greater WELLINGTON
REGIONAL COUNCIL

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Committee **Environment Committee**
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Freshwater fish diversity in the greater Wellington region

1. Purpose

To inform the Committee of the Council's new tool for measuring biodiversity in Greater Wellington's rivers: a freshwater fish diversity index.

2. Background

A freshwater fish diversity index has been developed to help manage rivers in the greater Wellington region. This work is part of the Freshwater Ecosystem Programme. The purpose of this programme is to develop ways of managing rivers as ecosystems, rather than managing for specific characteristics such as water quality or flooding, as we have done in the past. The Resource Management Act 1991 now includes the maintenance of indigenous biodiversity in water bodies as a function of regional councils.

Attachment 1 to this report provides a list of other freshwater fish work that we have completed, or is underway, as part of this programme over the last 5 years. One outcome of our work is a computer package that we have developed called "Point, Click, Fish". This package brings together information about the management of fish habitat with a model that tells us the fish we expect to find in every river in the Region. Point, Click, Fish is now an integral part of resource consent processing and is routinely used in other areas of water management.

3. A diversity index for freshwater fish – what and why

Generally, a diversity index uses a formula that describes in a single number the different types and amounts of plants or animals. Various attributes of plant or animal communities can be scored and weighted so that, for example, a threatened species might get a higher score than a commonly occurring species or a pest species might score lower than another species. A higher index usually indicates more desirable species are present, which might reflect environmental conditions such as lower levels of pollution.

The index we have adopted for freshwater fish is called the Index of Biotic Integrity (IBI). It has been successfully applied to freshwater fish communities on many continents around the world. To date it has not been used in New Zealand because of significant differences between our freshwater fish and those of other countries. In particular, a commonly occurring life strategy followed by our native freshwater fish of migration between freshwater and the sea means the IBI is not suitable in an unmodified form. Recently, researchers from Massey University have included measures in the IBI of distance from sea and elevation that make it an effective tool to use for freshwater fish in New Zealand.

Being able to measure and compare the diversity of freshwater fish life can tell us a lot about the ecological health of greater Wellington's rivers. The presence of freshwater fish not only tells us about the physical habitat where they occur but freshwater fish are also affected by land use and discharges that occur upstream.

Freshwater fish can also tell us what is happening downstream. This is because 18 of the 22 native fish species found in this region need to migrate between freshwater and the sea during their life cycles. The absence of freshwater fish in places where we would expect to find them can be because culverts or weirs are limiting passage. Overall, freshwater fish are very good biological indicator species.

4. Greater Wellington's freshwater fish diversity index

The index that we have adopted has been developed for the greater Wellington region by Massy University using all available data from the New Zealand Freshwater Fish Database (over 500 records). The model that Massey has developed for us can present scores for individual fish survey sites or sites can be combined to give information on particular rivers or catchments.

We can also apply this index to the model that tells us which fish species are likely to occur in rivers of the region (Point, Click, Fish). Scores can also be compared with environmental variables available at a site, river or catchment, giving us a useful tool for reporting on the state of the environment

Our analysis, so far, tells us:

- Greater Wellington has very good freshwater fish diversity compared with other regions in New Zealand;
- Freshwater fish diversity in indigenous vegetation and scrub catchments is higher than in pasture catchments;
- Freshwater fish diversity in the Ruamahanga catchment is lower than other large rivers in the region; and
- No clear or consistent picture emerges when comparing urban streams with rivers outside urban areas.

Our main use of the freshwater fish diversity index will be as a monitoring tool for rivers, particularly over the long term, and it will assist us to report on the state of our river environments.

5. Communication

The results of applying this freshwater fish diversity index will be of general interest to people. They will be presented in the Ecosystems Chapter of our next State of the Environment Report, which is due later this year.

6. Strategic context

Clean and healthy rivers and streams are an objective of Greater Wellington's LTCCP. The freshwater fish biodiversity index that we have developed gives us a useful way of measuring the state of our freshwater ecosystems now and into the future.

7. Recommendation

It is recommended that the Committee:

1. ***receive*** *the report; and*

2. ***note*** *its contents.*

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Attachment 1: Summary of Freshwater Fish work