other disciplines that are not yet included in the group; other members can be co-opted in as required. The group can identify knowledge gaps where necessary.
- Why isn't kaupapa Māori being looked at? There was discussion around the scope of the group being focussed on biophysical science, but also being informed by kaupapa Māori approaches.

Discussion on confidentiality:

- There was general agreement among group members that they would need to have discussions with others to be able to effectively contribute to the group. This is important to reflect in the TOR.
- Minutes are to be high-level and will not attribute names to discussion.
- In order for the Group to operate effectively, members must maintain the confidence of the group, including maintaining confidentiality of matters discussed at meetings, and any information or documents provided to the group.
- MfE will indicate which documents are confidential due to their draft nature.
- The confidentiality clauses in the Terms of Reference do not affect the ability of members to talk to the media in their capacity as experts.
- If required, meetings can include a regular time slot to address confidentiality questions.

The procedure for identifying and declaring conflicts of interest was outlined.

Actions:	**To be completed by:**
Update TOR and circulate next week.	Jen/Lucy
Officials to work out logistics of how three groups will work together.	Lucy
Officials to keep STAG up to date with climate policy developments.	MfE officials
Conflict of Interest forms to be sent separately to members.	Jen

5. Te Mana o te Wai

Lucy Bolton outlined the concept of Te Mana o te Wai as an overarching concept for the NPS-FM. There was discussion on how to integrate Te Mana o te Wai into a biophysical framework. It was discussed that community values sit at the top of the NPS-FM as a guide to objectives and limit setting.

6. NPS overview

Vicki Addison gave a presentation on the NPS-FM and how it works by directing regional plans while allowing flexibility. Limits are placed on resource use to achieve freshwater objectives which are measurable in-stream. Vicky is working on providing more direction to Councils on how to set limits.

Discussion points included:

- It takes 5-10 years for the NPS to filter down to regional plans. Group members noted that the process is long and the courts are heavily involved.
- The NPS-FM does not provide for restoration. Actions can be carried out in the non-regulatory space that can achieve action quickly, e.g. catchment accords.

7. Discussion on NPS-FM

Jo Burton provided an outline of the feedback received on the NPS-FM by Fish & Game NZ, Land and Water Forum, and others. Clive Howard-Williams summarised the feedback given to MfE outlined in the briefing "Resolving Freshwater Science Differences" (included under Agenda Item 7 in the meeting materials).

It was noted that MfE was prioritising addressing this feedback, but would not be able to address everything within the current round of changes due to time restraints.

Key points discussed in relation to "Resolving science differences" were:

- N toxicity attribute is sometimes being used inappropriately. It was not intended to be used to define consenting limits for wastewater treatment plant discharges, for example.
- The NPS-FM is a good mechanism and was appropriate for its time, but needs improvement.
- In formulating the "Resolving science differences" letter, there was disagreement among the scientists about how to best derive dissolved inorganic nitrogen limits – whether through its effects on periphyton, or macroinvertbrates and fish.
- There is a clear need for a clear and transparent process of engaging with scientists, including feedback on the process.
- The definition of "maintain and improve" water quality (relating to being maintained within a band) is problematic. Bands were originally devised as a way for communities to set objectives, not as a way of defining "maintain or improve". Movement within a band may represent a significant shift in the ecosystem.
- Guidance is needed on the use of statistics to define "maintaining" water quality. The group felt this would be an important area to discuss.
- An important consideration for "maintaining" water quality is defining reference condition when this may change over time. To address this it would be important to know the natural rates of change in freshwater systems. Chris Daughney has done a similar piece of work for groundwaters.
- An example of defining reference conditions is provided by the Wetland Condition Index, which uses historical information to define the reference state.
- A question was asked whether other countries had dealt with the same problems, and how. Lucy Bolton outlined the UK experience, where certain EU objectives were unachievable, which resulted in communities eventually setting their own objectives for local waterbodies.
- It was noted that giving a wide range of options including regulatory and non-regulatory solutions would result in faster progress.
- Science information can be enabling for communities.
- Research is needed into the effectiveness of mitigations.

8. At-Risk Catchments update

Oscar Montes de Oca Munguia gave a presentation on the progress to date of the At-Risk Catchments programme. Councils have provided a list of at-risk catchments around the country and there is also a number of existing lists compiled by various organisations (e.g. Fonterra, DOC).

The next step will be prioritising these catchments. A subset of the group indicated they would be willing to help further with the project; Oscar will follow up with more information. Potential areas where the group could contribute included a method of determining what is "at-risk" and ensuring all at-risk catchments had been captured by the list.

The group agreed it would be useful for officials to give a summary of the latest water quality state and trends work, recently commissioned by MfE.

Actions:	**To be completed by:**
Present to group at next meeting on state and trends	Ton
Provide further information about participating in At-Risk Catchments project	Oscar

9. General discussion

Ken asked for any suggestions from the group. It was suggested that:

- The group could consider bringing in some international expertise (it was generally considered by the group that this would not be progressed)
- The group could include early-career scientists as observers (the group was in general agreement with this idea)

Actions:	**To be completed by:**
Explore ways to include early-career scientists as observers	MfE officials

Items: Friday 19 October

10. Summary of previous day and introduction

Ken reiterated some of the broad themes from Minister's talk, then referred to the Essential Freshwater work programme document, and highlighted its timeline with key themes, encompassing regulatory changes as well as work on at-risk catchments. He discussed the work programme of STAG as being focussed on testing and advising on scientific aspects of the NPS-FM.

Discussion points included:

- Group members identified a need to reflect more detail on the operation of the group in the Terms of Reference.
- It was noted that officials will define a schedule of work and goals for the upcoming meetings.
- Officials will also provide an online portal as a collaborative space to share work between meetings.

Actions:	**To be completed by:**
Define forward work programme and schedule of meeting goals	MfE officials
Provide further information on group operation in Terms of Reference	Lucy, Jen
Set up online portal for information sharing	MfE officials

11. Different options for managing stressors (e.g. attributes, guidance, rules, NES)

Nik Andic presented an overview of the function of attributes within the NPS-FM and how the intervention logic works by limiting resource use. He explained that this mechanism may not be suitable for some stressors such as pest plants and aimals, but that other approaches could be required. Restoration is another example where other approaches might be necessary. The group was asked to consider other approaches than attributes, but it was noted that the group wasn't expected to make decisions around which regulatory mechanism would work best – that is the job of the policy analysts.

Group discussion included:

- Catchment approaches require a tailored combination of regulatory and non-regulatory mechanisms; regulation on its own may not drive behaviour change.
- Relationships are key to enable good practice. Te Mana o te Wai encompasses this idea. The term whakamana describes the need to build up the mana of the water as well as limiting negative effects.
- The group discussed the possibility of narrative objectives rather than numerical ones. MfE officials asked the group to consider these, and not to limit thinking to numerical attributes. It was noted that narratives can aid in understanding of numerical attributes and processes.

- The group was asked to identify where further work is needed if things cannot be dealt with within the first tranche of work.
- Biosecurity was identified as a key gap in the NPS-FM and different ways of managing freshwater pests were discussed. A need was identified to ensure that anything recommended is consistent with the NPS- Indigenous Biodiversity.

12. Evidence requirements for policy development

Ton Snelder and Nik Andic discussed the criteria that were applied to the existing attributes developed in the National Objectives Framework. NPS attributes are compulsory, which has driven the need for due diligence to ensure that attributes can be applied nationally. For example, the first criteria is that the attribute is linked to a national value.

There was discussion on other non-compulsory values that can also have attributes. Mauri is one of these non-compulsory attributes. Criteria for attribute development need to align with community values. How can we give community values and attributes equal value, when different places will have different criteria?

Adam Canning provided comments via email; his comments on the first three criteria were read to the group.

Nik outlined the regulatory impact statement process that Cabinet needs to go through to change any regulations. We therefore need to allow ministers to assess the impact of any regulatory changes. STAG should keep this in mind, but not focus on economic impacts. STAG can assess the level and quality of information for each issue to help the Minister make decisions.

At the moment we use attributes such as nitrate as one of the many variables that measure ecosystem health. Many factors influence such attributes. An ecosystem health approach requires us to assess all components of the ecosystem e.g. water quantity, habitat and fish passage as well as water quality indicators. This approach could allow the bands to be considered differently. Key factors to ecosystem health are not considered in the current NPS-FM. For something to be included as an attribute, can we consider the other relationships with other factors in the system.

NPS-FM is not the only tool for managing things – e.g. regional plans often include objectives for turbidity.

The intervention logic of the NPS-FM was discussed. Attributes that meet the existing attribute development criteria can drive limits on resource use (e.g. nitrogen), but if we were going to include more holistic ecosystem attributes we would need to assess how the intervention logic would work, because not all ecosystem attributes can be managed by limiting resource use.

If attributes were nationally applicable but not nationally definable, a guidance approach could work. Guidance can then be updated as necessary. Guidance can be formally referenced in the NPS-FM; it then becomes part of the legislation. The guidance would need to be quite directive and couldn't have too much ambiguity. This could be an option for incorporating a more holistic view of ecosystem health.

It was discussed that it would be helpful for the group to identify which ecosystem health components can't be managed by way of an Appendix 2 attribute. Officials will then make the call on what is the best mechanism.

Adam's comments around bands and the definition of "maintaining" were discussed. Nik informed the group that this definition is being looked at as part of the Essential Freshwater work programme. Bands were not originally set up as a way to define "maintain or improve" but as a way for communities to set objectives. However, they are now being used to define whether water quality is being maintained. "Maintain or improve" is a complicated measure, and assessing whether a change is ecologically meaningful or statistically significant are different matters.

The group agreed that it would be useful to discuss "maintain or improve" at the next meeting.

Adam's comments on criteria 3 and 4 were read out. It was discussed that requiring absolute certainty about the drivers of potential attributes may mean that we miss out on taking action. For example, MCI is not included at the moment because it doesn't meet criteria 3. An approach could be to be aware of the attribute criteria without using them as strict binary decision tools. However, we need to keep in mind what outcomes we want to achieve. The strength of attributes in the NPS-FM is in directing councils how to achieve the outcome by limiting resource use. MCI remains difficult to improve within an attribute framework (i.e. by limiting resource use) but these kinds of measures can be incorporated in a different way. Is there room for a new mechanism that monitors certain factors closely?

There was discussion on whether we are measuring attributes for assessing values or pressures. Sediment, for example, affects value of ecosystem health and also relates to pressures, e.g. livestock in streams. It is more complex than nitrogen as it doesn't have a 1:1 relationship to land use pressures like nitrogen does. For upholding values, existing attributes in the National Objectives Framework (NOF) don't tell the whole story. On the other hand, MCI, which is not currently an attribute, measures value, but isn't directly linked to pressure.

There was discussion around the point that economic implications are not a key consideration for the group; however, the implications of decisions, e.g. actions required to be taken by regional councils, do need to be understood.

It was discussed that the group should also consider emerging issues. It was noted that the NPS-FM tries to address emerging issues by proactively setting limits rather than dealing with specific land uses.

It was noted that compulsory monitoring is useful as a learning process, and could be expanded to consider new important variables that may not be suitable as attributes, e.g. Matauranga Māori is a compulsory monitoring requirement. In different FMUs, different values and monitoring requirements may apply.

It was suggested that looking at ecosystem health as a whole can tell us more about ecosystem declines than just assessing attributes. This approach requires whole systems thinking, rather than focussing on attributes. This relates to a combination of regulatory and non-regulatory approaches that is catchment based and incorporates community values and involvement.

Outcome: The criteria will be framed as things that need to be considered, rather than strict decision gates. It is important for the group to consider the precautionary principle, and understand links between potential attributes and other components of the ecosystem. The group should also consider, should it be an attribute or something else? If it should be an attribute, should it be numerical or narrative?

Actions:	**To be completed by:**
Discuss "maintain or improve" at the next meeting	MfE officials

Joanne Clapcott tabled Figure 10 from the Biophysical Ecosystem Health Framework report (below; tabled under Agenda Item 13) illustrating the link between aspects to be managed, variables, and values. Attributes in the current NPS-FM measure stressors. It was suggested that the focus should be on things that we can manage, and we should have attributes that describe those. The diagram illustrates how we can affect multiple values by managing a handful of aspects. Attributes are necessary in this process, but not sufficient on their own. There was discussion on whether we need different attributes to measure state and stressors, e.g. periphyton can either be an indicator of ecosystem health, or swimmability, and would need to be measured in different ways and have

different bands for each purpose. If some variables are correlated with each other, it may not be necessary to measure everything.

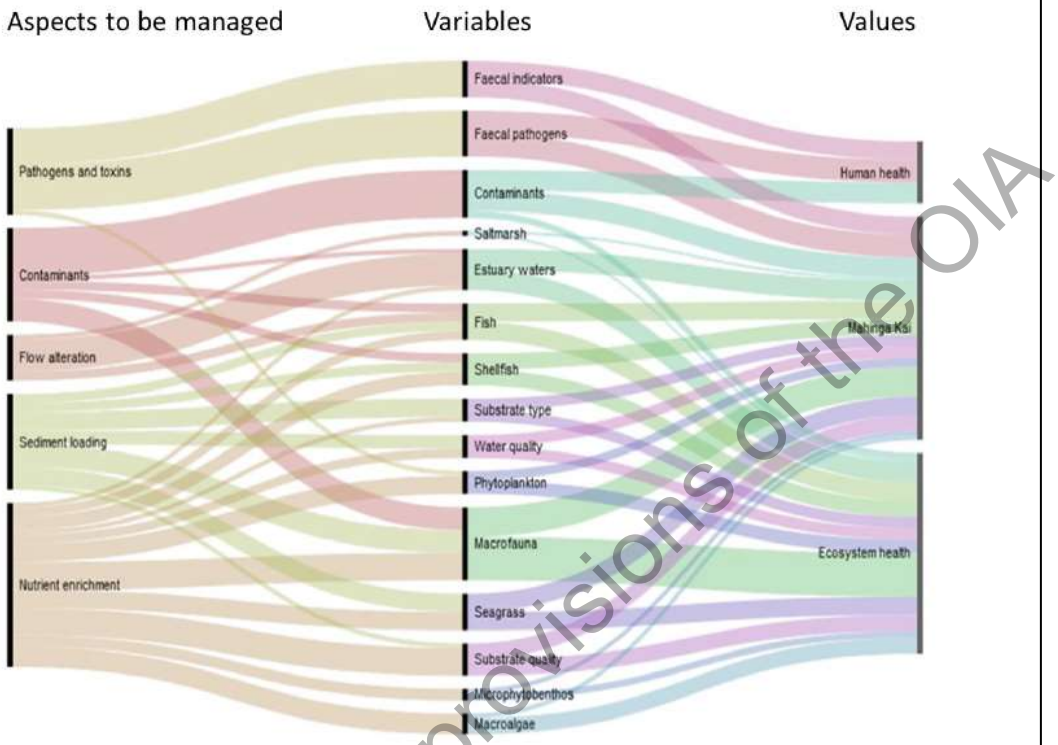


Figure 10. Alluvial diagram showing linkages between aspects to be managed, variables and values identified from an online survey of c. 30 estuarine experts asked to identify characteristics of healthy estuaries (from Cornelisen et al. 2017).

13. Ecosystem Health Framework

Carl Howarth tabled the Biophysical Ecosystem Health Framework report as well as a summary document. He summarised the report for the group and provided some starter questions.

Discussion focussed on:

- The importance of reference conditions. Reference conditions need to be the pre-human condition. Benchmarks may shift along with global changes. They also need to take into account natural temporal and spatial variation and natural system evolution. Some ecosystem components are more advanced in terms of reference condition knowledge. Modelling can be used to predict reference state where this cannot be measured directly. Existing methods don't take into account temporal change in reference conditions.
- How does mauri fit into the Framework? This is not dealt with specifically as the Framework is focussed on biophysical aspects, but there are mauri aspects in all of the components. However, the Framework would not be sufficient on its own to measure mauri or other values. The NPS-FM makes reference to the other values.
- The Framework allows the observed/expected (O/E) method to assess ecosystem health components, and is a valuable contribution.
- The Framework has parallels to the Wetland Condition Index (WCI), which uses historical information to assess the pre-human reference state. Some relevant learnings from the

application of the WCI include: the method needs to be rapid to keep costs at a manageable level (it takes a day to assess a wetland); and training is important to maintain consistency of scores.

- It was noted that the Framework has not yet been trialled, but the report provides a worked example of using the Framework for rivers.
- To provide consistency across the country it would be important for MfE to give an approach for aggregation and harmonisation now, before the method is taken up by regional councils.
- Aggregation approaches need to be clear and transparent to ensure that granularity of information is not lost. The report recommends that aggregation would only be done to the highest level for environmental reporting, not setting limits.
- How would be Framework be used in the NPS-FM? You can use the indicator components in the same way the WCI does. Attributes would apply to the more detailed measures. The current attributes in the NOF only monitor one component of ecosystem health.
- Can NOF bands be expressed as O/E? The group agreed that this was possible (but see further discussion points below). How can we then work out what is the national bottom line? There are international examples of this, such as RIVPACS (an aquatic biomonitoring system for assessing water quality in freshwater rivers in the United Kingdom) and AUSRIVAS (Australian River Assessment System).

Key areas where STAG could contribute could be:

- Consistent ways to aggregate and harmonise data
- How to convert O/E ratios into bands
- How do we make the Framework a nationally applicable instrument? How do we scale it up? (it was noted that might not be a priority because we need to focus on the Essential Freshwater programme)
- Considering how the Framework could be applied to the NPS-FM

There was discussion around the use of observed/expected ratios, including:

- Observed and expected values are both variable, so dividing one number by another may not be statistically robust. However, it was pointed out that other countries use this approach despite inherent variability. Models will always have inaccuracies, and regulations need to take errors into account. Errors also apply to the existing numeric attributes. *E. coli* is an example where risk and uncertainty has been built into the attribute states.
- It was also pointed out that just because a system is not like the reference condition, doesn't mean that people don't value it. The other values could then be measured in different ways. Could "expected" be defined in different ways – would it be more accurate to call it "desired" or "reference"?. How do you measure community aspirations when deciding what "expected" is?
- This approach needs to be tested in an NPS-FM context. A risk approach would help councils identify where interventions are required most urgently.
- River systems evolve naturally over time, and it might not be realistic to measure rivers against the pre-human condition. On the other hand, using lower standards might lead to further degradation. There was some discussion around different ways to deal with this. An example would be the Otaki River, which has good water quality, moderately good biological values, but the floodplain is constrained to make way for Otaki town. It has therefore been modified from a braided river to a meandering river. But people still value it for fishing, whitebaiting etc. Therefore, it would score badly in O/E for geomorphology but not other ecosystem health components. Getting a low score in this case wouldn't necessarily indicate that action needs to be taken. To manage this you could report each aspect separately.

- It was reiterated that O/E measures have been used successfully overseas. There are different ways of defining reference state, and the important thing is to make sure reference states are consistently defined.
- How does an Ecological Integrity approach[1] fit into the Framework? It was explained that the Framework uses the NPS-FM definition of healthy ecosystems as well as the definition of the Resource Management Act (RMA). If you measure core components, you can comment on emergent properties referenced in the Ecological Integrity report, such as resilience and ecosystem integrity. An O/E approach captures nativeness and pristineness which are parts of the Ecological Integrity approach.
- Measuring the state of water holistically and incorporating community values would involve a wider view and would need to take into account more components than are incorporated into the Framework. Narratives describing the computations can help people understand processes at the Freshwater Management Unit/local level.

Outcome: Statement from group: We are comfortable with the five components of the Ecosystem Health Framework to proceed with further work, noting that there is a caveat around Te Mana o te Wai and Maori views which are not measured directly by the framework.

Additional agenda item: Brief introductions from Alison Dewes and Corina Jordan from Freshwater Leaders Group (FLG)

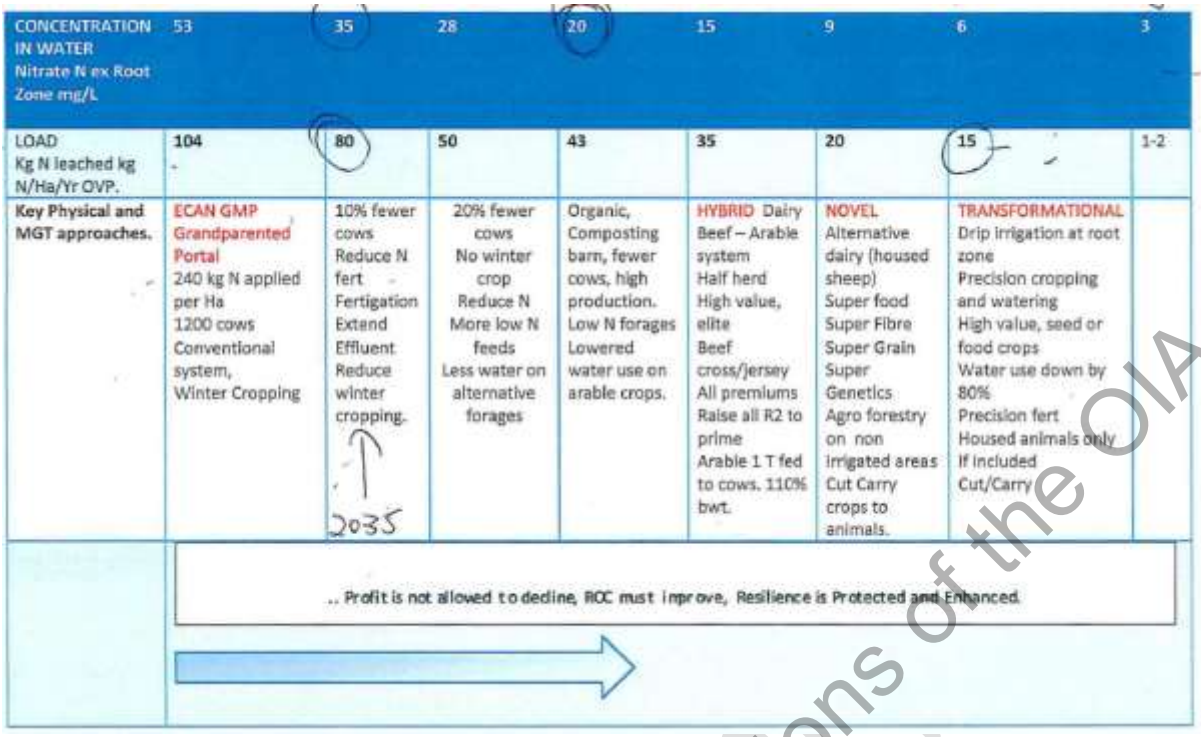
Martin introduced Alison Dewes and Corina Jordan from FLG. They are looking into the effectiveness of good management practices and how we are defining our long-term target. It was emphasised that we need clear policies so that we can provide businesses with certainty for the future.

Corina emphasised the importance of the group providing an unsanitised scientific opinion and clear definition of ecosystem health to feed into the policy making process.

Alison pointed out the importance of certainty for communities. Alison passed around a table (below). She explained that the Environment Canterbury system of grandparenting is not related to ecosystem health, and that it is important to understand the relationship between nitrogen in water leaving the root zone and what goes into drinking water aquifers and ecosystems. Optimizing dairy systems will not be sufficient on its own for meeting targets, we need novel land use systems. Drinking water guidelines are being used as targets for groundwater nitrate concentrations because these are currently the only guidelines available.

It was discussed among the group that we need to have a feedback mechanism for policy work to come back to STAG to reassess. It is an iterative process.

[1] Schallenberg, M., Kelly, D., Clapcott, J., Death, R., MacNeil, C., Young, R., ... & Scarsbrook, M. (2011). Approaches to assessing ecological integrity of New Zealand freshwaters. Department of Conservation. Available from https://www.doc.govt.nz/globalassets/documents/science-and-technical/sfc307entire.pdf



CONCENTRATION IN WATER Nitrate N ex Root Zone mg/L	53	35	28	20	15	9	6	3
LOAD Kg N leached kg N/Ha/Yr OVP.	104	80	50	43	35	20	15	1-2
Key Physical and MGT approaches.	ECAN GMP Grandparented Portal 240 kg N applied per Ha 1200 cows Conventional system, Winter Cropping	10% fewer cows Reduce N fert Fertigation Extend Effluent Reduce winter cropping. 2035	20% fewer cows No winter crop Reduce N More low N feeds Less water on alternative forages	Organic, Composting barn, fewer cows, high production. Low N forages Lowered water use on arable crops.	HYBRID Dairy Beef – Arable system Half herd High value, elite Beef cross/jersey All premiums Raise all R2 to prime Arable 1 T fed to cows. 110% bwt.	NOVEL Alternative dairy (housed sheep) Super food Super Fibre Super Grain Super Genetics Agro forestry on non irrigated areas Cut Carry crops to animals.	TRANSFORMATIONAL Drip irrigation at root zone Precision cropping and watering High value, seed or food crops Water use down by 80% Precision fert Housed animals only If included Cut/Carry	
	.. Profit is not allowed to decline, ROC must improve, Resilience is Protected and Enhanced							

14. Wetlands update

Helli Ward gave a brief update about wetlands to signal future work. In 2015, an expert panel discussed wetland attributes, and came up with a range of aspects to be managed along with potential attributes. Lack of data was flagged as an issue affecting progress. It was outlined that a policy response was required to stop loss and decline of wetlands, and that different options are being considered.

Discussion points included:

- Can a condition index be an attribute? This is a topic for further discussion.
- How can wetlands be restored in areas where there aren't any left? MfE is looking at options.
- NPS – Indigenous Biodiversity – Helli is working with the Department of Conservation on this.
- Jon R indicated that Horizons can provide data on wetland extent and loss.
- It's important to halt drainage of wetlands.
- Delineation and definition of wetlands are ongoing issues. Landcare Research is working on methods. Wetlands have significant values other than indigenous vegetation, such as carbon storage and flood attenuation.
- Wetlands can be assets for dairy farms and DairyNZ is advocating for the retention of natural wetlands. They have excellent denitrifying potential.

Outcome: It was flagged that this topic is to be discussed further at a subsequent meeting.

15. Sediment

Stephen Fragaszy gave a presentation about the attribute development programme (detailed in tabled materials for this agenda item), which is not the only policy option being looked at, but is the most helpful place to focus our attention for the first few meetings. Stephen explained that the draft attributes were developed using long term averages/medians rather than event loads. There was discussion about the reasons for this:

- Under the RMA and NPS-FM only human use activities can be managed rather than natural events such as heavy rainfall, which result in elevated sediment loads (though the effects of these events can be mitigated somewhat).
- There is no good information on how to set loads and durations for short term events in relation to their effects on macroinvertebrates and fish.
- Life-cycle scale impacts are more predictive for effects, e.g. loss of habitat by filling of interstitial spaces over time. There was some disagreement among the group here. It was noted that short-term events have significant effects on nutrients.
- Stephen noted after the meeting that point source event loads are often managed using consent conditions, e.g. for stormwater discharges.
- Practical points were raised:
    - 1. We monitor the environmental state variables (clarity, turbidity, deposited sediment) and the ecosystem response randomly in time. Therefore it is only valid to examine measures of central tendency.
    - 2. The analytical chain applied to connect sediment supply to catchment to environmental state variables is based on measures of central tendency. Measuring event loading would be much more complex, because it would involve dealing with magnitude and duration of events. There is also an assumption that the central tendency measures are highly correlated with the extreme events, therefore we are capturing the effects of extreme events (this correlation could potentially be tested).

Stephen summarised the new work being carried out, which aims to ensure consistency and comparability of classifications so that thresholds from different lines of evidence align, are comparable and have robust and transparent information behind them. This work will also examine whether bands can be introduced. He plans to talk through this work with STAG in subsequent meetings.

A regulatory impact assessment will be commissioned, that will be predicated upon: how much sediment reduction is needed in a particular catchment to meet bottom line? What are costs and co-benefits of mitigation options? This would be finished next year before any significant decisions are made.

The focus for the next meetings will be where attribute and classification systems apply. Attribute bands will also be discussed. The focus will be on determining if the numbers were derived in a robust way. A question to be considered by the group is how to progress management mechanisms when there isn't a clear relationship between deposited sediment coverage and sediment loading.

Further discussion points included:

- There have been recent breakthroughs in connecting land use to sediment in rivers. Horizons has identified high risk areas and priced mitigation options.
- How do you address the timing factor (noting Minister Parker's desire for change in next 5 years)? Time frames for change can be long, and there is a need to be truthful about the requirements of the attribute when communicating to the public and politicians.
- There is policy work progressing currently on identifying high risk areas.
- The NPS-FM doesn't specify time frames for improvement.
- Climate change will also cause an increase in sediment load. There is a huge amount of mitigation work being done in the Horizons region for example, but climate change will affect how effective it is. There are parallels with intermittently closed and open lakes and lagoons (ICOLLs) – management is challenging when attributes are not being met.
- Expected state changes with time. Should these be shifted to take climate change into account, and can the group advise on this? It was noted that species protection percentages form the bottom lines at the moment and these will not change with climate change. There

is a need to be realistic about scale of improvements or declines that will happen in the future.
- Can we measure behaviour change as an indicator of the success of the policy?
- Measurement is done by means of visual clarity and turbidity for suspended sediment, and deposited sediment uses the SAM2 – visual assessment protocol[2]. Also looked at using Quorer; while it is more closely related to sediment load, it's quite resource intensive and variable. SAM2 and Quorer are quite well correlated. It was suggested that the impact on ecosystems is in the first stages when the interstitial spaces are first filled up.
- The draft attribute table mentions statistics to be used and frequency of measurement – what is evidence base for these? How will implementation of catchment mitigations affect relationships between land use and in-stream sediment? There's a strong relationship between catchment load and visual clarity or turbidity – this is related to grain size distribution. Mitigations can affect grain size distribution.
- The value of high-frequency data was pointed out; Horizons has long-term high frequency data available.
- It's important to remember that episodic events are correlated with rainfall, and there is no way of controlling frequency of rainfall.
- There are logistical issues around capacity to install stream fencing and providing plants as sediment mitigation measures. There was discussion around the fact that these are not the principal concern of the group, but that we need to identify these constraints to manage expectations.
- It was suggested that there is a role for social science and community buy-in as a way of speeding up the restoration process.

Outcome: The focus of the group going forward (relating to sediment) will be to:

- Test the validity of current work and the newly contracted work; the first part will be ready around mid-December and the second part will be ready around mid-February.
- It was identified that there is a short time frame to adequately assess attributes, and that the group will need examples and more information to properly assess the data.
- Attribute tables need to address issues around time frames and statistics. The group can address this at next meeting along with classification systems.
- The group will consider Stephen's focussed questions at the next meeting.

16. Summary

Ken outlined potential agenda items for 29 November:
- Current state and trends
- Sediment
- Wetlands
- Maintain/improve

[2] Clapcott, J.E., Young, R.G., Harding, J.S., Matthaei, C.D., Quinn, J.M. and Death, R.G. (2011) Sediment Assessment Methods: Protocols and guidelines for assessing the effects of deposited fine sediment on in-stream values. Cawthron Institute, Nelson, New Zealand. Available at http://www.cawthron.org.nz/media_new/publications/pdf/2014_01/SAM_FINAL_LOW.pdf