July 2018

# MRQ

Monitoring Research Quarterly

*Monitoring Research Quarterly, MRQ* is the newsletter of Auckland Council's Research and Evaluation Unit, RIMU. The newsletter reports on RIMU's current work including information about recent publications, research, facts and trends about Auckland. RIMU publications are available on council's research information website, Knowledge Auckland www.knowledgeauckland.org.nz

## Contents



## Auckland Unitary Plan rural subdivision appeals in the Environment Court

The appeals are a result of Auckland Council rejecting the Auckland Unitary Plan Independent Hearings Panel's (IHP) recommendation for rural subdivision. The IHP recommendation allows for significant rural development, including more in-situ rural site subdivision opportunities in rural zones (development occurs on site) and transferrable (development occurs off site, to specified Countryside Living Zones) than was sought by the council. Council's concerns related to the potential proliferation of ad hoc lifestyle blocks.

The decision of the Environment Court was released on 12 June 2018 and largely favoured the reinstating of the IHP provisions on rural subdivision in the Auckland Unitary Plan, Regional Policy Statement and at the District Plan level.

In July, council decided to appeal the decision.

RIMU personnel (and other council staff) were expert witnesses at the Environment Court in support of council's position for 'land and soil science' (Senior Scientist, Dr Fiona Curran-Cournane) and 'plan enabled capacity modelling' related matters (Principal Growth Analyst, Kyle Balderston).

Council wanted a reduced amount of in-situ rural subdivision in rural zones (including by capping in-situ development and thereby encouraging transfers) in return for significant environmental gain than what was recommended by the IHP. Potential differences in the scale of potential subdivision opportunities under each rule option were addressed in the capacity modelling evidence and the parties' economic evidence addressed the feasibility of the potential subdivision opportunities.

Council's evidence highlighted the adverse cumulative effects associated with widespread in-situ rural subdivision that over time limit the potential diversity of rural land use activities and future use options. The expansion of what would be ad hoc lifestyle blocks (new sites must be between 1-2ha) in these zones would create reverse sensitivity effects which can have a negative impact on current (and future) commercial rural production activities.

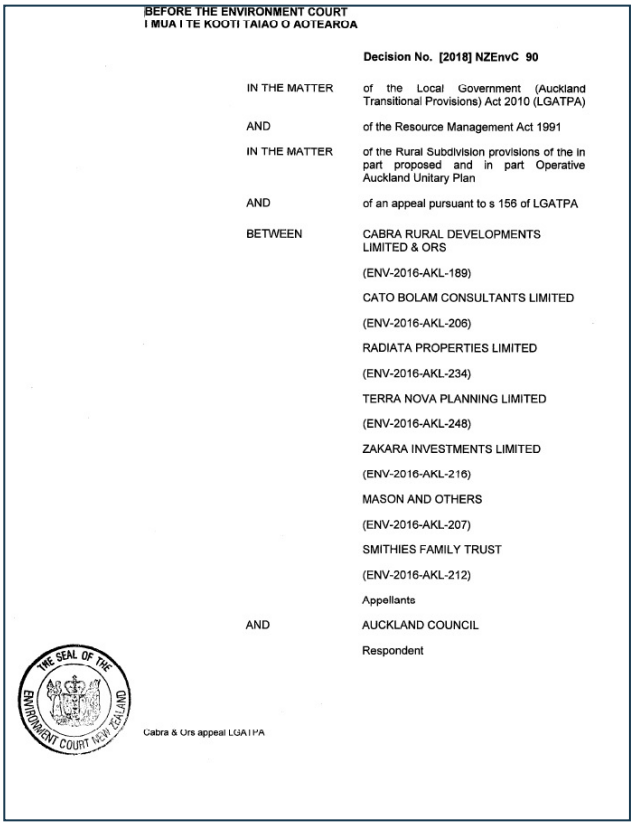
Auckland Council
Te Kaunihera o Tāmaki Makaurau

The Court also heard from other council expert witnesses on how more liberal in-situ rural subdivision rules can impact rural landscape and amenity, biodiversity, economic and planning related matters.

Counter arguments held that implementing these potential development opportunities would be limited irrespective of what was facilitated by the rules, given current market conditions. Any potential adverse effects would be unlikely to arise and a more enabling approach to subdivision was desirable to maximise the limited potential for significant environmental gains.

The Court's decision highlighted a need for council to improve rural consenting, consent monitoring, enforcement and record keeping practices irrespective of the decision on this appeal. The Court comments that council's:

*"...unwillingness or inability to monitor performance of conditions is a reason that this approach should not be adopted. The Council's obligations are to enforce the provisions of its Plan, and particularly in relation to resource consents it has granted. The fact that it may not have done so in the past cannot be a basis to avoid inclusion of provisions within the Plan provided they are reasonable."* (Environment Court, NZEnvC 90, 12 June 2018, paragraph 296).



BEFORE THE ENVIRONMENT COURT
I MUA I TE KOOTI TAIAO O AOTEAROA

Decision No. [2018] NZEnvC 90

| | |
|---|---|
| IN THE MATTER | of the Local Government (Auckland Transitional Provisions) Act 2010 (LGATPA) |
| AND | of the Resource Management Act 1991 |
| IN THE MATTER | of the Rural Subdivision provisions of the in part proposed and in part Operative Auckland Unitary Plan |
| AND | of an appeal pursuant to s 156 of LGATPA |
| BETWEEN | CABRA RURAL DEVELOPMENTS LIMITED & ORS |
| | (ENV-2016-AKL-189) |
| | CATO BOLAM CONSULTANTS LIMITED |
| | (ENV-2016-AKL-206) |
| | RADIATA PROPERTIES LIMITED |
| | (ENV-2016-AKL-234) |
| | TERRA NOVA PLANNING LIMITED |
| | (ENV-2016-AKL-248) |
| | ZAKARA INVESTMENTS LIMITED |
| | (ENV-2016-AKL-216) |
| | MASON AND OTHERS |
| | (ENV-2016-AKL-207) |
| | SMITHIES FAMILY TRUST |
| | (ENV-2016-AKL-212) |
| | Appellants |
| AND | AUCKLAND COUNCIL |
| | Respondent |

THE SEAL OF THE ENVIRONMENT COURT NEW ZEALAND

Cabra & Ors appeal LGATPA

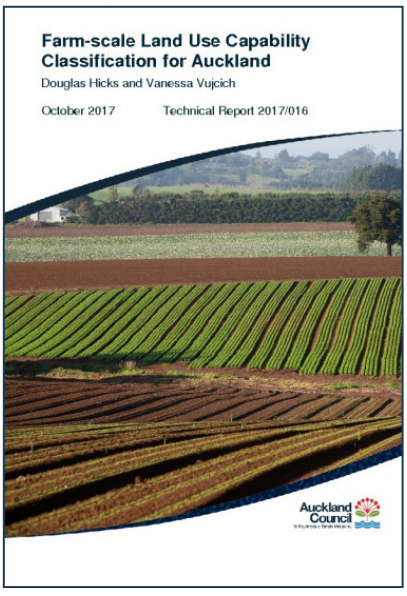
As the Environment Court has signalled that it prefers a more liberal approach to in-situ rural subdivision (and recognising that its decision is subject to a High Court appeal) it will be even more important to monitor what happens on the ground via rural consent monitoring data. This provides us with the opportunity to work with our colleagues across council to establish a robust and defensible policy effectiveness monitoring framework for rural subdivision, and the wider resource consenting practice generally, to ultimately improve our regulatory functions and ensure Auckland's ongoing prosperity and sustainability.

For more information about the rural development implications of the Court's decision, please contact Kyle Balderston, Principal Growth Analyst kyle.balderston@aucklandcouncil.govt.nz

## Integrating the FARMLUC classification

A new regional land use capability classification known as FARMLUC has been developed for Auckland and it is becoming increasingly integrated into planning and policy decision-making at Auckland Council. The classification system is explained in detail in two council technical reports, *Farm-scale land use capability classification for Auckland*, TR2017/016, and *Matching farm production data to land use capability for Auckland*, TR2017/020.

A recent *Policy Bulletin* provides a good overview including reference to FARMLUC application as part of an Auckland Unitary Plan Environment Court appeals hearing. – See, *Integrating the FARMLUC classification into planning and policy decision-making*. Auckland Research and Policy Bulletin, ARPB 4, 21 May 2018.


## Recent research activities

RIMU's scientists, researchers, technical specialists and analysts have assisted with many Auckland Council projects over recent months. A list of recent publications and research related activities follows. The reports noted here are available on the Knowledge Auckland website.

### New reports

- *Auckland Council quarterly monitoring report for the National Policy Statement on Urban Development Capacity. June 2018*
- *Changes in indigenous ecosystems and the environment within the boundary of the Waitākere Ranges Heritage Area Act 2008:2012-2017 report,* TR2018/002
- *Cost Benefit Analysis of the natural environment investment options for the Auckland Council Long-term Plan, 2018-2028,* TR2018/005
- *Cultural Values Assessments. Negotiating kāwanatanga and rangatiratanga through local government planning processes in Aotearoa, New Zealand: a review of the literature.* TR2018/008
- *Integrating the FARMLUC classification into planning and policy decision-making* (Auckland Research and Policy Bulletin 4)
- *Land covenants in Auckland and their effect on urban development,* TR2018/013
- *Marine water quality state and trends in the Auckland region from 2007 to 2016, TR2018/015*
- *Safeswim impact evaluation: have improvements to Safeswim changed Aucklanders' awareness and behaviour?* TR2018/004
- *Selected northern Manukau beaches (French Bay, Titirangi Beach, Wood Bay) water quality investigation 2015, 2016,* TR2018/009
- *Soil moisture monitoring in the Auckland region – programme establishment,* TR2018/012
- *State of the environment monitoring: river water quality annual report 2016,* TR2018/003
- *Survey of Adult Skills: results for Auckland,* TR2018/007

### Other reports expected soon

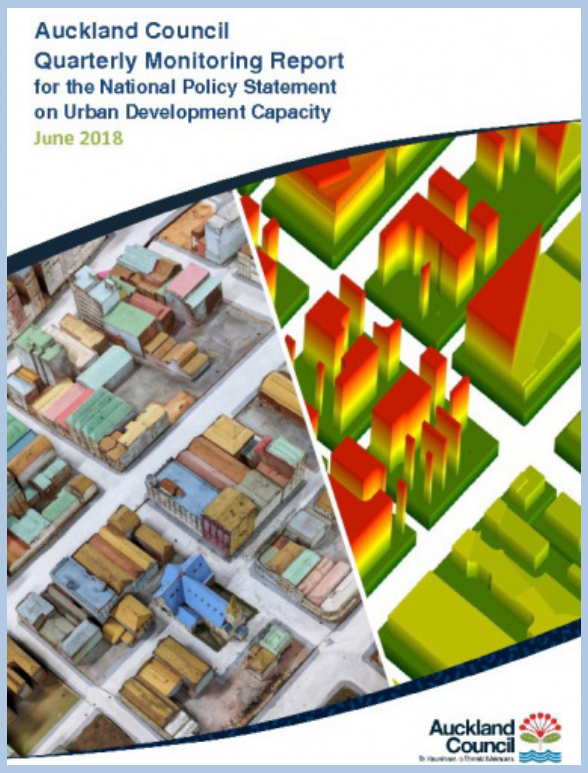
- *Publicly owned land in Auckland*
- *Tree loss in the Waitematā Local Board over ten years, 2006-2016*

### Auckland Research and Policy Bulletin

- Cost Benefit Analysis of the natural environment investment options for the Auckland Council Long-term Plan, 2018-2028
- What happened to the Special Housing Areas in Auckland?

• We hosted a RIMU Insights presentation and workshop by Garth Harnsworth, *Mātauranga Māori and science: opportunities for research, planning and practice.* Garth is Senior Environmental Scientist at Landcare Research.

• We hosted the Auckland Council Social Research Network symposium. Six speakers made presentations on current projects including presenters from COMET Auckland and Lifewise.




• Automated marine water quality sensors. Scientists deployed five continuous water quality sensors to measure sediment that is flowing into the Karepiro Bay area. This sediment data will help supplement the hydrodynamic modelling of Karepiro Bay to better understand what council can do to improve environmental conditions in this sensitive marine area.

• Research economist, Dr Mario Fernandez presented papers at the New Zealand Association of Economists conference, 27-29 June. *A matching simulation to assess additional housing capacity in Auckland* and *Price effects of Special Housing programs in Auckland.*

• Marine scientists Megan Carbines and Melanie Vaughan attended a Department of Conservation workshop on the Marine Habitats Assessment Decision Support Tool, MarHADS. MarHADS was jointly developed by councils using Envirolink funding. DOC is expanding the tool to guide the Marine Protected Area planning and monitoring programme which will improve MarHADS use for all regional councils.

• Social science researchers attended the *Māori and Local Government: problems and possibilities* hui hosted by Hui Rangahau Tahi / Engaged Social Science. The panel discussed issues around Māori representatives on local authorities, and the relationship between councils and Māori communities.

# Lake Pupuke and the Project Baseline water quality monitoring initiative

Freshwater scientist and keen underwater diver, Ebi Hussain, explains a community driven and Auckland Council supported project that monitors the ecology and water quality of Lake Pupuke.

Project Baseline (www.projectbaseline.org) is an international initiative founded by the Global Underwater Explorers (www.gue.com) which uses observations collected by citizen science groups to create long-term datasets and projects to assess changes in aquatic environments. For Lake Pupuke, this initiative provides a great platform for gathering more environmental information leading to a better understanding of the lake – one of Auckland's iconic water bodies.

Lake Pupuke is a 150,000-year-old volcanic crater lake in Takapuna, Auckland. It is a popular recreational water body and has served as a venue for the World Masters Games as well as several national sporting events. The lake has numerous interesting features that make it unique. It's a large lake that drains a fully urban catchment and has no direct in or out flows. Water enters the lake from several diffuse sources (runoff, groundwater, rainfall) and exits by evaporation and through intermittent drainage channels out to neighbouring beaches. As a result of this relatively stagnant flow regime, the lake has a high water retention time, this means that a parcel of water could take several years to fully cycle through the lake.

The local community has raised concerns about the lake's water quality over many years. Reduced subsurface water clarity is noted by divers from local dive schools and my personal lake diving experience over recent years also confirms these observations of deteriorating water quality.

## Algal bloom

In the summer of 2014 a thick brown algal bloom (*Ceratium hirundinella*) developed for the first time. We thought that the bloom was a one-off event. However, it occurred in 2015 and every summer since. Our state of the environment monitoring did not provide any definitive explanations for the blooms and there were no subsurface observations that could help explain the bloom. Analysis of the usual seasonal surface based water quality sampling data was not sufficient to understand what was happening in the lake. Regular surface and subsurface observations were needed. These types of assessments are costly and time consuming for council science teams so I began looking at citizen science initiatives that could facilitate regular data capture by community volunteers who could help fill our knowledge gaps.

Diver with underwater samples, Lake Pupuke

## Project proposal

I submitted a proposal to Project Baseline which was accepted in June 2017. The focus was to work with volunteers, local communities, research organisations and my Auckland Council colleagues to collect data that would complement our current monitoring work and address the lack of subsurface environmental data. Doing this would enable us to make use of both council funded and citizen science driven data collection to support and inform a more holistic management strategy for Lake Pupuke.

The data collected by the Project Baseline Lake Pupuke Team and Global Underwater Explorers New Zealand, is split into surface and subsurface observations which complement existing monitored parameters by adding detail, high frequency observations and context to allow a better understanding of the lake's ecology and water quality conditions. Lists of observation parameters are shown in Tables 1 and 2.

All the parameters are easily measured by volunteers taking photos and recording observations on standardised field sheets. The photos make a valuable visual record of the lake over time and combined with the data sheets, they provide a wealth of information that helps with assessing the current ecological state of the lake.

## Lake Pupuke management plan

This year, a year after the project started, I began work on a combined dataset including monitoring data collected by council and research organisation scientists and the Project Baseline volunteers' observations. Our goal was to use the collated data to help identify critical issues and inform management solutions to address the decline in the lake's health.

We discussed several options for improving water quality ranging from pest eradication and installing aerators in the lake, to the use of flocculants to sequester excess lake nutrients. All of these measures are considered beneficial and so Auckland Council is collaborating with other research organisation scientists and the Project Baseline Lake Pupuke Team on drafting a lake management plan and when confirmed, assisting with its implementation.

Project Baseline has proved to be a useful programme to facilitate collaboration between citizen science volunteers and local government by formalising community driven data collection. It's also a great example of how citizen science can be used to improve knowledge gaps and inform environmental management strategies with the common goal of creating a better, healthier environment for Auckland.

Table 1: List of surface observation parameters

| **Surface observation parameter** |
|---|
| Photos at set points in the lake |
| Date and time of the observation |
| Weather conditions |
| Surface water clarity |
| Number of water fowls |
| Number of recreational users |
| Abnormal odours |
| Land use changes |
| General comments |

Table 2: List of subsurface observation parameters

| **Subsurface observation parameter** |
|---|
| Photos |
| Date, time and depth of the observation |
| Number of divers seen |
| Horizontal visibility |
| Temperature |
| Native and invasive fish numbers |
| Native and invasive macrophyte extent and occurrences |
| Fish spawning locations |
| Stratification profiles |
| Signs of anoxia (lack of oxygen) |
| Algal bloom tracking |
| Organic silting |
| General comments |

For more information about Project Baseline, please contact Ebi,

ebrahim.hussain@aucklandcouncil.govt.nz

Project Baseline Lake Pupuke divers

# Cost benefit analysis of natural environment options

Auckland's natural environment is central to the health and wellbeing of the region's people, cultural and spiritual identity and economic success. Continuing biodiversity loss is an ongoing challenge for Auckland. Introduced pest animals compete with native birdlife for food and habitat, eat the eggs and young, and attack adult birds. Pest plants smother and displace native plants and ecosystems. Therefore, effective pest control has the biggest impact in protecting native species.

If the current level of investment in Auckland's natural environment does not change, there is a high risk of significant ecosystem and species loss. For example, currently more than 1000 hectares of Auckland's kauri forest area is infected with kauri dieback. Under current status this number would be at least tripled by 2050, and 60 per cent (more than 2000ha) of the diagnosed area would be covered by dead kauri trees.

To avoid this eventuality, Auckland Council's 2018-2028 Long-term Plan (LTP) included two options for increased funding for natural environment investment. These proposed options, A and B, were above the current level of investment with option B being more comprehensive than option A. They both reduce the risk of species loss and damage, based on the prevailing pest control practice, rather than guaranteeing avoided loss and damage. Expenditure on the natural environment in the LTP is based on planned activities that will occur according to the Regional Pest Management Plan which has eight outcome or investment areas. These include expenditure in both land and marine environments. In addition, the LTP includes investment in marine ecology and the Pest Free Auckland initiative.

The Research and Evaluation Unit evaluated the likely economic costs and benefits of each alternative with a cost benefit analysis (CBA). The CBA addresses pest management outcomes from a holistic perspective, recognising that there are combined and synergistic effects of individual species on natural environment outcomes. A level of uncertainty in the ability to control pests was acknowledged. To reflect this uncertainty, the evaluation adopted the most conservative assumptions regarding likely benefits, so as not to overstate the likely net benefits.

The time assessed in this CBA was from 2019 to 2050, the target year for the Pest Free Auckland initiative. This comprised 22 additional years to the LTP and Regional Pest Management Plan period. Although beyond the time period of the LTP, it can be considered a short timeframe for natural environment values, where species loss is at stake.

There are a range of benefits for each option. Some of these benefits, such as nature-based tourism or avoided agriculture losses, have a measurable market value. Other benefits, while real, are more intangible – for example, the recreational value of 'being in nature' or the knowledge that at-risk species have avoided extinction. Many intangibles are noted, but not included in the monetised benefits, due to the difficulty in quantifying them.

In order to make the costs and benefits information most useful for decision-makers, costs and benefits are expressed in present value terms. The time period for this analysis is 32 years. Consistent with the available Auckland Council internal CBA guide, the discount rate applied is four per cent.

The timeline of option A's and B's costs and benefits in present value are illustrated in figures 1 and 2 on page 7. The turning points of combined net results are years 2044 and 2038.

It is important to reiterate that these results do not include benefits that could not be measured. Our assessment is that including them would raise the net benefits significantly. Benefits not measured include: Māori cultural values associated with improved biodiversity; values associated with preventing species and habitat extinction; ecosystem services other than kauri forest carbon sequestration; and health benefits associated with recreating and interacting with nature.

Figure 1. Option A – costs and benefits

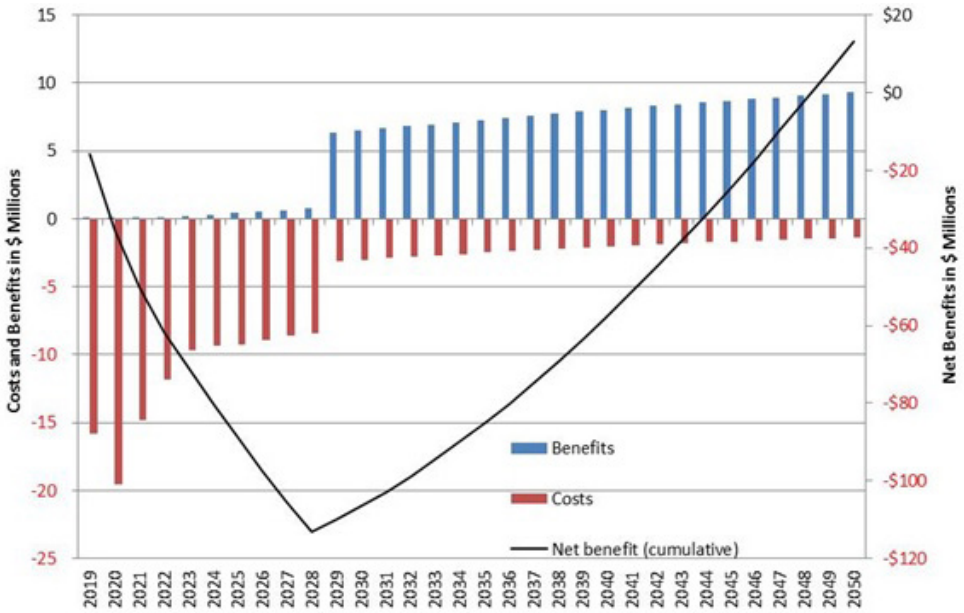
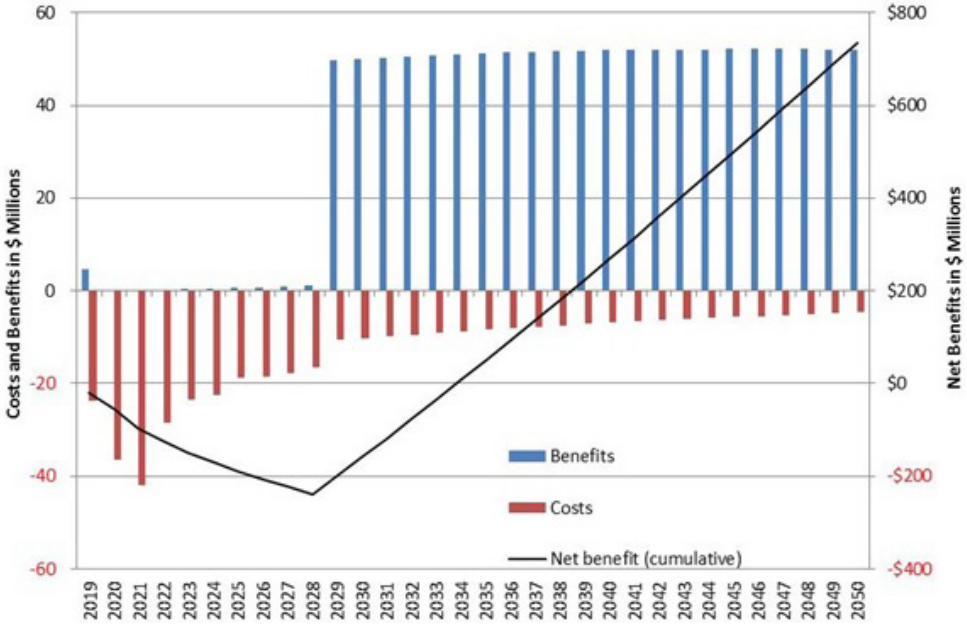



Figure 2. Option B – costs and benefits




While the study is exploratory, it supports the view that Aucklanders are likely to be better off from both of the natural environment investment options for the LTP. The cost of investment for both options offsets by the benefits from that investment. The more expensive option (B) reflects much better value for money spent; for every dollar spent under that option, almost three dollars is expected to be generated in benefits to Aucklanders. In comparison, the less expensive option has a benefit that is eight per cent higher than its cost.

For more information about the cost benefit analysis described here please read the Auckland Council technical report, *Cost Benefit Analysis of the natural environment investment options for the Auckland Council Long-term Plan, 2018-2028* (TR2018/005) or contact Mehrnaz Rohani, Senior Research Economist, mehrnaz.rohani@aucklandcouncil.govt.nz

# Fish passage enhancements

Auckland streams are home to many native fresh water fish species. These fish have suffered since the region was modified when humans first burned forests, cleared land, drained wetlands, urbanised catchments, dammed streams and introduced pest fish.

Many of our native fish are identified as threatened species which means we need to actively ensure they have a suitable habitat. One particular habitat location on Auckland's north shore is the Vaughan Stream catchment, which flows into the Long Bay-Okura Marine Reserve and is bordered by Long Bay Regional Park.

Large-scale development is occurring in the catchment and Auckland Council has established a long-term monitoring site where environmental data is collected to help understand any effects this development could have on the stream and receiving environment.

The catchment is 3.15km$^2$ with 2.3km$^2$ of catchment above the Vaughan Stream monitoring location. The parameters measured at the site include water level, water flow, sediment, water quality and stream ecology.

A major issue with the monitoring site was the original construction of the water flow monitoring weir. The weir was located in the stream's tidal influence zone which meant that it had to be built high enough to ensure water quality and ecology measurements were not being affected by salt water on the incoming tide (Figure 1). This caused the weir to become a partial dam for certain fish species trying to migrate upstream.

The incorrect height of the weir was identified as an issue and questioned the long-term viability of the site. In 2015 a project was established to modify the existing structure to ensure it enabled fish passage.

Working alongside Todd Property Group (a local developer), Golder Associates (environmental science consultants) and Nasey contractors the weir redevelopment began in 2017 and was completed in March 2018. The new weir (Figure 2) is a first-class design for both fish passage structures and hydrological engineering. The fish passage ramp has multiple resting pools and slow velocity zones to ensure the fish can swim easily upstream.

Council science teams are checking weirs in other catchments to ensure good fish passage on any existing stream damming structures. This will help improve the amount of habitat available to the native fish species.

For more information about fish passages please contact Nicholas Holwerda, Senior Freshwater Hydrologist, nicholas.holwerda@aucklandcouncil.govt.nz

Figure 1. Old monitoring weir showing the water drop that hinders the swimming of some fish species.

Figure 2. New monitoring weir looking downstream and showing the new fish passage.

For more information about Auckland related research, data and monitoring programmes visit the Research Unit's websites:

Knowledge Auckland

www.knowledgeauckland.org.nz

Auckland Counts, census data

www.censusauckland.co.nz

Environmental data requests go to

environmentaldata@aucklandcouncil.govt.nz

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