Report No.	19-87
Information Only - No Decision Required	

FISH PASSAGE UPDATE (PRD 04 07)

1. PURPOSE

1.1. The purpose of this item is to update Committee members on progress with improving native fish species populations in scheme drains.

2. EXECUTIVE SUMMARY

2.1. New Zealand has a unique and highly mobile native fish fauna consisting of a large number of migratory species. The majority of native fish within the Horizons' region are migratory in nature and therefore require access to the sea at some stage in their life cycle. The inappropriate placement of structures or type of structures can prevent that migration.

2.2. An incident occurred at a pump station in the Waikato in 2015 that resulted in a large number of eel deaths. A range of factors contributed to that particular incident, including the configuration of the station/ lake outlet, the operability of the station at the time of the incident, the very high ecological values of the water body, weather conditions and the influence of seasonal/ migratory factors.

2.3. Horizons' River Management asset inventory includes 22 land drainage pump stations, 1,100 km of drain and 540 floodgates. Although no large scale mortality events have been either observed or reported that relate to Horizons' River Management activities, scope exists to improve access to the network and reduce the potential for such an event to happen in the future. This item updates Item 18-95 presented to the June 2018 Catchment Operations Committee meeting.

3. RECOMMENDATION

That the Committee recommends that Council:

a. receives the information contained in Report No. 19-87 and Annexes.

4. FINANCIAL IMPACT

4.1. Improving fish passage to scheme drains has a cost that has yet to be fully determined. Note that most will be relatively small initiatives that form a part of routine operations and maintenance activity and as such are likely to be difficult to itemise separately. Clearly the focus will, for the most part, initially be on high value/ low cost initiatives, factored where possible/ practicable into operating budgets. Prevailing weather conditions will influence what is achievable in any given year; a financial year with relative benign weather/ river flows will allow more to be achieved and vice versa. Some improvements, particularly to passage at pump stations, will have a cost that cannot be accommodated within existing operating budgets; specific approval will be sought for these initiatives. Staff will also continue to fully explore funding alternatives to targeted rates.

5. COMMUNITY ENGAGEMENT

5.1. This item is being presented in a public forum. As further information is gathered and improvement work identified this information will be presented at Scheme Liaison

Committee meetings and Catchment Community meetings. It will be a standing item for all such meetings.

6. SIGNIFICANT BUSINESS RISK IMPACT

6.1. Notwithstanding the events that unfolded in the Waikato in 2015 and the reputational damage that arose, the matters contained in this item are not considered to constitute significant business risk; put simply the situational characteristics do not exist on a similar scale in the Horizons' region.

7. BACKGROUND

7.1. New Zealand has a highly mobile native fish fauna consisting of a large number of diadromous (migratory) species. New Zealand's native fish communities also display a high degree of endemism (85% of New Zealand's native fish fauna are only found in New Zealand).

7.2. The Horizons' region is home to 17 species of native freshwater fish, with most found in the Horizons' region. They are migratory in nature and therefore require access to the sea at some stage in their life cycle. The region's rivers and streams are the conduit between the sea and freshwater bodies.

7.3. Given the migratory nature of our native fish species those streams that are closer to the coast will generally have a more diverse range of freshwater fish species due to the ability of fish to be able to penetrate inland (due to climbing abilities, habitat preferences etc.).

7.4. The inappropriate type/ placement of structures can therefore limit the ability of fish to be able to complete their life cycle. This explains why at times, fish monitoring at sites can show surprisingly low numbers and limited diversity where one would expect higher numbers and/ or a wider diversity.

7.5. The June 2018 item to Council's Catchment Operations Committee referenced a high fish mortality event that occurred in the Waikato in 2015. That incident and the technical work that has resulted from it, prompted staff to reflect on the potential impacts that Horizons' pump stations may be having on both native fish migration and mortality rates, systematically determining where best to focus efforts. That assessment of the pump stations found that :

- Of the 22 pump stations, 19 are rated as low to medium impact, with three identified as having a relative level of high impact. Those three sites were Diagonal, Koputaroa No.1 and Okuku.
- Of those sites identified as having a high impact, one has an associated drain network where the ecological values are rated as high with the other two high impact sites identified as having drains with slightly lower ecological values, requiring further work to determine the potential benefits of any improvement works.

7.6. When assessing the ecological value of the sites staff acknowledge that it was based on the current in-stream values of the contributing network and that this current ranking may not reflect either its potential or community aspirations. It also valued all species equally and it may be that eels (the main species of concern in regard to passage through pumps) require a higher ranking. Neither of these factors change the underlying approach to undertake further investigate works to identify potential solutions, costs and associated benefits; to make this an ongoing component of operational activity, notwithstanding the fundamental level of service drivers.

8. DISCUSSION

8.1. The Bloxam Burnett & Oliver report commissioned by the Waikato Regional Council looked into native fish migration through land drainage and flood control infrastructure. The report generally focused on the ability of eels to be able to pass through pumps, their large size when migrating downstream making them particularly vulnerable. The report looked closely at the Waikato incident and the impact the type of pump and the outlet configuration had on fish passage mortality, as well as potential remedial options to address the fish migration impacts of land drainage and flood control infrastructure.

8.2. Of the 22 pump stations Horizons operates, 17 use axial flow pumps as either duty or standby/ flood pumping. These types of pumps have been identified as having the highest mortality rates for eels. Pumping durations are a factor in mortality rates and they vary greatly, usually in the range 50 to 500 hours per year.

8.3. There are a number of remedial options available to enhance fish passage at pump stations, including:

- Deterrent measures to prevent fish from entering potential harmful environments (narrow weed screens, electric screens, light and sound barriers);
- Alternative pumping systems (fish friendly pumps, low impact pumps); and
- Alternate fish passage (fish friendly floodgates, alternate migrator routes).

8.4. The use of alternative pumping systems has largely been discarded as an option, at least in the short term, primarily due to cost. This option will however be considered when designing new or replacement pump stations, part of a wider efficiency/ rationalisation strategy that will form part of future scheme reviews.

8.5. A review of the current screen set up at the 22 pump stations shows that the gap between the vertical bars range from 20 to 90 mm. Reducing screen aperture without increasing screen area can have two detrimental effects to both pump life and levels of service. A reduction in screen aperture increases flow velocity resulting in more turbulent flow and that in turn can lead to cavitation. Higher velocities can also increase head loss, detrimentally affecting levels of service.

8.6. Staff have very roughly costed constructing wider screens either upstream of the pump station or running parallel to drain flow, presented in Annex B. Being able to justify the cost of this work purely on the basis of a potential reduction in fish mortality is difficult at best; the focus is more on increased awareness amongst staff around taking opportunities that arise from other drivers. An example would be replacing a screen coming to the end of it's useful life – factoring in to that replacement how potential fish mortality could be reduced at the same time.

8.7. More detailed assessments of both habitat and impediments to passage within networks is also a consideration, looking at habitat size and quality, upstream barriers, fish species (expected and present) and fish numbers already present within that part of the network. That work will enable more informed decisions and better justification for improvements.

8.8. That work has commenced with staff undertaking an extensive inspection of the Koputaroa No.4 station network to determine potential habitat size and upstream barriers, along with lengths of fencing and planting already in place alongside these potential habitat sites. Further investigation by Natural Resources and Partnerships staff will help determine the habitat quality and fish numbers that currently exist.

8.9. River Management staff also intend to monitor eel mortality rates at some key pump stations over the coming winter period to provide us with a more accurate picture of the impact that the pump stations are having on the eels.

9. COMMENT

9.1. Clearly the Diagonal, Kop #1 and Okuku stations are the main risks in regard to both passage and mortality. Staff will continue to build the picture around both risks and

opportunities at those three sites and what is feasible by way of modifications, with a view to including a programme of works into the next Long-term Plan update. Wider and more day to day passage/ habitat improvements to the network will continue as part of operational activity, along with an appropriate level of focus on potential environmental enhancements as part of the scheme review process.

10. CONSULTATION

10.1. No specific consultation is planned for the matters contained in this item.

11. SIGNIFICANCE

11.1. This is not a significant decision according to the Council's Policy on Significance and Engagement.

John Foxall
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ANNEXES

A Summary of Current Screen Set Up

B Preliminary Cost Estimates

C Koputaroa No. 4 Pump Station Network Environmental Enhancement Potential Report