

MRQ

Monitoring Research Quarterly



Monitoring Research Quarterly, MRQ is produced by Auckland Council's Research, Investigations and Monitoring Unit, RIMU.

Each edition of the newsletter contains reports of RIMU's current work including information about recent publications, research, facts and trends about Auckland. RIMU publications are available on the Auckland Council and Knowledge Auckland websites.

Tuatara, kiwi and kakapo on Little Barrier, Hauturu-o-Toi

RIMU and biodiversity team scientists, environmental specialists and volunteers visited Hauturu-o-Toi (Little Barrier Island) for terrestrial biodiversity monitoring in February. Hauturu is New Zealand's first nature reserve and is free of pests and most weeds.

Monitoring involved visiting randomly selected sites on the island and setting up 20m by 20m vegetation plots, which were checked to identify every vascular plant species present and sampled for biomass and plant diversity information. Twenty-one sites have been established on the island since 2009 and February's trip added seven new sites. Each new plot was established on the north-eastern side of the island, which has limited access through difficult terrain, dense vegetation and with only a small hut for shelter. Field days were long — some sites required nearly four hours' tramping to reach — but our hardy field workers were

rewarded by being surrounded by some of New Zealand's famous and rare birds, such as kokako, hihi, saddleback and kakariki.

The Department of Conservation runs a captive tuatara breeding programme on the island and RIMU staff assisted with feeding these incredible creatures. At night, kiwis were spotted burrowing through long grass around the bunkhouse, and to everyone's amazement, kakapo could be heard booming from the mountaintops!

All of the Hauturu vegetation plots will be revisited regularly and the information collected will be used as a comparison baseline for data collected on the mainland. Hauturu's nature reserve status means that any vegetation changes observed will be free from human influence, and so are more likely to be climate related. Baseline data such as this allows the RIMU science teams to

make important comparisons with Auckland mainland sites and help to explain which changes occurring over time are natural and which are due to human activities.



Contents

Page 1

- Tuatara, kiwi and kakapo on Little Barrier
- Research projects progress

Page 2

- Research projects progress (*continued*)
- Recent research activities
- Social return on investment evaluations

Page 3

- Marine sediment contaminant trends
- Stream daylighting

Page 4

- Checking Auckland's bird diversity

Research projects progress reports

Ethnic precincts in Auckland

Fieldwork has started. Interviews are being conducted in English and Chinese with business owners and managers in the Dominion Road precinct and with shoppers who use the centre. Data from the Dominion Road and Northcote precincts has been collected and will be analysed to help us better understand the centres' economic functions: their catchments; the share of demand they meet for local households and variations in spending patterns over time. Short surveys focusing on the social roles these centres play in their local communities will be sent to households in both areas over the next few weeks.

Lead researcher: Dr Carina Meares

Mangroves: tracking rates of mangrove expansion and infilling

Analysis of 1996 aerial photographs has helped identify the extent of mangrove growth and establish a digital record of the 1996 "mangrove line" and link it to the Proposed Auckland Unitary Plan. Current aerial photographs have also been used to digitise the current mangrove coverage, while analysis of new high-resolution satellite imagery will determine mangrove extent and estimate mangrove coverage and density to track mangrove infilling.

Lead researcher: Dr Jarrod Walker

(*Continued on page 2*)

Mangroves: recovery trajectories at mangrove removal sites

Eighteen sites with mangroves removed were sampled in November 2013. Sites were sampled for infaunal species (animals living in the soft sea bottom), sediment texture, microalgae and leftover mangrove biomass. Data analysis continues and a preliminary report is expected in May 2014.

Lead researcher: Dr Jarrod Walker

Te Muri Regional Park: land management and stream restoration

Measuring instruments have been placed in the Te Muri stream so that the water quality can be monitored before the shift in farming practices. This has involved installing a purpose built weir for water level monitoring (while not impeding fish passage) and installing continuous monitoring equipment for turbidity, temperature, oxygen and pH.

Ecological surveys of the stream's catchment are also underway: freshwater assessments in February and terrestrial assessments in March. The surveys will describe baseline conditions before land use change so that we can measure the effects of changing the land use farming practice.

Lead researcher: Dr Martin Neale

The small-scale residential development sector

Researchers have received 110 completed surveys and are analysing the responses. Twenty-two small-scale developers have also been interviewed, providing an opportunity for developers to express their views and explain the barriers that prevent development projects in Auckland. A technical report is expected by July 2014.

Lead researcher: Mohsen Mohammadzadeh

Please contact the lead researchers for more information about the projects or email research@aucklandcouncil.govt.nz

Social return on investment evaluations

RIMU researchers will complete two social return on investment (SROI) evaluations soon. SROI is a framework for measuring and accounting for economic, social and environmental costs and benefits of a programme, project or intervention by measuring change resulting from the programme in ways that are relevant to people or organisations that experienced or contributed to it — namely, the programme's stakeholders.

The first evaluation investigates the social, environmental and economic value created by Auckland Museum's Moana - My Ocean exhibition. The second investigates the value created by the Auckland Council Retrofit Your Home programme. Both evaluations investigate:

- what type and how much value is created by each programme for stakeholders
- whether the programmes provide a positive return on investment, by calculating how much value is created for every dollar invested.

The evaluation technical reports, *Measuring the social and environmental value created by the Auckland Museum's Moana - My Ocean exhibition: a social return on investment evaluation (SROI)* and *Retrofit your home programme: a social return on investment (SROI) evaluation report* are expected to be published by June 2014.



Installing the Te Muri stream weir

The water quality effects of artificial sports fields

A new artificial sports field was installed at Michael's Avenue reserve Ellerslie in April 2013. Rainfall and field drainage was monitored continuously since then with 1100mm of rain recorded and a total drainage discharge of 1045m³. The automatic sampling equipment collected 323 drainage samples. The samples have been tested for metals and hydrocarbons to show the chemical composition of the field drainage. A detailed report is expected in April 2014.

Lead researcher: Dr Martin Neale

Youth mobilities in The Southern Initiative area

Semi-structured interviews of people aged 15-24 who live in The Southern Initiative area have mainly been conducted by peer-interviewers trained for this purpose by the project team; this approach is new to RIMU and introduces an element of youth development into the research process. Interview analysis has started and a technical report is expected by July 2014.

Lead researcher: Emma Fergusson

Recent research activities

RIMU's scientists, researchers, technical specialists and analysts have assisted with many Auckland Council projects over recent months including:

- published new reports including: *Assessing the carbon abatement reduction potential in Auckland's energy resilience and low carbon action plan* (TR2014/005), *Green jobs in Auckland – an update* (WR2014/002), *2012 home heating survey results* (TR2014/011), *Marine sediment contaminant monitoring: organic contaminant data review 2003-2010* (TR2014/001), *Shellfish contaminant monitoring programme status and trends analysis 1987-2011* (TR2013/054), *Valuing artists in Auckland: report on a survey of Auckland artists 2013* (TR2013/057), *Waiuku Estuary aquatic environment information review* (TR2014/003), local board 2013 census profiles local board economic profiles
- hosted Auckland Conversations presentations by Professor Robert Wood – *Unconscious bias and inclusive leadership* and Dr Eric Martinot – *Local renewable energy futures: low-carbon Auckland in global context*
- hosted a presentation by PhD student and RIMU intern Jessica Terruhn: *Conflicted cosmopolitans: Pākehā attitudes towards ethnic diversity in Auckland*
- set up the Auckland Counts website for Auckland census data, www.censusauckland.co.nz
- completed field work for the Long-term Soil Monitoring Programme, including collecting soil samples at 40 sites across Auckland
- completed the freshwater macroinvertebrate monitoring programme, sampling 68 stream sites across Auckland
- Dr Jarrod Walker attended the Ministry for Primary Industries' oceanic tier 1 statistics workshop hosted by NIWA, Wellington
- Dr Todd Landers presented on Auckland Council's terrestrial biodiversity monitoring programme at the National Wetland Restoration Symposium held at Unitec

The reports noted here are available on the [Auckland Council](#) or [Knowledge Auckland](#) websites.

Marine sediment contaminant trends reveal interesting new patterns

Contaminants discharged into the marine environment from land-based and coastal activities can accumulate in marine sediments over time. This build-up of contaminants can change the ecological health of an area by reducing the abundance and diversity of sensitive species, resulting in degraded communities dominated by species that are tolerant of higher contaminant levels. Understanding the distribution of contaminants in marine sediments, their potential effects on aquatic ecology, and trends over time in contaminant levels is important for effective management of catchments and coastal areas.

These contaminants are commonly, zinc from galvanised roofs and vehicle tyres, copper from vehicle brake linings and hydrocarbons from the use of fuels. Vehicle fuel was also a significant source of lead until lead was removed from petrol in the mid-1990s. Industrial activities are also a potential source of contaminants. For example, marinas are a significant source of copper entering the marine environment through leaching from antifouling paints (see Auckland Council technical report *Antifouling biocides in marinas: Measurement of copper concentrations and comparison to model predictions for eight Auckland sites*, TR2012/033).

The Auckland Council (and previously the Auckland Regional Council) has managed the Regional Sediment Contaminant Monitoring Programme (RSCMP) since 1998. Information collected in the RSCMP contributes to state of the Auckland environment reporting, stormwater quality management, resource consenting, policy development and public education.

Recent analysis of RSCMP data has revealed some familiar patterns as well as some new ones. Spatial patterns remain similar to those previously reported with highest concentrations of contaminants found in muddy upper estuarine areas receiving runoff from extensively urbanised and industrialised catchments, particularly in the Tamaki Estuary and Central Waitemata Harbour. Lowest contaminant concentrations are found in estuaries with rural or forested catchments and on open coastal beaches. However, the previously reported pattern of increasing trends



in the metals zinc, copper and lead in urban estuaries has not necessarily persisted. While there are still a number of areas with increasing zinc and copper levels, many of the increases are small and in some areas, levels may even be decreasing. Decreases in lead concentrations have been recorded at most urban sites, a trend consistent with the removal of lead from petrol in the mid-1990s.

Information from the status and trends assessment has also improved our understanding of the capabilities and limitations of current sediment contaminant monitoring approaches. This information is being used to improve the quality of future monitoring data, providing greater certainty for future trend assessments.

More information is available in the Auckland Council technical Report *Marine sediment contaminants: Status and trends assessment 1998 to 2010*, TR2012/041 or from Marcus Cameron stormwater contaminant scientist marcus.cameron@aucklandcouncil.govt.nz

Stream daylighting at La Rosa Reserve

RIMU scientists Dr Martin Neale and Peter Hancock attended the opening of the La Rosa Reserve, stream daylighting project in December 2013. Stream daylighting is a stream ecology management practice that uncovers streams, which were previously covered for drainage or other urban development needs.

In the 1970s, development of La Rosa Reserve resulted in two lengths of the stream being buried in culverts to make the reserve easier to maintain. Scientific and community perspectives of stream values have evolved since the 70s and we now know more about the social, cultural and environmental values

streams can provide in their natural open channel state, such as public amenity values and a natural habitat for stream life.

The \$1.7 million daylighting project removed concrete culverts and aimed to return sections of the stream to natural channels. Culverts were removed from two 85m sections of the stream, and open flowing channels were re-established. To encourage aquatic life, the streams were lined with rocks and fallen trees, which created a fantastic habitat for freshwater invertebrates and fish. Community planting days were held, new art works installed, a new boardwalk and three new bridges built.

Martin and Peter monitored stream ecology in the reserve before, during and after project works to measure ecological outcomes. The ecological value of the stream has improved significantly including:

- better flow patterns
- better habitat quality
- better biodiversity functions
- sensitive species of stream invertebrates that were not present before arrived
- whitebait and short-finned eels arrived.



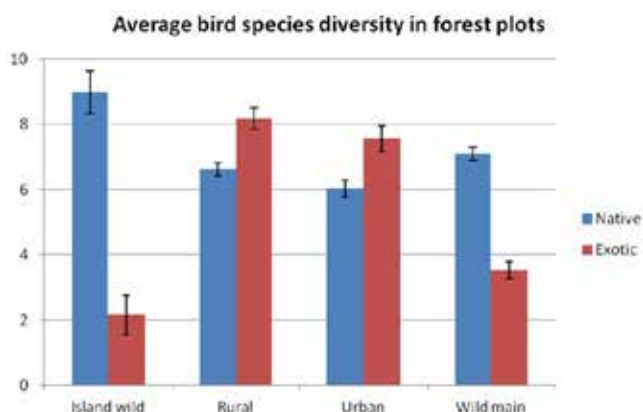
Checking Auckland's bird diversity data

Throughout the summer field season RIMU staff, students and contractors have been undertaking forest and wetland surveys as part of the terrestrial biodiversity monitoring programme (TBMP). The TBMP is designed to measure coarse scale changes in biodiversity across Auckland and in various sub-regions. This information can then be used to track Auckland Council's progress towards a range of different targets, for example, success in achieving Auckland Plan and Auckland Unitary Plan objectives, assessing the effectiveness of different policy or management approaches, or ensuring the funds spent on biodiversity and biosecurity are achieving intended outcomes.

During a TBMP visit, the RIMU field teams establish a vegetation and weed monitoring plot at the site. They count birds present, quantify the presence and general abundance of pest animals, and assess the condition of the surrounding ecosystems. Science teams will re-visit each site every 5 to 10 years, re-measure them, and track change in important indicators over time.

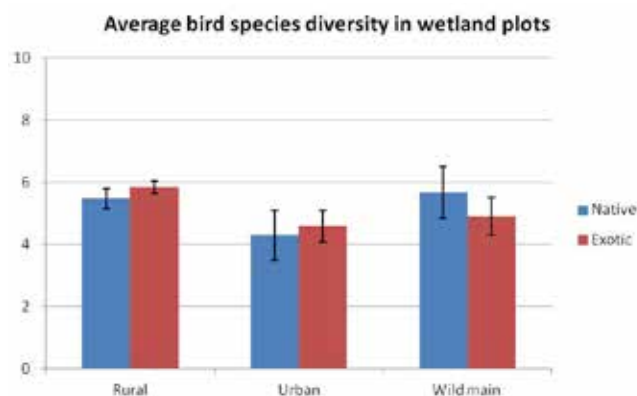
The data presented in the graphs is a summary of bird diversity data collected from the 274 forest sites and 149 wetland sites in the first four years of terrestrial biodiversity sampling.

These data show that plots in native forest remnants in a rural setting had the highest overall bird species richness, with an average of more than 14 species recorded per plot (Graph 1). However, the majority of these species (8 at each site on average) are exotic birds. Significantly more native bird species, and significantly fewer exotic species, were detected in forest sites on Hauraki Gulf islands compared to the mainland. 'Wild main' sites, which were established in large mainland forest tracts (for example, Waitakere and Hunua Ranges) had significantly fewer exotic bird species than forest sites in rural and urban settings. However, diversity of native birds at wild main sites was very similar to urban and rural sites.



Graph 1

Bird species diversity data for the wetland sites followed a very different pattern to that of the forest sites (Graph 2). The most distinctive feature is the lack of clear differences in the pattern of bird species diversity between different wetlands in Auckland. No significant differences in the species diversity of native or exotic bird species was found between different landscapes: rural, urban or wilderness.



Graph 2

For more information on bird diversity and the terrestrial biodiversity monitoring programme please contact Craig Bishop, senior scientist craig.bishop@aucklandcouncil.govt.nz

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For more information about Auckland related research, data and monitoring programmes visit the Research Unit's websites, [Knowledge Auckland](#), [Monitor Auckland](#) and [State of Auckland](#)

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