SUMMERY OF EVIDENCE
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AUCKLAND WAIKATO FISH AND GAME COUNCIL
HEARING FOR PROJECT MARTHA: APP139551
15 November 2018

1. I acknowledge that filling the pit lake without the river abstraction would be time consuming and costly, so a practical solution needs to be found. However, the applicant has failed to justify the increased in water take (10% to 20%) in terms of the benefit as opposed to the additional harm.

2. The Ohinemuri River is the closest significant trout fishing stream to Auckland. However, extreme water temperatures and degraded water quality have greatly reduced the trout population and frustrated anglers. Temperatures in the Ohinemuri regularly breach 25°C during the summer months posing a threat to native fish and completely excluding trout from most available habitat causing significant harm to the remaining trout population.

3. The Ohinemuri River trout population suffers from multiple stressors including extreme water temperatures, degraded water quality, migration barriers and degraded habitat. In my professional opinion the Ohinemuri River ranks a 2 out of 10 in terms of the stability of the trout population. This low ranking is largely due to the extremely hot water temperatures. Any increase in stream temperatures would harm the trout population and potentially the native fish population. Additionally, it is critical for trout to maximise their feeding potential to survive in this harsh and modified environment. In ideal South Island conditions trout populations have additional resilience they do not have in the Ohinemuri where they are often in survival mode.

4. The applicant has indicated that based on historic flows granting the new consent would allow them to abstract 20% of the Ohinemuri River 61% of the time (223 days per year on average) for about a decade. I do not consider this a short term or minor abstraction and the trout habitat below the abstraction point will be negatively impacted.

5. In the absence of known physical habitat requirements for the life sustaining capacity of a river 2xMALF is a meaningful starting point in terms of protecting rivers from the harm caused by abstractions. However, in this case there are detailed models of optimal habitat for each species based on habitat use curves for native and introduced fish measured at over 5000 locations in 124 rivers (Jowett, 2014) so guessing is not necessary.

6. It is important to keep in mind that the Jowett (2014) data used to justify the minimum flow for the take is based on a site well upstream (3.7 km) of the impacted habitat and should be considered an underestimate of the flows required in the impacted reach. For example, the optimal flow for torrentfish at Golden Cross Road is 1800 L/s as opposed to 6000 L/s at the Karangahake site downstream. The flow calculation provided by the applicant includes data from Ruahorehore Stream that makes up about 20% of the Ohinemuri at the abstraction point and in my understanding was not factored into the Jowett (2014) models. The harm or suboptimal conditions predicted should be considered an underestimation of the impacted

reach in my opinion. To properly protect the impacted habitat similar modelling should be done at the torrentfish habitat downstream of the abstraction point (flagged sites shown in Figure 1). Additionally, it should be noted that due to the degraded nature of the Ohinemuri trout must optimise their feeding to survive because they do not have added resilience as they would in colder cleaner streams.

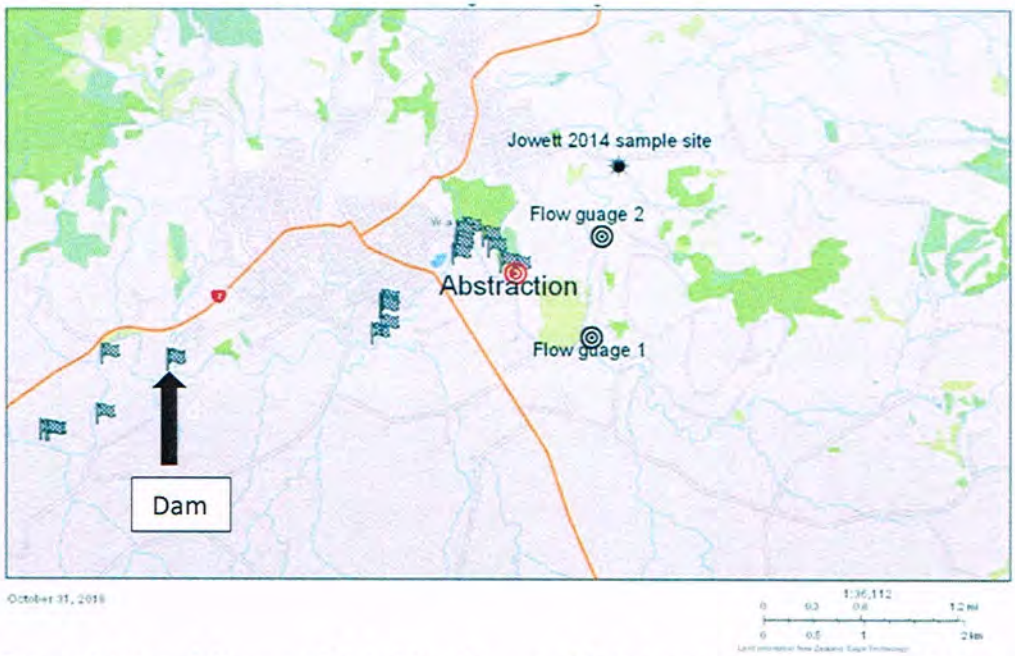

Figure 1. Potential torrent fish habitat (flags, n=25) below the abstraction point (red circle).

7. I have two grave concerns with the application:

    a. The Ohinemuri is classified as Trout Fisheries and Trout Habitat and regularly exceeds the 20°C limit so by reducing the water volume the abstraction will increase the rate the river will heat up compounding an already dire situation. I believe any additional harm needs to be minimized.
    b. Reducing the flow will degrade trout and native fish habitat that needs to be as close to optimal as possible for trout due to the degraded nature of the Ohinemuri.

Flow

8. Minimum flow limits should be set to safeguard the life sustaining capacity of a river for the most sensitive native species. Torrentfish are the species with the highest flow requirements, and therefore are the most sensitive to reductions in flow (Storey, 2015). Torrentfish require a minimum flow for the take to be set at approximately **2250 L/s** (1800 L/s after abstraction) for optimal habitat protection (Jowett, 2014) and a level below **1100 L/s** would cause habitat to "decline sharply" for Torrentfish (Jowett, 2014). The minimum flow for a take proposed by the applicant (845 L/s) will not adequately safeguard the life sustaining capacity of the river for torrentfish or trout.

    a. Boothroyd states that the dam (5km downstream) is blocking torrentfish migration and makes the assumption that there is no need to provide habitat for torrentfish. This structure is targeted for fish passage (Bruno David, personal communication, October 20, 2018) by both Waikato Regional Council and Fish & Game and will likely have adequate passage before the abstraction begins. Additionally, there is no

evidence that reducing flow by 20% will not harm torrentfish habitat below the dam if it is a barrier.

b. Additionally, Jowett (2014) included torrentfish (3.7 km upstream) in his habitat analysis despite omitting adult trout habitat because he believed there were not many adult trout.

9. Table 1. Cost benefit analysis of consent condition scenarios using flow data provided by the applicant from 1/1/2013-30/7/2018 or 2038 days of daily total discharge converted to L/s. The data is raw and uncorrected but as all scenarios are applied to the same data set they can be used for a rough comparison. Scenarios include "Existing 10% 850 L/s" representing the existing consent of a 10% take with a minimum flow of 850 L/s, "Proposed 20% 850 L/s" representing the proposed consent of a 20% take with a minimum flow of 850 L/s, "20% 1000 L/s" representing a 20% take with a minimum flow of 1000 L/s, "20% 1400 L/s" representing a 20% take with a minimum flow of 1400 L/s and "20% 2250 L/s" representing a 20% take with a minimum flow of 2250 L/s. "Days" shows the number of days the water take can occur under each scenario, "Reduced over existing" is the percent reduction in days the take would occur over the exiting consented minimum take, "Harm torrentfish" is the total days of suboptimal flows that would occur under each scenario for torrentfish based on Jowett (2014), "% additional harm tor" is the percent of additional days over no take suboptimal conditions would occur for torrentfish, "Harm RBT" is the total days of suboptimal flows for rainbow trout (averaged 1200 L/s) that would occur under each scenario based on Jowett (2014) and "% additional harm" is the percent of additional days over no take the suboptimal conditions would occur for rainbow trout.

	Days	Reduced over existing	Harm torrentfish	% additional harm tor	Harm RBT	% additional harm RBT
No take	0	na	1260	na	976	na
Existing 10% 850 L/s	1330	na	1318	4.60%	1044	6.97%
Proposed 20% 850 L/s	1330	0%	1399	11.03%	1127	15.47%
20% 1000 L/s	1210	-9%	1399	11.03%	1127	15.47%
20% 1400 L/s	986	-26%	1399	11%	1032	6%
20% 2250 L/s	639	-52%	1260	0.00%	976	0.00%

10. In summary I believe a minimum take of 1400 L/s sets a reasonable level of protection based on the available data.

Increased water temperatures

11. Trout in the Ohinemuri River are subject to extreme temperatures and according to data provided by the applicant are severely impacted by warm water temperatures (>19°C) 26% of the time and lethal temperatures (>24°C) occur 2% of the time. Conditions downstream in the lower Ohinemuri are far worse resulting in the complete collapse of the trout population in hot dry years.

12. Boothroyd's response to questions posed by the commissioners suggest that I have stated trout simply move when the Ohinemuri reaches temperatures above 19°C. Some fish do move to cooler water but only when it is available and there is no known thermal refuge

(spring or cool tributary) in the upper Ohinemuri resulting in significant stress on the trout population that requires optimal conditions when temperatures are cool to ensure survival.

13. In the absence of the modelling data that should have been conducted to evaluate the impact of the abstraction it is difficult to quantify the impact of the water take other than to say there is very little resilience in this already stressed population of trout and reducing the volume of water will increase the rate the remaining flow will heat up during warmer months.

14. The applicant has justified the take by claiming existing plantings. Boothroyd's evidence (49-53 p.7) and his response to questions posed commissioners he fails to quantify any cooling of the river to justify the potential increase in river temperatures. I would agree plantings can offset increased temperatures but to evaluate the usefulness of the plantings the applicant needs to estimate the cooling that has been achieved, and verify the plantings were not part of other mitigation. Additionally, the tree planting that has been conducted cannot directly offset the loss of habitat caused by reducing the flow of the river by 20% at the point of abstraction. If this consent is not anticipated to be used for multiple decades there is time to achieve substantial shading prior to starting the abstraction if the required planting plan is implemented.

15. (81-85 p.10) Boothroyd singles out a FRE3 parameter as being a primary focus of the abstraction impact. I would agree the FRE3 value is one of many useful tools to look at the impact of a water take in the absence of good ecological modelling and that the applicant has shown the proposed water take will reduce the FRE3. However, in this case there is flow based modelling that quantifies the impact of water takes near this location for all known fish species that would be far more useful than a single metric that indicates the frequency of flushing. Estimating the impact of the proposed water take on fish should have been done based on Jowett (2014).

RELIEF SOUGHT

16. Considering that the take will occur for an extended period, taking 20% of the Ohinemuri River for 223 days a year and exacerbating already poor conditions, Fish and Game would like the minimum flow before any abstraction to be set at 1.4 m^3/s during the trout spawning season (May-Sep) and 1.0 m^3/s during the remainder of the year. Alternatively, Fish & Game would agree to a renewal of the existing consent conditions. The required planting plan is essential, in addition to an appropriate offset based on the outcome of modelling the impacts of the abstraction on river temperature (Nov-May) and fish habitat.