



Monitoring Research Quarterly

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Parekareka/spotted shag restoration on Otata Island

New Zealand is internationally recognised as the seabird capital of the world with approximately one quarter of all seabirds breeding here. Auckland itself is one of New Zealand's seabird hotspots with 24 species breeding in the area and the majority of its ocean areas classified as 'Important Bird Areas'.

Seabirds are linkages between marine and terrestrial ecosystems as top predators which forage at sea and breed on land where they deposit marine nutrients. Their ecological importance is of concern because many of these birds are in trouble, and in fact, they are known as the most threatened group of birds.

Some of the major threats to these birds include marine pollution and deleterious fisheries interactions at sea (both from commercial and recreational fishers), to habitat destruction and invasive mammalian predators on land. There are also a variety of concerns for seabirds from climate change impacts. (See, [Climate change risk assessment for terrestrial species and ecosystems in the Auckland region](#), Craig Bishop and Todd J Landers 2019).

Auckland Council is committed to improving our seabird taonga through species monitoring and management efforts such as those in our new regional Seabird and Shorebird Monitoring and Restoration Programme, which is funded by the new Natural Environment Targeted Rate.



Figure 1: Parekareka/spotted shag (*Stictocarbo punctatus punctatus*) on Tarahiki Island

One of our most recent seabird projects has been on restoring a breeding colony of parekareka/spotted shag (*Stictocarbo punctatus punctatus*, Figure 1) to Otata Island (Noises group) in the inner Hauraki Gulf, an island which has been free of invasive predatory mammals since the 1980s when rats were removed. These seabirds occur only in New Zealand, and once bred at a number of colonies on both coasts of Auckland; however, parekareka are now regionally threatened in Auckland with only three known breeding sites, on Tarahiki Island and two sites at the eastern end of Waiheke.

Monitoring Research Quarterly is the newsletter of Auckland Council's Research and Evaluation Unit, RIMU.

RIMU publications are available on council's research information website, Knowledge Auckland

www.knowledgeauckland.org.nz

Collaboration

The parekareka project is a collaborative effort involving seabird experts from council's Research and Evaluation Unit (RIMU), Infrastructure and Environmental Services (Biodiversity), and Auckland Museum who worked with imaging experts to 3D scan historic collection specimens (Figure 2). The resulting digital files were 3D printed and then hand painted by museum volunteers with an eye for detail so that the replica birds would be as realistic as possible. We then installed these on Otata Island, including a solar-powered acoustic attraction system (designed by the Department of Conservation) that plays calls of the birds throughout the day, and other seabird calls at night which would benefit from nesting on this predator-free island (Figure 3).

We hope that parekareka will begin arriving at this new site soon – as their breeding season is starting to kick off – however, it may take longer for the site to be permanently taken up. We have already seen seabird feathers from another species near the acoustic system, which are likely to be from the 'at risk' pakahā/ fluttering shearwater (*Puffinus gavia*).

For more information on the seabird/shorebird programme and the parekareka project, please contact RIMU Senior Scientist Dr Todd Landers, todd.landerson@aucklandcouncil.govt.nz

Figure 2: Parekareka team installing replicas on Otata Island, including several different life-like poses, a nesting scene, and plenty of guano for visually attracting birds



Figure 3: RIMU Senior Scientist, Dr Todd Landers, uploads additional seabird sounds to the acoustic attraction playback system on Otata Island, which is already attracting seabirds (likely to be pakahā/ fluttering shearwater) to the area

Coastal turf and other rare ecosystems along Auckland's coast

Luke Stanley, RIMU Environmental Specialist, discusses his study of the Waitākere coast coastal turf.

Across the Auckland region, 32 native ecosystem types have been identified (see, *Indigenous terrestrial and wetland ecosystems of Auckland*, Singers et al., 2017). The coastal area includes terrestrial ecosystems that are rare, unique and affected by human impacts.

If we look in the right places along Auckland's coast, we might be lucky enough to find four special ecosystem types that are both rare and critically endangered. These are coastal turf, coastal lakeshore turf, dune sedgeland and iceplant herbfields.

These ecosystems are interesting because they provide habitat for a high diversity of plant species in a small area. Some of these plant species are rare and specialised and are often found only in these ecosystem types. These highly restricted ecosystems tend to occupy specific ecological niches that are not very common in nature, making them naturally rare.

Coastal turf is found in areas where a lot of salt is deposited by wind from the sea, for example the coastal cliffs south of Piha. Coastal lakeshore turf grows in a narrow band around coastal lakes that can be below or above water depending on the season – for example, Lake Rototoa (South Head, Kaipara Harbour). Dune sedgelands form behind mobile dunes, such as at the Whatipu dune plains. Iceplant herbfields are found where seabirds burrow (and deposit guano) and where salt deposition limits other plant growth, such as on our predator free offshore islands: the Mokohinau Islands, or small islets off the Waitākere coast.

Rare ecosystems can be heavily affected by the impacts of development such as historical draining of land for farming, trampling and grazing by livestock, pest mammal browsing and competition from exotic

weeds. Because they are so small, and have such narrow ecological niches, they have less of a buffer than larger ecosystems and therefore human impacts have the potential to affect them more.

I conducted a pilot study of coastal turf as part of my MSc thesis (*Monitoring and ecology of coastal turf on the Waitākere coast, Auckland, New Zealand*, MSc thesis, AUT, Stanley 2018) while working in the RIMU student partnership programme. The study identified potential methods and indicators for monitoring coastal turf ecosystems' ecological integrity. I looked at three sites along the Waitākere coast, using the point intercept transect method to identify species. The indicators assessed were change in area and vegetated area, and change in native and exotic vegetation dominance. Each site was fragmented and had patches of coastal turf ranging in size from a tabletop (3m²) to two-thirds of a tennis court (168m²). The sites showed seasonal variability in area (up to 23 per cent increase from winter to summer). Nineteen native plant species were identified, one of which is nationally endangered (the Northland button daisy, *Leptinella rotundata*). Native plants dominated at two sites in Piha and I found a more equal split between natives and exotics at a third site in Te Henga (Bethells Beach). The relative dominance of species changed seasonally, with exotics generally increasing from winter to summer.

Further monitoring could show how seasonal variation compares with longer term changes in size and species dominance. If we look at more sites over a longer time, we can track if coastal turf, or any of the other rare ecosystems, is improving or declining in ecological integrity. Identifying state and changes in ecological integrity can help inform management of these rare ecosystems.

For more information, please contact Luke Stanley, Environmental Specialist, luke.stanley@aucklandcouncil.govt.nz



Coastal turf showing *Samolus repens* (sea primrose) and *Selliera radicans* (half star) at Byers site, south Piha



Sarcocornia quinqueflora (glasswort) along vegetation edge, south Piha

Using Urban Living Labs to deliver urban planning long-term goals

Barbara Ribeiro, RIMU Research Analyst, is writing a new report on Urban Living Labs (ULLs) and in this article, Barbara provides an overview of the ULL concept with examples from Helsinki and Melbourne and how the ULL approach is good for Auckland.

The Auckland Plan 2050 contains six long-term goals for Auckland. Structure planning is a strategic process for spatialising these goals, as they constitute a type of spatial planning for development or redevelopment of rural and urban areas. However, other approaches are required, particularly where delivering the long-term goals can be intangible. High-level ideas such as 'belonging and participation' or 'opportunity and prosperity' need to be actioned across the city somehow. The new report, *The Urban Living Labs mechanism for grounding long-term goals* (in preparation and expected to be published later this year), focuses on Urban Living Labs – a mechanism for enabling the small victories that can keep momentum going on long-term goals.

Internationally, local governments play an active role in both enabling and promoting ULLs. An Urban Living Lab is defined by its long-term goal or purpose, brought about by necessity from a place and people from a particular time – often associated with the pressing sustainability challenges currently faced by communities. A ULL can be as simple as a room in a city council building, such as for my case studies – Helsinki's Laituri and Melbourne's CityLab.

Laituri is located on the ground floor of the Helsinki City Hall. The ULL was launched in 2008 to increase citizen participation in Helsinki's planning process and help disseminate information about the city's plans and policies through shadow planning workshops and discussions. The ULL's purpose is to address urban transformation through a participatory process in which citizens have a chance to co-create and brainstorm solutions with planners and other city stakeholders. For example, my report examines how Helsinki's planners managed to move forward with turning a motorway into a leafy boulevard despite resistance from car users. The planners utilised Laituri to engage with community members interested in cycling and public amenities,

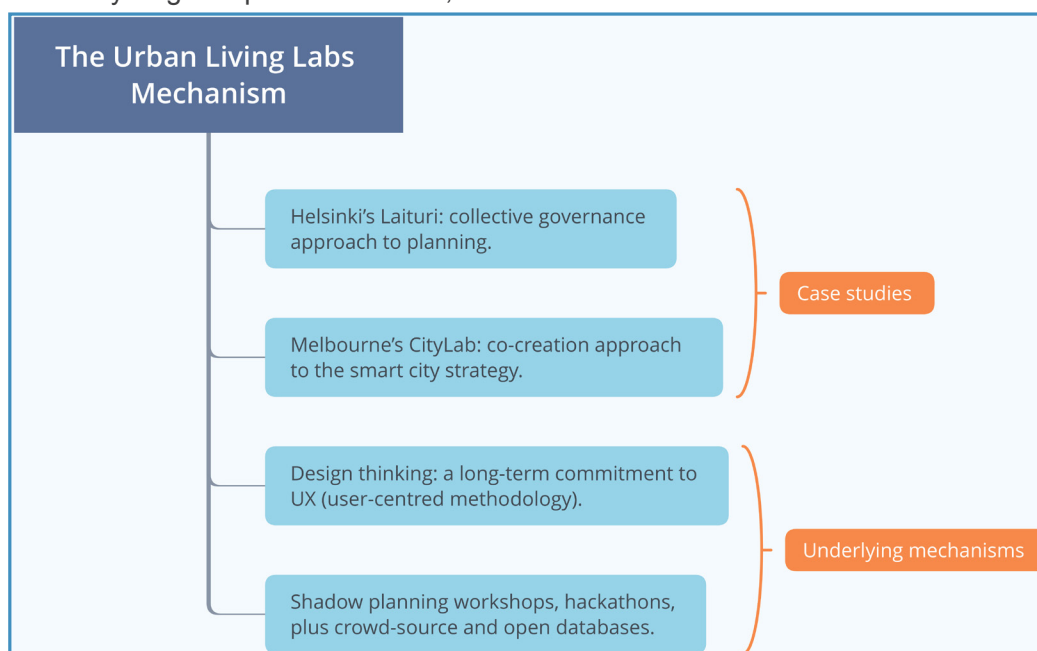
who supported implementing the planners' motorway conversion project. The European Commission also notes that Laituri's activities "have built city level capabilities to attract both [public and private funding] for the past ten years". (*Cities as living labs: increasing the impact of investment in the circular economy for sustainable cities*, Santonen et al., European Commission 2017.)

Melbourne's CityLab (a room on the ground floor of the Melbourne Town Hall, launched in 2015) serves a different purpose: delivering Melbourne's long-term goal of becoming a Smart City leader. The city council has engaged with entrepreneurs, business people and researchers at the CityLab. It promotes hackathons to generate citizen-centred ideas that may inform policy-making or attract the interest of investors who can turn some of these seed ideas into start-up business ventures. The report analyses a seed idea from a hackathon, the Internet of Trees, a crowd-sourced monitoring system for keeping track of the health and well-being of each tree in Melbourne.

A cross-case analysis of Laituri and CityLab grounds the discussion of the report's findings, which provides a platform for proposing a ULL for Auckland.

My recommendation to trial a ULL in the Auckland City Centre is a low cost proposal that could replicate Helsinki's shadow planning workshops and Melbourne's hackathons. These initiatives embody co-creation and collective governance approaches that can result in reducing the costs of landing the long-term goals contained in the Auckland Plan 2050 while engaging citizens, the private sector and academia as active agents. If coupled with the engagement of incumbent firms and central government, the recommended ULL could generate mixed-funding partnerships to address social issues and foster start-up ventures, creating additional value for Auckland.

For more information about Urban Living Labs, please contact Barbara Ribeiro, RIMU Research Analyst, barbara.ribeiro@aucklandcouncil.govt.nz



Recent research activities

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

New reports

- *2017 World Internet Project Survey: results for Auckland*, TR2019/001
- *Air quality and societal impacts from predicted climate change in Auckland*, TR2019/013
- *An assessment of vulnerability to climate change in Auckland*, TR2019/011
- *Auckland regional household labour force survey: quarterly overview December 2018*
- *Auckland's exposure to sea level rise: part 1 – regional inventory*, TR2019/017
- *Auckland's greenhouse gas inventory to 2016*, TR2019/004
- *Climate change risk assessment for Auckland's marine and freshwater ecosystems*, TR2019/015
- *Climate change risk assessment for terrestrial species and ecosystems in the Auckland region*, TR2019/014
- *Climate change risks in Auckland*, TR2019/019
- *Constructing Auckland: 2013 building outlines in the urban core and its periphery*, TR2019/006
- *Development of the Auckland Heat Vulnerability Index*, TR2019/012
- *Marine water quality annual report 2017*, TR2019/003
- *Te Tokaroa Meola Reef intertidal reef ecological monitoring programme: 2001 to 2017*, TR2019/004
- *Using behavioural insights to increase dog fine payments* (Research note)

Waitākere Ranges shorebird monitoring

Scientists are working on a new Waitākere Local Board funded shorebird monitoring programme that aims to improve our knowledge of the birds' habitat use, breeding locations and threats to shorebirds in the Waitākere Ranges.

Water level monitoring

RIMU's Hydrology and Environmental Data Management Team is working with the Healthy Waters Department on a trial of a new low cost water level sensor at Piha. The sensor uses sonar technology to measure the water level from a road bridge to the river below. Information collected will be used to inform local residents of potential flooding.

Regional wetland monitoring programme

The annual regional wetland monitoring programme, which tracks plant, animal and other threats to wetlands across Auckland was conducted in February, March and April. Field teams checked some 35 different wetland systems on public and private land across the city and the Hauraki Gulf islands.

2018 Census External Data Quality Panel

Alison Reid, Manager, Economic and Social Research and Evaluation, is co-chair of the 2018 Census External Data Quality Panel. The Panel is providing independent advice to the Government Statistician about whether the methodologies used to produce information from the 2018 Census are based on sound research and a strong evidence base.

Geothermal activity at Waiwera

Kolt Johnson, RIMU Hydrogeologist, was interviewed by Newshub about geothermal activity at Waiwera. The council monitoring bore there has recently overflowed due to a rise in the groundwater level above the top of the bore's casing. The most likely cause is the closing of the Waiwera Thermal Resort and the stopping of thermal water used to supply the pools. Locals have been very interested and wondering if changes in the geothermal system will mean hot springs reappearing at the beach.

Urban forest water use

RIMU scientists are working with council's urban forest specialists, AUT and University of Auckland scientists to establish a postgraduate student project on the water use of different tree species under different physical conditions. The data from water sensors used in the study will help to build a long-term dataset on the water retention benefits of urban forests.

New air quality monitoring stations

Two new air quality monitoring stations are operational – Khyber Pass Road and Customs Street. The Customs Street downtown site is important for measuring the effects of shipping emissions and includes a real time black carbon sensor.



Auckland Council Climate Change Risk Assessment Series

As communities across the world set out to plan for climate change mitigation and adaptation, they first seek to understand how climate change will affect their city, region, or country.

The Climate Change Risk Assessment (CCRA) has been produced by Auckland Council's Research and Evaluation Unit (RIMU) in support of the Auckland Climate Action Plan (ACAP) at the request of the council's Chief Sustainability Office. Its aim is to provide information about the risk and vulnerabilities the Auckland region may face under a changing climate regime, which is already underway.

In 2018, national climate change projections were scaled-down to produce a more specific picture of their likely effects within the Auckland region. Based on this, CCRA adopted the Intergovernmental Panel on Climate Change's representative concentration pathway 8.5 ("business as usual") scenario as its guiding projection, given the lack of evidence of any meaningful and sustained decreases in emissions that would shift to other projection pathways.

The eight reports in the CCRA consider various components of key risks – that is, hazard, exposure, and vulnerability – across sectors and systems of interest: people (heat vulnerability, climate change and air quality), society (social vulnerability and flooding), and natural environment (terrestrial and marine ecosystems), as well sea level rise at regional and local scales. A summary report has also been produced.

The titles in the CCRA series are:

- *Air quality and societal impacts from predicted climate change in Auckland*
- *An assessment of vulnerability to climate change in Auckland*
- *Auckland's exposure to sea level rise: part 1 – regional inventory*
- *Climate change risk assessment for Auckland's marine and freshwater ecosystems*
- *Climate change risk assessment for terrestrial species and ecosystems in the Auckland region*
- *Development of the Auckland Heat Vulnerability Index*
- *Flooding risk in a changing climate (In preparation)*
- *Summary report: Climate change risks in Auckland*

The CCRA reports were launched during the Auckland Climate Change Summit, 18-20 March 2019.



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 portal

www.environmentauckland.org.nz

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Acknowledgement: Page 1 banner. Parekareka carrying nesting material.
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