wastewater is routed to a treatment plant, significant amounts of microplastics were still found to be discharged into the environment (Kalavrouziotis, 2018; Magni et al., 2019; Murphy et al., 2016). Only a few published attempts have been made to quantify microplastics in New Zealand's inland water systems, including a study of the Auckland region (Dikareva and Simon, 2019), an area more than three times larger in population than the next most populated region in New Zealand, with contamination levels that are similar to much larger streams in Europe.

A dissecting microscope was used to visually assess particles between 1 – 5 mm. After completion of the visual count, the concentration is calculated using the number of microplastics and volume of water during the flow time. Flow data was provided by Environment Southland based on modelled data from the waterways. The modelled flow data could not be used to provide a filtered water volume that could be used for calculation of concentration, however, the flow could be compared to the microplastic numbers in order to investigate any relationships.

Results and Discussion

Microplastic presence in Invercargill waterways

nyk.0 (lloec)-2 (o(h)e Tfoll3w(tng),(2a)s(a1)0-38n(la7s)(-d)-2)0.2741(5p)(-r3()u-)200-16.(0)-47T9c (w2)-T5c.20Tw0(9)T0j7-4e9p (I-)c2-06(0t5h)-7e2.28Tc -0.3904 Tc -0.01(2ent1)T(8)

p a o e s u l d o e a t 8 2 n i p 2 (a)

Table 1. Number of microplastics at the two study sites and the modelled flow from Environment Southland data.

Otepuni Stream	
Sample Number	

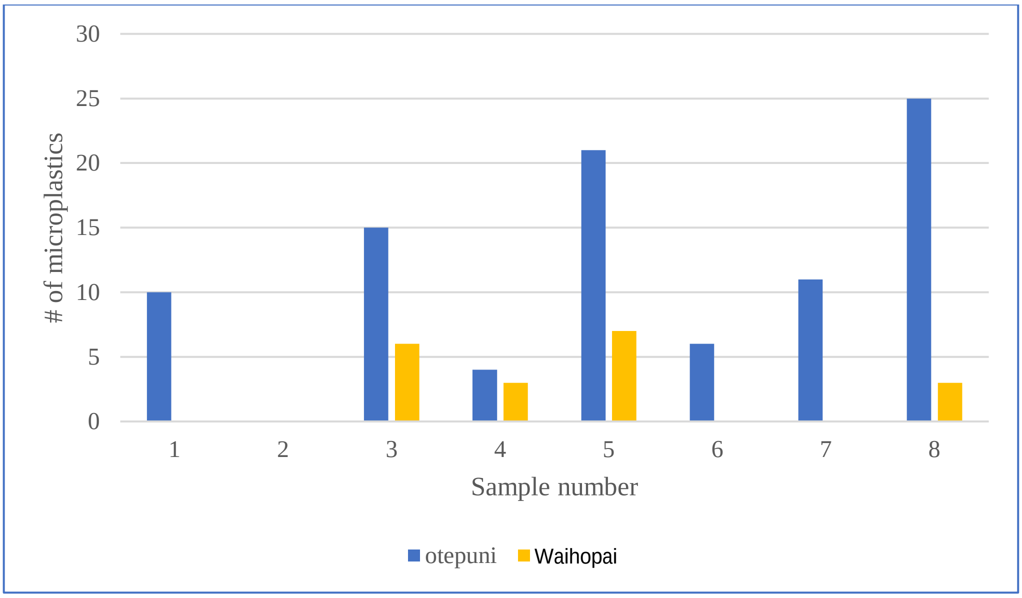

Figure 3. Comparison between microplastic concentrations at Otepuni Stream and Waihopai River. Over the course of the sample period, Otepuni Stream consistently had higher numbers of microplastic particles compared to the Waihopai River.

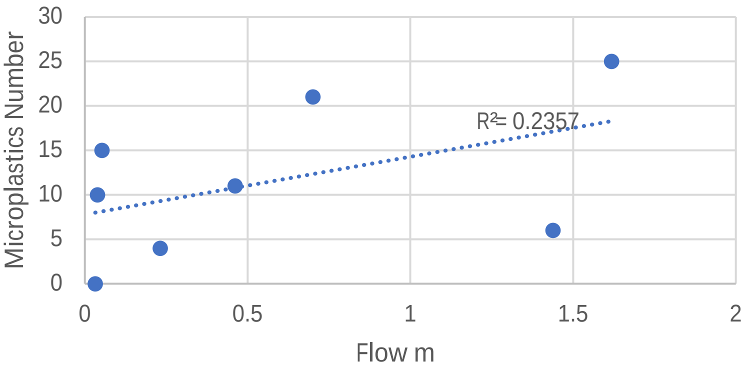

Figure 4. Relationship between flow and microplastic number at Otepuni Stream and Waihopai River.

There is no clear relationship between waterway flow and number of microplastics (Figure 4). The Otepuni Stream appears to show a positive correlation; however, this trend is absent for the Waihopai River data. The higher flow of water could result in the flushing of microplastics into waterways, since the main pathways to the study site appear to be surface run-off. For further research, a concentration of microplastics for each waterway can be calculated using on-site measured water velocity along with the net opening size, giving an estimate of the filtered water volume through the net. However, even with concentration numbers, there is currently no regulatory standard or guideline to set the results in context. The results from the 16 samples have confirmed that there is a presence of microplastics in the two inner-city waterways in Invercargill. These waterways both lead to the New River Estuary, which eventually feed into the ocean.

Conclusion

This study has demonstrated that microplastics are present in urban streams, which have the potential to retain and move the particles to downstream habitats. It has highlighted the importance to quantify and monitor microplastic concentrations in inner-city waterways as they are a point source for pollution and could lead to environmental impacts downstream. New Zealand is at the forefront of microplastics research with academic projects and government initiatives (e.g. Scion, ESR, MPI, NIWA, MBIE) cosde a efforts towas q10.6 yu-09 (e)ntifya, characterisdel, and mitilatiel microplastics p-09 (eo)-6.6 (llu)2.3 (t)-3 (i)10.6 (o)-6.6 (n)2.3 (()-2.4 (T)-3.1 (r)11 (e)7.9 (m)-6.3 (b)2.2 (lay)-4.6 ( )10.7 (
prod10.6 yu-09 (ec)-1.9 (e)-3 (d)2.2 (p)2.2 (e)-3 (r)10.6 (c)-1.9 developed countries in the world, the (e)2.3 (it)-3 (e) in New Zealand are comparable to other
q10.6 yu-09 (e)ntity and risks of microlastics in our waterways is likely to be similar (Tremblay et al., 2019).
Thus, we see this as an opportu-09 (en)2.2 (it)-2.9 (y)6.3 (fo)-6.6 (r)11 (N)3.7 (e)-3.1 (w)7.5 (Ze)-3 a widespread (alan)2.3 (d)2.2 (t
effort to qu-092(e)ntify, monitor, and subsequently mitigate the spread of microplastics in the environment.

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2.2.9. If natural organic material was visible after 30 minutes of heating, another 20 mL of 30% hydrogen peroxide was added. This was repeated until no natural organic material is visible.

2.2.10. 6 g of salt (NaCl) per 20 mL of sample was added to increase the density of the aqueous solution.

2.2.11. The mixture was then heated to 75°C until the salt dissolved.

2.2.12. Steps one to 11 were repeated for each sample.

2.3 Density Separation

2.3.1. The density separator was prepared using a glass funnel, with tubing attached to the bottom.

2.3.2. The density separator was placed in a metal stand and a 200 ml beaker was placed underneath.

2.3.8. Settled solids were visually inspected for any microplastics. If any were present, the settled solids were drained from the separator and microplastics were removed using forceps and were archived

Other considerations: Cross contamination