

## TAKAKA FLAG ATTRIBUTE SUBGROUP MEETING 12b NOTES: 21 August 2015

<b>Purpose:</b>	Takaka FLAG Attribute Subgroup meeting – WaterWheel Attributes – Meeting 12b
<b>Date:</b>	21 August 2015
<b>Time:</b>	9.30am-3.00pm
<b>Venue:</b>	Takaka Fire Station
<b>Present:</b>	<p><b>FLAG members:</b>          Graham Ball (GB)          Mirka Langford (MLa)          Mike Newman (MN)          Mik Symmons (MS)          Piers MacLaren (PM)          Margie Little (MLi- iwi representative on FLAG)          Martine Bouillir (MB- council representative on FLAG)          Neil Murray (NM)          Hika (Matt) Rountree (HR)          Andrew Yuill (AY)</p> <p><b>Staff:</b>          Mary-Anne Baker (MAB – Senior Environmental Policy Planner)          Joseph Thomas (JT -Resource Scientist - Water &amp; Special Projects)          Lisa McGlinchey (LM – Environmental Policy Planner)          Trevor James (TJ- Resource Scientist – Water Quality &amp; Aquatic Ecology)</p> <p><b>Other</b>          Andrew Fenemor (AF – Landcare Research)          Tim Kerr (TK – Aqualinc)          Julian Weir (JW – Aqualinc)</p>
<b>Apologies:</b>	Greg Anderson (GA), Tony Reilly (TR), Kirsty Joynt (KJ),
<b>Notes taken by:</b>	Lisa McGlinchey (supplemented by other staff)
<b>Definitions and Abbreviations</b>	FLAG = Freshwater and Land Advisory Group NPS-FM 2014 = National Policy Statement for Freshwater Management 2014 NOF= National Objectives Framework – under the NPS-FM TRMP = Tasman Resource Management Plan (the Plan) TWMC = Takaka Water Management Catchments SOE = State of the Environment WCO = Water Conservation Order application for Te Waikoropupu Springs and recharge area AMA = Arthur Marble Aquifer TLA = Takaka Limestone Aquifer TUGA = Takaka Unconfined Gravel Aquifer MALF = Mean Annual Low Flow TWS = Te Waikoropupu Springs
<i>Note: records of discussion points have been grouped into similar topics and are not necessarily in the order discussed at the meeting. Notes in square brackets [ ] have been added post meeting for clarity.</i>	
<b>FLAG MEMBERS PLEASE NOTE:</b> If you have any questions or need anything between meetings, then please contact Mary-Anne Baker by email: <a href="mailto:marya@tasman.govt.nz">marya@tasman.govt.nz</a> or by phone ddi 03 543 8486.	

## **Purpose of Meeting**

- Remaining attribute thresholds and criteria (2<sup>nd</sup> meeting) for WaterWheel attributes

## **Welcome and Karakia**

MAB welcomed the group and MLI lead the FLAG in the karakia.

## **Session 1 – WaterWheel attribute grade setting**

*Discussions on attributes lead by Tim Kerr, Julian Weir and Andrew Fenemor.*

*Due to time constraints the FLAG allowed ½ hour per attribute to discuss grading thresholds (red through green) for use in the WaterWheel.*

*Recap on last attribute meeting [Meeting 12a on 29 July 2015]:*

*Previous attributes discussed and criteria set for:*

- Nitrate at Te Waikoropupu Springs
- River low flows at Payne's Ford
- Fish abundance
- Water clarity
- Economic attribute – originally cow numbers, but changed to milk solids estimate

*Categories discussed – no specific definition as this differed between attributes, but green was better than yellow, which was better than orange, which was better than red.*

***PM: The periphyton issue at Motupipi is very different from periphyton at Te Waikoropupu Springs. I have some concerns over where this attribute is measured.***

*We could have a separate wheel for periphyton at both TWS and Payne's Ford – this is subject to funding implications.*

*Generally the criteria are applicable more generally than the specific numbers are.*

*[Post meeting clarification TJ: While it is acknowledged that it would be useful to have both locations represented there are two problems: 1. Currently there is very little data for periphyton at TWS. Such data is needed to base attribute grades on. 2. Every attribute and site on the WaterWheel takes a reasonable time to develop and is subject to funding implications and Aqualinc are getting towards the end of the funding available for this part of the project]*

### ***How does the milk solids attribute fit into the context?***

*Milk solids has been selected as a measure of economic value.*

*With the current milk prices there are a lot of factors that affect this attribute beyond what the FLAG is directly dealing with. [TJ: Unfortunately all readily-available information on economic indicators suffer this issue.]*

***There are also salmon farming, tourism and mussel farming not considered in this economic attribute.***

*Yes, the attributes are a specific indicator for a value as a means to measure the difference between scenarios. Therefore they should be chosen where the changes are more sensitive*

*We can more easily measure the value of water to dairying, where as it would be more difficult to determine the importance of water for other uses. Water use is predominantly for dairying currently.*

*If the use of water does have a negative impact on other uses such as tourism or mussel farming this needs to be included in the considerations.*

*Irrigation is controversial in Golden Bay and we need to consider irrigation in the discussions.*

***The WaterWheel is only a tool for communication – it's not the only tool to help us in making our decisions.***

*AF: the wider purpose of the WaterWheel is attempting to look at the most important and most sensitive values as a snapshot and appreciate the trade-offs among scenarios – it is not manageable to look at all the values in depth. We are looking for representative attributes to reduce the complexity.*

### **Groundwater Level Attribute (livelihood and economic value)**

- This is measured at the fire station bore – looking at the minimum water level. This bore is in the Takaka Gravel Aquifer which is very important, particularly for township water supply.
- Comparison with data from the last ten years shows modelling of the ground water level shows a reasonable match to measured ground levels. The model is used to determine the likely impacts of each of the scenarios looked at.
- If irrigation were doubled the model shows the ground water level at the fire station increases – this is because some irrigation is taken from surface water and some of this irrigation recharges the groundwater aquifer. If all irrigation water was taken from groundwater, it would cause groundwater levels at the fire station to drop.
- The status quo groundwater level is 6.7m above mean sea level (amsl) [*this is approximately 3.3m below ground level*]. Pumping using a surface pump becomes difficult when groundwater is more than 6m below ground level.
- Allowing for an additional 2m of draw-down, the lowest level measured at the fire station bore shows we have about 0.7 meters to work with before issues would be experienced.
- For residential pumps these don't usually create much draw-down so as long as they can reach the water there is not usually an issue.

**Could you show us (visually) the relationship between groundwater levels in relation to the Takaka river flow?**

**Doesn't the water wheel do this? – ie it will show the groundwater levels and the river flow attribute?**

Yes it does - this will be the next stage to look at.

- If we get below 6.3m amsl pumping difficulties might be experienced (3.7m below ground level)
- 6.0m amsl would be the absolute minimum ground water level.

It is the FLAG's choice which levels they choose as acceptable for green-yellow-orange-red.

**What are people saying about their wells in town, Martine?**

There has not been a history of wells going dry, but more recently I have been hearing a few issues about wells going dry - there are issues with peoples wells needing to be maintained, however the issues have occurred since irrigation has increased so people have been concluding there is a link. eg the Eatery on the Rock has had to put in a deeper well.

JT: every complaint we have had regarding wells going dry has been tracked back to issues with the pumps and well screens blocking up rather than from water levels dropping.

**Is it possible that the fire station bore is not that representative of other wells in town?**

JT: We have another monitored bore at the council office across town which is very similar to the fire station bore and when looking at properties with issues their neighbours bore levels have been fine.

## Do you know about the Eatery on the Rock situation Joseph?

JT: No, but this is not in the Takaka Gravel Aquifer – it is in karst.

### Groundwater Level Attribute Grading

- 6.7m amsl seems to be an appropriate boundary for the bottom of the green category.
- 6.5m amsl suggested for between orange and yellow categories.
- 6.3m amsl suggested top of red category.

**Units:** metres above mean sea level *[not to be confused with meters below ground level]*

Green	Yellow	Orange	Red
>6.7m amsl (~10m-6.7m)	6.7-6.5m amsl	6.5-6.3m amsl	<6.3m amsl

### Periphyton Attribute (recreation value)

**TJ: Can we confirm we are talking about filamentous green algae over 2cm long? – this is considered the part of periphyton that is the main issue from an ecological and aesthetic value point of view.**

Yes it is.

**PM: I think we should change this attribute to Te Waikoropupu Springs as it is very important to the visual values, but doesn't really affect the key values at Motupipi.**

**What about at Payne's Ford – this attribute is important for swimming values? Do we have measurement at Payne's Ford?**

TJ: Yes, but we have just started monitoring this attribute there.

**Did we originally choose Motupipi because we had monitoring data there?**

TJ: Partly, and the other part is that periphyton is an ecological attribute as well, so it will provide an indication of this at Motupipi.

HR: Yes, the Motupipi hasn't always been like it is now – it used to be swum in a lot – but in the last 15 years it has become a smelly mess. Even some whitebaiters don't go there due to the smell and lower flows and lack of flushing from the Takaka River. The Motupipi should be the [WaterWheel attribute location] as it is degraded.

**Is there seasonality to the periphyton issues?**

TJ: Yes there is, but you can get it at other times too.

*[post meeting: TJ: peak growth is often in January-February and seldom do you get growths of FGA >2cm long outside of the period from October to May.]*

- TK: There is lots of uncertainty in the national periphyton model, but it is the best we have– the parameters driving the model are: *[nutrients]*, stream flow, including number of days when the flow is reducing – this is when periphyton has a chance to grow; how flashy the flows are; and how big the floods are. All the other values were kept the same in the model.

**Is it not temperature related too?**

TJ: Yes, but this is not as important as flow, there is also an impact from how much sand is in the bed material, but again this is not as big a factor as river flow *[because it takes flood flows to move the sand enough to cause the sand-blasting effect].*

- The scenarios show that if irrigation were doubled, or all irrigation taken from groundwater there would be an increase in periphyton as these change the flow characteristics mentioned above.

**From my interpretation of the NPSFM we are maintaining or improving water quality, so we can't be degrading it to the levels seen in the scenarios.**

HR: We don't want it to get any worse than currently – it has been a lot better in the past.

The Motupipi used to have round rocks and you could see them – now the rocks are slimy and covered with sediment.

**We are dealing with a different river now as the Takaka River bed has dropped and higher flood flows are required to flush the Motupipi.**

**What were the findings on this aspect during the Takaka flood modelling work Lisa?**

Lowering of the informal bank was discussed during the Takaka Flood Hazard Project to allow for additional freshes into the Motupipi, however there are other considerations in this such as the flood protection provided by the bank to parts of the Takaka township.

**TK: At what periphyton level would you not swim (refer slide 10 in presentation)?**

HR: We don't like going swimming when it is slippery – there are places we don't go now at certain times of the year, but then if a flood comes through and clears it out we would be going back in. From the photos shown we probably wouldn't go swimming *[in any of them – ie percent cover greater than 20%]*.

### Periphyton Attribute Grading

Since this is for swimming numbers the data and grade should focus only on the summer swimming period, however any periphyton issues are likely to happen then when there is more sunlight and warmer water temperatures.

We need to recalculate data for summer data only and then look at the numbers.

**Action:** Trevor to recalculate numbers *[this was done during the meeting]*

**Units:** percentage cover of river bed

Green	Yellow	Orange	Red
0%-6%	6%-12%	12%-18%	>18%
Natural state or less	(1/3 of status quo) Eg Kotinga is at 3%	(2/3 of status quo)	(>status quo) (~18% average for Nov-April)

### Macro-invertebrates Attribute (ecosystem health value)

- The Macro-Invertebrate Community Index (MCI) represents how tolerant invertebrates are towards pollution. So the more intolerant species are present, the cleaner the water and the higher the MCI score.
- It is scaled from 0 to 200. 0 is bad and 200 is very good.
- In reality the range in Tasman is 50- [148-160]. (Seaton Valley stream scored 50 and was very bad). *[post meeting correction - TJ: Waingaro at Hanging Rock has scored a maximum of 160 – subsequent to the meeting I checked our full database and found this maxima; sorry the 148 maximum I mentioned at the meeting was based on the last 10 years of data that we are using for the current river water quality SOE report].*
- TDC has MCI data for Kotinga. Scores range from 115 – 145, but with only four data points so far, we are not really able to get robust statistics.

**When is MCI measured relative to floods?**

TJ: Macro-invertebrates are always sampled during base flows (away from floods). We have to wait at least 2 weeks after a flood. Often after floods the MCI increases as the worms and other lower-scoring species can get flushed out more than the higher-scoring mayflies etc.

**What is the impact of the Cobb Dam on the MCI in reducing flood flows?**

**Action:** TJ to look up MCI data from Cobb Dam.

*[Post meeting answer: TJ: macro-invertebrates have been sampled four times in the last 15 years (2000, 2008, 2009 and 2014). The MCI and QMCI score was significantly lower for the Takaka River at Harwoods than the Takaka River upstream of the Cobb River. The reason for this over the three more recent samples could be the presence of Didymo. MCI was significantly lower in the Cobb River downstream of the discharge compared to upstream. However, it is not conclusive whether this is due to the Cobb Hydro-Electric Power Scheme.]*

- The driver in the national macro-invertebrate model is river flashiness and the size of flood flows, plus the number of receding flow days.
- Good vegetation land cover is good for MCI scores.
- The model didn't include intensification of land, but this was included by assuming low intensity would move the model result to the upper limit of the model's uncertainty band, and high intensity would be at the lower limit of the models uncertainty band.
- The scenarios modelled don't show a large change in MCI from the status quo. All the values, except for double irrigation, are all above the national guidelines for 'excellent'.

**So does this mean that MCI is not a good attribute for us to use as it is not very sensitive for our needs?**

It is sensitive, but what it shows is that the Takaka River is in good condition and up there with the better rivers in the country.

We keep hearing things are good compared to elsewhere, but that doesn't mean it hasn't got worse – we need to compare our scores within the catchment, not to other degraded rivers elsewhere.

**I'm concerned that we have too low a number for the red category.**

If orange was at 120-110 this would place the most recent Kotinga sample in the orange category.

TJ: We would normally not use a single sample, but an average MCI over 5 years.

**So if the trend (degrading MCI) continued (at the rate indicated by the existing results) we would get worried?**

Yes.

**We've talked before about using the ratio of MCI at Kotinga and Harwoods.**

Harwoods is not particularly natural due to artificial flow influences - could we use Waingaro instead as this flows into the Kotinga?

*[some general group discussion occurred on this]*

**Are we happy with the numbers selected, rather than using a ratio?**

Yes.

**We need to recognise the specialness of the Takaka River and its connection to the groundwater.**

- *[Waingaro MCI = 160 (2002), 139 (2003)*
- *Takaka River at Harwoods MCI =150 (2002), 125 (2003)*
- *Kotinga MCI =154 (2002), 133 (2003)]*

**Would we be taking action now? With the current numbers Kotinga would be in orange – is this representative? Trevor how would you see this?**

TJ: I'd consider Kotinga is probably in the orange – I'd expect to see this site above 130 MCI given the amount of the catchment in indigenous forest. I would like to have more samples to determine if this trend is real.



I've seen a decline in fishing quality in recent years – there is more algae, more earlier in the year.

**Does algae growth affect the invertebrates?**

TJ: Yes, once it gets over 20-30% it really starts affecting invertebrates, but also fish. It does this by reducing habitat quality and quantity (taking up space in the stream) and reducing dissolved oxygen in the water during the night.

**What action would council take if the numbers are still above the national averages?**

We could change the orange-yellow boundary.

**What could be done to improve MCI values?**

TJ: The main drivers in this catchment are likely to be fine sediment and nutrients – reducing inputs of these contaminants would likely improve MCI.

**MLi: We also need to consider spinoffs such as the impacts of water quality going into the sea. With climate change it is going to get worse.**

**If we are seeing impacts on the river, maybe there is something about the MCI 120 threshold – something is happening in the river. We don't have to align with national levels – particularly as we are starting from a higher level anyway.**

NM: If we keep our levels better, then the national average will increase over time too.

There is also a lag to some factors – a lot of fencing and planting has been done and we may still be seeing impacts of past sedimentation.

Council's response wouldn't be to come down hard, it would be looking at options.

**I don't understand how this attribute will link to setting limits.**

MAB: We have to set management objectives for attributes, but we may not set limits for this. The question of what we need to do to achieve these objectives is something we look at later.

**Macro-Invertebrate Attribute Grading**

**Units:** Macro Invertebrate Community Index (MCI) score (between 0 and 200)

<b>Green</b>	<b>Yellow</b>	<b>Orange</b>	<b>Red</b>
>135 (150-135)	135-120	120-110	<110

**Drinking Water Attribute (drinking water value)**

- MB: Drinking water is a huge issue for local people.
- We would be well above the NZ drinking water standard and we want to stay above this.
- Takaka has been given awards for the best water in NZ.
- They bottle it.

**Is any testing done on Takaka drinking water?**

JT: We have done a general survey of Takaka town water. We need to be careful as many people have unsecure (leaky) bores.

The supermarket and restaurants have to test their water as they are making food.

We haven't picked up any bugs in secure wells during testing in Takaka.

**Hamama has had issues in their supply, but this has been plumbing issues.**

This is also a surface water take.

- TK: the drinking water standard is <1 E.coli per 100ml. I suggest this is top of the red category.

**There is only really green or red – it is either good or bad. No yellow or orange categories are needed.**

### Drinking Water Attribute Grading

Units = E.coli per 100ml

Green	Yellow	Orange	Red
<=1	NA	NA	>1

### Spring Flow Quantity Attribute (cultural and spiritual values)

- This is for spring flow at Te Waikoropupu Main Spring.
- The quantity has been modelled and the model shows some too-high and some too-low data compared to the synthesised data. The synthesised data is created from correlating gauged spring flow data with groundwater level data *[this is done as it is easier to regularly measure groundwater levels than flows in the Springs River from the main spring]*.

**This is a bit tricky as the TWS flows are higher than the natural state due to the Cobb Dam flows.**

Yes, the lowest scenario is natural state due to the influence of the Cobb flows.

What we want to retain is the status quo.

### Why are the flows with the Cobb Dam higher than the natural state?

The Cobb Dam augments the river flows during dry periods. The natural state scenario also excludes irrigation and has land coverage of native forest.

- TK: the categories and numbers on this are up to the FLAG to decide.
- Status quo is 7500 l/s (nearest 100l/s above the 'no consumptive use' scenario).
- Red is suggested at the natural state of 5830 l/s.

### Do we know what spring flow leads to the Fish Creek drying up?

JT: we do have those numbers

JW: Fish creek was dry in 2001 and 2004, 2006, 2008, 2010.

AF: it looks like the threshold is about 8000l/s Springs River flow.

JT: we are talking about the Fish Creek springs rather than Fish Creek which gets back flow – so the level would be a bit higher around ~8200 l/s.

7500 l/s is around MALF.

If you set it at the current level every few years the Fish Creek springs will dry up.

From the numbers we wouldn't be in the green. We should amend the status quo number of 7290 l/s.

6500 l/s is halfway between yellow and orange.

**With our current numbers we would be triggering action, rather than just a flag for further consideration...**

### What is the ten year flow? Should we use this rather than the average flow?

JT: 6200 l/s is the ten year flow.

This would have direct impacts on the security of supply for allocation.

**It will be interesting to see how the next summer numbers stack up with issues around dairy payouts.**

Irrigation is usually the last thing to go – feeding the cows is still important.



**The more allocation, the more often Fish Creek Springs will go dry – it is more sensitive than the main spring which has a lot of buffering. Perhaps we should use the 5 year flow in the main spring?**

The 5yr flow is approximately 6500 l/s.

So where does this leave us? We're saying our current status quo is in the green category - and if we get to natural state there would be something very weird going on in the catchment.

**Is anyone uncomfortable with the numbers?**

I'm uncomfortable perhaps the 5830 l/s given the comments.

**If you want staff to go away and convert the numbers to 10 year flows we can do this.**

Yes, it would be good to have both.

The ten year is more conservative so we should look at this.

**Action:** Staff to convert average TWS spring flows to 10 year flows *[this was done during the meeting]*.

### Spring Flow Quantity Attribute (TWS) Grading

**Unit:** litres per second: Long term average low flows OR ten year flows.

Long term averages to be used for WaterWheel, but ten year flows to be used for consideration of allocation issues.

Units	Green	Yellow	Orange	Red
Long term average low flow (7-day MALF) (l/s)	>7290 (7500-7290) [7500-7200]	7290-6900 [7200-6800]	6900-6500 [6800-6300]	<6500[6300] (6500-5830) [6300-5830]
1 in 10 year low flow (l/s)	> <b>6000</b> (6400-6000) <i>[existing status quo]</i>	<b>6000-5650</b> <i>[Takes all from groundwater]</i>	<b>5650-5300</b> <i>[Waingaro River Scenario]</i>	< <b>5300</b> (5300-5050) <i>[No Cobb scenario]</i>

*[JW: Since the meeting I adjusted the models to be more in line with JT's understanding. These give slightly different results, which have been added in the square brackets in the table above.]*

### Dissolved Oxygen Attribute (ecosystem health value)

- Dissolved oxygen (DO) is measured in two ways – the percentage of saturation of oxygen in water and concentration of oxygen in water.
- With higher water temperatures there will be lower concentrations of dissolved oxygen in the water that have the same percent saturation as more dissolved oxygen in cooler water.
- We have used percentage saturation as the key unit in the modelling *[because it takes variations of temperature and pressure into account. We measure both whenever we sample dissolved oxygen]*.
- The 7-day daily minimum is the most relevant statistic - this is the lowest average over any 7 day period.

**The Motupipi River has known issues with dissolved oxygen in summer and TDC have a continuous monitoring site at Reilly's bridge – but not at the Factory Road site suggested in the WaterWheel.**

We can change the site location to Reilly's bridge.

General agreement to change site to Reilly's bridge.

- Roger Young has attributed some of the low DO levels to land use and stock access to rivers, but was clear to state there were other factors that could also affect this.

- The scenarios show that increased irrigation will decrease DO levels and a reduction in irrigation will increase DO levels. This is a concern.

**How does this work – isn't the river partly spring fed? What is the DO level in the springs?**

TJ: The spring water is low in dissolved oxygen – typically about 60%. However, reasonable re-aeration rates are expected to occur especially when the river flows over riffles.

**So why do DO levels drop further?**

TJ: Due to plants and algae growing in the water. This occurs over the night with DO levels rising during the day.

**When did Roger Young do his report?**

2006.

**How does this relate to when the Windles stopped pumping whey onto their land?**

This stopped much longer ago.

**How does dissolved oxygen change relative to the amount of riparian planting?**

TJ: It takes ten years or more for planting to get big enough to shade the stream and only a small part has been planted

**Many things have improved management wise – stock access has been stopped, whey onto the land and direct discharges have been stopped - shouldn't it be getting better?**

AF: we are probably seeing the effect of land use putting nutrients into the groundwater which then comes out of the springs which is supporting plant growth.

TJ: and these nutrients are present in the sediment that is on average 300mm deep through the Motupipi River. So these plants are utilising this source of nutrients.

**Won't plant growth increase the oxygen?**

During the night they respire and take up oxygen (and produce carbon dioxide) – it is this swing that can take the DO levels down below levels that will kill fish – we look at the daily minimum in DO for this reason.

**How do we currently relate to the NPSFM NOF standards?**

The 7-day minimum dissolved oxygen is typically 4-4.5 mg/l and the NOF 7day minimum bottom line [for 1 November to 30th April] is 5 mg/l. *[The Motupipi River is below the national bottom line, however the current NOF wording relates to 'below point sources']*

**We are talking about the Motupipi River, but the numbers can't really be related to the rivers in the AMA system...**

TJ: The same criteria for DO should be used everywhere because these are based on testing of a range of species that are common across the district. Most of the rest of the system is in the 'A' band [under the NOF] – it is the smaller streams that tend to have DO issues. Motupipi River and Te Kakau Stream are where we have the problems that we know of.

HR: The Motupipi River is more visual – most visitors drive over it.

**How can you get more than 100% saturation?**

Plants can put more oxygen into the water than we can *[when we produce oxygenated water for calibration of our monitoring equipment by aerating water with bubble equipment.*

*We calibrate our monitoring equipment which gives us the 100% saturation level, but plants are more effective and can push levels higher which shows up as more than the 100% on the monitoring equipment.]*

**What happens to the spring water once it is on the surface? – 60% DO appears natural – I presume if the river was healthy these levels would increase back up to 100%.**

TJ: DO would increase by re-aeration in the first few riffles *[and due to photosynthetic activity of plants during the day. However, because DO is reduced at night by plants, it decreases below 60% to a low point around dawn. Because DO fluctuates throughout the day it is only likely to be at 100% for a short time.]*

**So something is going on to reduce oxygen levels?**

TJ: Yes, *[it's mainly due to the excessive growth of plants and algae in the river - both the respiration at night and the breakdown of organic detritus/sediment from the aquatic plants in the waterway.]* We get massive fluctuations from 45 – 150% saturation.

**Are the highs during the day and lows during night?**

TJ: Just before dawn is when the daily minimums occur.

**If there wasn't the water cress *[and other plants]* would you expect the daily minimums to be better?**

TJ: Yes, it is because this river is not shaded and the water cress and other aquatic plants can grow.

**Do the plants take oxygen out of water during the day?**

TJ: They switch to photosynthesis during the day and release oxygen into the water. At night they respire taking oxygen out.

**Does it depend on the type of plants growing? – ie if plants are floating on the top they would stop sunlight and photosynthesis in lower levels...**

TJ: Yes, oxygen weed (*Elodea candiensis*) that is very common in this waterway is particularly good at producing oxygen.

**So the daily minimums have not improved over time?**

TJ: No, they have stayed the same from 2007 when we first started sampling DO in the Motupipi, but if more riparian vegetation (shading) was done they should improve.

**So if we were below 50% saturation we would be concerned – so this would be in the red *[category]*?**

TJ: Yes. 50% saturation is equivalent to 5 mg/l of DO.

**Do the trees have to close over the river or is side shading ok?**

TJ: No, you do not need >90% shading. If look at it from a fish-eye point of view, you want to get about 60-70% shading. More planting on the northern bank will achieve more shading than planting on the southern bank.

**People have been planting flax – would this provide enough shading?**

TJ: Not really, you need overhanging trees.

**Isn't 60% saturation too low? – we aren't measuring at the springs inflow...**

TJ: 60% is not ideal for all species but for parts of the Motupipi (around the springs), this is the natural level. We have measured at the springs but the routine measurements are at Reilly's Bridge.

**How good could the Motupipi River get at Reilly's bridge?**

TJ: I suggest that we could achieve about 60-70% for a long term 7 day daily minimum.

JT: The river is gaining water all the way down from springs (at 60% saturation) – from the factory all the ways to Reilly's bridge. So Trevor's numbers seem sensible.

**The 60% saturation for the orange-yellow boundary is not half way.**

Let's make it half way at 57.5%

## Dissolved Oxygen Attribute Grading

Unit: long term, 7day, daily minimum for percentage saturation (%).

Green	Yellow	Orange	Red
>65% (70%-65%)	65%-57.5%	57.5%-50%	<50%

## Swimming Water Quality Attribute (recreation value)

- Currently the site is at Pohara Beach.

### I don't get the relevance of this site. Shouldn't we use Payne's Ford?

TJ: Yes, the Pohara site is not always related to faecal contamination coming from rivers.

There is also an issue of potential natural *E.coli* populations at Pohara.

We have a good record for swimming quality at Payne's Ford since 2001.

FLAG agreed to switch site to Payne's Ford.

- AF: the original proposal was the number of sites that exceeded the swimming water guidelines.
- The unit is E.coli / 100ml
- The national guidelines for swimming is 260 (alert for further sampling) and 550 (alarm – put up warning signs at the swimming site).

**Action:** Trevor to determine status quo at Payne's Ford and number of exceedances of swimming water quality alert guidelines [*this was done during the meeting*].

### Do you sample only when there are complaints?

TJ: No, we sample 20 times per year [*during the bathing season (weekly, then twice weekly during the peak Christmas to late January period). We took additional samples after complaints at the Takaka at Top Rocks site due to cattle around the swimming hole. We only put up warning signs if there are two consecutive samples over guidelines. While we occasionally get exceedances, we have only once (in 2005-06) put up a warning sign, and then we took it straight back down again the next week when levels improved again.*]

### Can't we just use the national standards?

TJ: Yes, That's exactly what we propose. TDC follows the national standards precisely and reports as the number of exceedances of these standards.

- After looking at the data – for all swimmable flows over the summer period (Nov-March) – in the early years 2004-2005 we had around 15% exceedances of the alert level – in 2007 the alert level was exceeded 20% of the time.
- For the alarm level (550 E.coli /100ml) again in 2004-05 there were 15% exceedances – but in recent years it has been 5% or 0%.

### Could the higher levels be due to cows in the river?

Yes, potentially.

### So the reduction over time could be due to the progressive fencing of streams?

Yes, potentially.

### Swimming Water Quality Attribute Grading

**Unit:** percentage exceedance of weekly sampling (over each summer season Nov-March) of national guidelines for the alert level (260 E.coli/100ml).

Green	Yellow	Orange	Red
<5% (0%-5%)	5%-10%	10%-15%	> 15% (15%-100%)

*[post meeting note: the data shows that approximately 25% of alert levels progress to an alarm level].*

### Supply Security Attribute (livelihood and economic value)

- TK: This relates to security of supply for water users.
- TK: The only limit in Takaka currently is set by the council at Harwoods via the water take consents – which is at an instantaneous flow of 1657 l/s at the Harwoods flow recorder – at this point there is a restriction on takes.
- JT: This is very volatile and they switch on and off regularly. They can be restricted for say 8 hours then they turn back on.
- JT: There is also a trigger for the Salmon Farm when Te Waikoropupu flows reach at 8.4 cumecs (m<sup>3</sup>/s).
- The data used shows how often the flows are below the trigger levels when restriction occurs (these are currently cease takes).
- The Cobb dam has changed the way it does its releases, which affects the occurrence of trigger flows at Harwoods.

**There is also long term climate fluctuations (eg El Nino etc).**

#### **The FLAG need to decide what level of restriction is too much?**

Should we be asking the industry this? – the security of supply will determine investment by the industry.

This will also depend on the industry – ie water bottling is very different to dairy farming requirements.

#### **In Canterbury they have a very high security of supply ~98%.**

But this is probably due to the high drainage and potentially growing sensitive crops dependent on water.

The Canterbury rivers are bigger so we need to be careful about comparisons.

How long the period of restriction lasts also determines the economic impact.

A security of supply of 96% has been discussed by the irrigators group. This is the current security of supply for the three consented takes.

#### **So if we increase allocation then the security will go down?**

This is also about how many people can get a piece of the pie (the more pieces of pie the lower the security becomes).

We need to be careful about trying to add certainty into an uncertain system.

#### **We are not in a situation that we don't have enough water...**

We need to work out what our allocation is for the rivers – we need to say how big the pie is.

- All the main takes are below Hardwoods, so the takes will not affect flows at Harwoods – but we need to take them into account in setting the flow trigger.
- There is a proposal for the trigger to be measured over the day instead of using an instantaneous flow to make flow management easier.

**There are those still wanting more water. Won't we have to reduce the security of supply to enable more water to be allocated?**

If more people are allocated the same [total] amount then yes, the security of supply will go down. But you would normally start with a target security of supply and allocate up to the point that that is the outcome.

**Who bears the lower security of supply if we allocate more water? Is it just the new water taker?**

The people downstream can be affected.

By setting the [total allocation] limit everyone knows how many people can access that water in maintaining a specific security of supply.

**So if we set our security of supply and set a minimum flow, then this determines the amount of water available for allocation.**

Yes. We will be having these discussions in September.

**We don't have the technical knowledge we need to determine the numbers for suitable security of supply...**

Other Councils and IrrigationNZ would have better information on good security of supply.

We're just putting a line in the sand for the modelling. So we don't need to get too hung up on the exact numbers now.

Since most users locally are dairy farming we should look at these.

**We have the Irrigator Users Group – we should put this question to them.**

**Action:** Staff / Tony R to email to irrigators group for category numbers to use for security of supply.

- We would end up with different requirements in Upper Takaka vs Waingaro River etc. But percentages could be applicable across the system.

**Why do we need to look at this? Why don't we just put in the minimum flows and let users take what they want above this?**

MAB: Because each new taker degrades the security of supply to a point where it isn't of any benefit to all users as security is so low – we cannot support investment by this approach.

MAB: There is a balance between the number of users and the security of supply – sometimes we can get better economic outcomes with a lower security of supply, but more people being able to use it. We need to find this balance.

The duration of restrictions is also important. If grass dies you can't just bring it back when you get water.

**So how can a group like the FLAG make this decision?**

Because we need to look at it on a regional basis – if we asked any one water user they would want all of their water all the time.

**Does the modelling provide us with relative allocation numbers vs security of supply?**

We will be looking at this in September.

We will also be looking at the rationing and cease take regimes – this will also affect the allocation amounts and security of supplies.

**By focusing on dairy are we potentially limiting future land uses (eg sheep and beef)?**

The numbers don't affect what the water is used for – if there is economic benefit in using the water for sheep and beef the market will direct this change.

We just need to make sure the water can move to higher value uses (transfers etc).

If water is a tradable thing then users should be paying for it.



**I think the numbers are too low (too high security) what about 10% [ie 90% as an orange-yellow threshold]?**

We don't want reactions where if they think they won't get water 10% of the time, they put on more when they have it in order to keep soil moisture up.

If we set it at 90% security we will force peoples hand to put in storage.

**If it is not secure enough we might as well say there is no water available for allocation.**

Yes – then landowners will invest in storage.

But this is expensive.

But that is the nature of business.

**So we are talking about setting a security of supply and letting this determine the allocation amount?**

That is where we talk about A-B-C permits with varying security of supply.

We will be limiting the number of water takers with the security of supply we are selecting.

So farmers might use their permits to prioritise in-farm uses, such as focussing water use on smaller dry-matter production, rather than spreading it across a wider pasture area.

### Supply Security Attribute Grading

**Units:** Long term average percentage of time without supply in summer – ie when cease take trigger flows are reached.

These categories would apply to 'A' level water permits with the best security of supply.

Green	Yellow	Orange	Red
<2% (0-2%)	2-4%	4-6%	>6% (6%-100%)

### Cultural Health Attribute (cultural and spiritual value)

- Cultural stream health determined on a scale of 1-5 (1 poor, 5 excellent).
- Base methodology developed by Gail Tipa.
- Multiple person assessment of different attributes of the river.
- Sites that are special to māori are likely to remain special over time.
- Mahinga kai aspects will be affected by fish abundance and other attributes.
- The factors looked at to determine stream cultural health look at physical features, water quality, habitat variety and can be quite subjective, but with multiple assessors values would average out.
- For some of these factors we can make judgements on how these would change under the different scenarios.

MLi: Aspects of kaitiakitanga are also important. The health of the water is important as this flows on to the health of the fish, etc. A healthy riparian vegetation is a sign of a healthy river system. The thing that concerns me is the amount of water that will be there during dry periods.

The health of our waters is the most important thing – that our children can come here and still catch a fish and use the rivers. We should leave only footsteps – we need to leave resources in a better state that we found them. The 'paradise' value is more important that the economic values and that we can pass this on.

My choice of what I want to pass onto my children is healthy waterways, not a pristine dairy farm.

**So it wouldn't be unreasonable to assume that the cultural values would go down if irrigation were increased, and would go up if irrigation was decreased?**

MLi: That would be reasonable.

We have done cultural impact assessments locally [*for salmon farm and river spraying?*] – I'm not sure if one was done for the Harwoods consents.

- TK: Due to lack of data, currently we have no status quo value – default used of 2.5.

**I don't think we can use the CHI in the WaterWheel – it is very subjective and I'm not sure it will add to what the WaterWheel can do.**

Disagreement in the group and discussion on this.

We need to be honest about our feelings about water – whether they are māori or pakeha and recognise our important values and acknowledge our feeling within the other values.

I want to be able to pass on an environment that is as good a quality as I have experienced, but I want them to be able to afford to live here too.

This is an imperfect way to measure such subjective things, but it is important that these aspects are given a place in our consideration.

We haven't yet sat down to discuss what we would trade-off in our values. This will tell us where we are trying to aim.

This could be that we are missing a vision statement.

If we leave cultural health out and don't put a number on it, it can be easy to overlook and we don't want this to happen.

To me the values we have set are the cultural values. The numbers are on everything else [*the other attributes*].

I think we each look at things differently – I like numbers and I think those science-minded people amongst us struggle with these kind of aspects. But I can see value in approaching it from both directions. You can get valid numbers through this process and the process needs to be robust, but I don't think the process is robust enough yet.

Without any data we need a commitment to undertake some cultural health assessments.

**Is the CHI an iwi scale or is it for everyone to put into?**

For everyone - we are all here for the same reason.

We are hearing that the environment used to be better.

### Cultural Health Attribute Grading

**Unit:** 1-5 scale Cultural Health Index – average of assessors scores [*method to be confirmed - based on Gail Tipa method?*]

Green	Yellow	Orange	Red
>4 (5-4)	4-3	3-2	<2 (2-1)

## Session 2 – Project Management

### Further comments on the day

**We always look backwards when everything was better – go back further and there were forests burning and mining wastes flowing everywhere – when we look around we see the resilience of the system and its recovery.**

It hasn't all recovered.

The bay hasn't recovered – we just exported all the sediment out there.

**AF: How do you think the WaterWheel will be useful? We can go away and populate the wheels for your later meetings – we could also go through some different scenarios that you come up with...**

Can we please have a WaterWheel for each location – it is impractical to have Payne's Ford and Te Waikoropupu Springs on the same wheel.

The WaterWheel will give a holistic indication.

**Action:** AF to complete waterwheels for current scenarios for comparison purposes.

**Could the WaterWheel show the difference between the current Upper Takaka and adding on further water takes?**

JW: Yes, there are three additional scenarios we have been discussing with Joseph which are more realistic scenarios for the area.

**What is the ratio of the waiting list to the current irrigation?**

They want half of what is being currently irrigated.

There is 291 l/s on the waiting list.

JT: The double irrigation scenario is over the whole catchment, but the allocation limit is just in the AMA.

Some areas are unlikely to take water due to local constraints.

**So a scenario would be those on the current waiting list?**

JT: They have already done this – but there has been some review of where water is realistic

JW: This gives around 25% of current irrigation on the waiting list.

**Last summer we went below low flows – is there an opportunity to go to council to discuss low flows before this summer?**

We can look at this in terms of looking at what council could use to inform cease take directions under Section 329 of the RMA to better control flows over this coming summer.

**MAB: Steve Markham has been asked to provide information to the Environment and Planning Committee on how much the FLAGS are costing and how well they are working. If you get a chance to talk to the councillors please let them know how you think it is going.**

**We are coming to the crunchy, pointy bits. If the WaterWheel doesn't fit then we shouldn't get hung up on using it.**

### Next meetings

- *Subcommittee meeting on consultation next week - date to be confirmed by MAB*
- *24 and 25 September - with social event on the Thursday evening*

**Action:** MAB to confirm date for consultation subgroup meeting.

**Action:** FLAG to confirm availability to RSN for 20 or 23 October and 20<sup>th</sup> November, 18<sup>th</sup> December dates sent by RSN.

<End of meeting>

## Action Points – Council Staff/Facilitator/Advisor

No.	What	Who
1.	Trevor to recalculate numbers <i>[this was done during the meeting]</i>	TJ
2.	TJ to look up MCI data from Cobb Dam.	TJ
3.	Staff to convert average TWS spring flows to 10 year flows <i>[this was done during the meeting]</i> .	JT/ JW
4.	Trevor to determine status quo at Payne's Ford and number of exceedances of swimming water quality alert guidelines <i>[this was done during the meeting]</i> .	TJ
5.	Staff / Tony R to email to irrigators group for category numbers to use for security of supply.	MAB / TR
6.	AF to complete waterwheels for current scenarios for comparison purposes.	AF
7.	MAB to confirm date for consultation subgroup meeting.	MAB

## Action Points – FLAG members

No.	What	Who
8.	FLAG to confirm availability to RSN for 20 or 23 October and 20 <sup>th</sup> November, 18 <sup>th</sup> December dates sent by RSN.	ALL

## Action Points – FLAG Sub-groups

No.	What	Who
9.	None	

## Scheduled FLAG and FLAG Subgroup meetings

<b>Date</b>	<b>Thursday 24 and Friday 25 September 2015 (FLAG Meeting 13 and 14)</b>
<b>Time</b>	9.30am -3pm
<b>Venue</b>	Takaka Fire Station
<b>Agenda Items</b>	TBA

<b>Date</b>	30 October 2015 (FLAG Meeting 15)
<b>Time</b>	9.30am -3pm
<b>Venue</b>	Takaka Fire Station
<b>Agenda Items</b>	TBA

*[Future meetings also booked for the 27<sup>th</sup> November and 18 December.]*

## Information and resource documents identified during meeting

Date	Title	Author/Source
	None	

*\*Key documents available electronically will be added to the online PDF document bibliography.*

## Issues or topics identified during meeting for future consideration

Topic/Issue Description	Requester
None	

*\*Issues or topics unable to be addressed at the meeting, but requiring future consideration will be recorded in the Takaka FLAG 'Information Eddy'.*