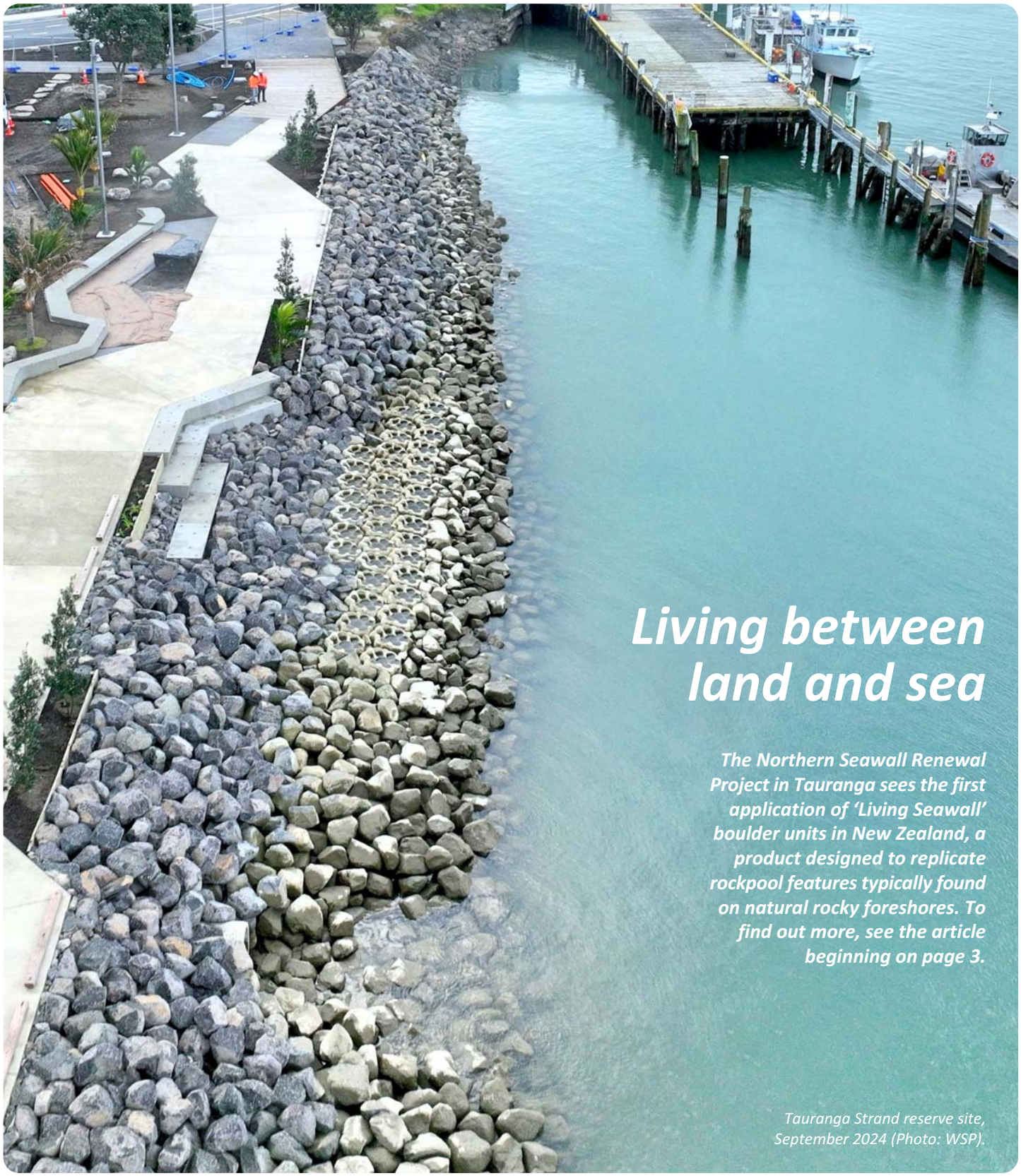
Te Hunga Takutai o Aotearoa
NEW ZEALAND COASTAL SOCIETY

Coastal News

Newsletter of the New Zealand Coastal Society: a Technical Group of Engineering New Zealand

Issue 85 • November 2024



Living between land and sea

The Northern Seawall Renewal Project in Tauranga sees the first application of 'Living Seawall' boulder units in New Zealand, a product designed to replicate rockpool features typically found on natural rocky foreshores. To find out more, see the article beginning on page 3.

Tauranga Strand reserve site, September 2024 (Photo: WSP).

ISSN 1172-6938

www.coastalsociety.org.nz

Te Hunga Takutai o Aotearoa
NEW ZEALAND COASTAL SOCIETY

CONTENTS

Contents numbers and blue web links in this pdf are active (clickable).

Word from the Chair

Kia ora all, and welcome to the final *Coastal News* issue of the year. This issue is landing on the heels of a fantastic conference in Christchurch. We'll defer a full write-up of the conference and its many highlights to next year's *Coastal News*. For now, we'd like to thank Derek and the Local Organising Committee for all their hard work in making the conference a success. They've set a very high bar for future conferences!

This issue of *Coastal News* contains several articles on coastal structures and ecology. From living seawalls to eco-engineered reefs, our first two articles will provide a detailed look at recent work on both.

We have an article remembering the life and work of Emeritus Professor Bob Kirk, highlighting some of his major contributions to coastal science. We were honoured to celebrate Bob's legacy through a special new award at this year's conference.

Christo Rautenbach provides details of the upcoming SCHISM Coastal Circulation Modelling Workshop, supported by the NZCS Professional Development Award.

Don Neale celebrates the tenth birthday of the West Coast Marine Reserves, and we bring an extended news from the regions, now including Florida (thanks to Matthew McNeill's travels) and the Pacific (thanks to Mike Allis). We also highlight the profiles of several recent graduates in our University News. It's great to see the new talent entering the coastal profession.

As the year winds up to a close, we hope you're all able to take a well-deserved break over the Christmas/New Year period. We're looking forward to bringing you the next issue of *Coastal News* in the new year (and if you would like to contribute an item, see the 'how to' box on page 20).

Colin Whittaker and Sam Morgan
NZ Coastal Society Co-Chairs

About the NZCS

The New Zealand Coastal Society was inaugurated in 1992 'to promote and advance sustainable management of the coastal environment'. The society provides a forum for those with a genuine interest in the coastal zone to communicate amongst themselves and with the public. The society's mission is to take a leading role in facilitating robust discussion and nationally-coordinated interactions to better manage and learn about our coastal and marine environment.

NZCS members represent a wide range of coastal science, engineering, management and planning disciplines. They are employed in the engineering and environmental consulting sectors, in local, regional, and central government, in research institutes, in the tertiary education sector, and in schools.

NZCS is a technical group of Engineering New Zealand. The multi-disciplinary nature of coastal management in New Zealand means many of our members are from areas other than engineering. There are no entry criteria for the society and we welcome membership enquiries from anyone with an interest in the coast.

Membership applications can be sent to the NZCS Administrator Renée Coutts at: nzcoastalsociety@gmail.com

Te Hunga Takutai o Aotearoa
NEW ZEALAND COASTAL SOCIETY

New Zealand Coastal Society • www.coastalsociety.org.nz

Tauranga Northern Seawall renewal, 'Living Seawall' project

Tom Wilde[1], David Culliford[2] and Robert Jeans[3]

Introduction

One hundred precast concrete 'Living Seawall' pod units have recently been installed in Tauranga Harbour, within a seawall renewal as part of Tauranga City Council's (TCC's) Civic Redevelopment and the Tauranga Moana Waterfront Plan (Landlab, 2023). The project comprised the construction of an approximately 200 m long section of rock revetment structure, overlayed on the existing seawall running parallel to The Strand in Tauranga's CBD.

The existing seawall structure was constructed in several sections between the late 1960s and early 1970s as part of a wider scheme of land reclamation to the east of the railway line. As of 2023, the seawall structure comprised a grouted rock revetment face, heavily patch repaired with mass concrete and asphalt over the life of the structure to prevent localized washout of the revetment stone (see Figure 1).

A key design principle underpinning the waterfront plan is to repurpose the existing car park that visually dominates the waterfront, creating a reserve to provide new space and experience at the water's edge, including new opportunities to access and interact with the surrounding marine environment.

The design of the Living Seawall sought to contribute to this principle whilst also repairing and remediating the existing waterfront areas that have undergone significant change and impact. In particular, the intent was to upgrade the existing seawall to create a resilient and, where possible, 'living' interface between the land and sea.

As discussed above, the existing seawall structure running parallel to The Strand Reserve comprised a grouted rock face. The seaward face of the structure was constructed at a typical gradient of 1(V):1.5(H) and was generally smooth and featureless. Limited marine growth was observed over the extent of the existing structure, which mainly comprised localised areas of aquatic snails and other marine invertebrates settling on the lower areas of the existing wall, where protruding revetment stones offered a form of shelter and shading.

This lack of and loss of marine habitat as a result of seawall construction is a common issue with seawall construction.

The living seawall seeks to reduce this loss, and in the case of this location provide a net gain in comparison to the previous coastal protection structure. The living seawall pods provide habitat in the form of engineered rock pools, placed within the rock armour. They are provided across the tidal range, giving water, shade and a textured surface to promote biological colonisation and retention.

Design phase

In mid 2022, WSP were engaged by TCC to complete the concept and subsequent detailed design of the proposed seawall renewal works in line with the intents of the Tauranga Moana City Plan described above.

WSP sought to develop a solution that contributed to the goals of the Tauranga Moana waterfront plan within the defined limits of the project resource consent. WSP's solution aimed to:

- Provide integrated areas of ecological enhancement that deliver increased areas of marine habitat, relative to a 'standard' rock revetment design.
- Incorporate landscaped features that permit close public access and interaction with the surrounding marine environment.
- Provide a resilient seawall structure, capable of protecting the foreshore of Tauranga Central Business District (CBD) from coastal erosion due to wave action and inundation due to storm surge events and sea level rise.
- Reduce, as far as practicable, the footprint of the proposed revetment structure and subsequent 'take' of the natural estuary bed, within the confines of a structurally resilient revetment design.

Figure 1: Existing seawall structure, June 2023 (Photo: WSP).

1 Team Leader – Coastal at WSP NZ Ltd (Tauranga)

2 Academic Staff Member, Marine and Environmental Management, Toi-Ohomai

3 Project Director at WSP NZ Ltd (Tauranga)

The concept of 'greening' coastal infrastructure through the provision of 'eco-engineered' solutions is a relatively emerging field that has gained traction in the industry over recent years. Solutions implemented in industry are largely limited to the previous 5-10 years, with localised, academia-led 'pilot schemes' in place generally around the early 2000s.

The field, and accompanying research, is a response to observed loss of marine habitat and biodiversity as a result of marine infrastructure construction relative to natural foreshores. The field has developed sufficiently in the last 5-10 years to support a range of proprietary products aimed at increasing the ecological value of coastal infrastructure.

At the outset of the project, WSP utilised its international network of coastal and maritime experts and conducted market research to identify a range of proprietary products that could be integrated into the Northern Seawall Renewal Project. WSP were committed to finding a solution that:

- Could be readily integrated into the proposed rock revetment structure design.
- Could be implemented via a compatible procurement model.
- Permitted procurement of a meaningful installation, within the project budget.

Australia-based Living Seawalls/Reef Design Lab boulder unit product were selected for inclusion in the scheme. This project comprises the first application of these proprietary products in New Zealand.

Through close coordination with both Living Seawalls and the project landscape architect LandLab, WSP developed the design of the seawall to suit two discrete installations of the units (referred to as North and South respectively) and coordinated seawall landscape features, such as tidal bleachers, to provide opportunity for public engagement and interaction with each installation. Living seawall pod units were placed in specifically designed areas of the seawall with shallower 1(V):3(H) gradients. The Ø1150 mm x 800 mm unit was ultimately selected for inclusion in the seawall design.

Due to the relatively low wave energy environment of the Tauranga harbour, in combination with the shallow 1(V):3(H) revetment gradients in the location of the living seawall installations, the decision to integrate the units into the top layer of the double layer armourstone revetment structure was made (see Figure 2). The boulder units weigh in excess of 1000 kg each, therefore exceeded the derived M50 value of approximately 750 kg for a steeper 1(V):1.5(H) revetment gradient.

WSP note that had the scheme been located in a more exposed, higher energy wave environment, the requirement for more detailed modelling, analysis or scale modelling may have been required to verify the stability of Living Seawall units under wave loading. However, WSP feel that, this approach was appropriate to the scale and nature of this specific seawall scheme.

Construction phase

Since this was the first application of such proprietary products in New Zealand, WSP worked proactively with Living Seawalls/Reef Design Lab and main contractor HEB Construction Ltd to understand the practicalities of implementing the design on site, within the tidal zone. A constructability workshop was held with the client and contractor to understand and work through the design tolerances, installation method and aesthetic requirements of the design in order to inform the placement trial to be held on site.

A significant barrier to the widespread application of such propriety products in New Zealand is cost effective procurement. The main contractor worked closely with the unit manufacturer to develop a viable and cost-effective procurement pathway for the proprietary product. Bespoke fiberglass molds were manufactured in Australia and shipped to New Zealand. This permitted the main contractor to utilise the local New Zealand precast concrete supply chain to manufacture and supply the units to the Tauranga site.

Following installation of the units, ecological monitoring, led by David Culliford (academic staff member at Toi-Ohomai) and in partnership with Bay of Plenty Regional Council (BoPRC) commenced.

Monitoring phase

A monitoring plan was designed to consider initial settlement on the structures and to compare species diversity with the other riprap seawalls nearby. The two distinct living seawall installations were identified as Northern and Southern and three rows were isolated as low, medium and high. Five individual pods from each of these areas were then surveyed monthly using point intercept quadrats to quickly assess the percentage coverage of growth and on-site id and collections to count numbers of individual species observed.

Other data collected included measuring angles and height above tide and collecting aerial photographs. Height of sediment in

Figure 2: Living Seawall Boulder units following installation (Photo: WSP).

the pools was also measured at the centre pool of each pod selected for monitoring.

Monitoring began in May, once the living seawall was in place and has been completed monthly until September 2024. The structures were quickly covered in a brown film which included tube forming diatoms and cyanobacteria. This continued to thicken and accrue throughout the monitoring period. Species were identified and counted to track species diversity, and both type and number of species increased over time, particularly in the final two months (see Figure 3).

Sediment depth was also found to increase over the monitoring period. It was first noticed in small amounts in June at the Southern group, then in July at the Northern group. Average sediment depth has increased steadily at the Southern group by approximately 10 mm per month. At the Northern group it increased by a similar amount between June and August, decreasing slightly by September.

Overall monitoring so far has shown an expected settlement and succession with nothing exceptional to note. A second more intensive phase of monitoring will begin in November 2024 lasting until February 2025, where species diversity will be compared with the surrounding rip rap wall and a more established rip rap wall further north.

The sites themselves will be monitored weekly providing better temporal resolution. Sediment depth and placement of the individual pods with reference to tidal height and angle will be investigated. This will enable a detailed summary of findings to be released and a more robust evaluation of findings to be made.

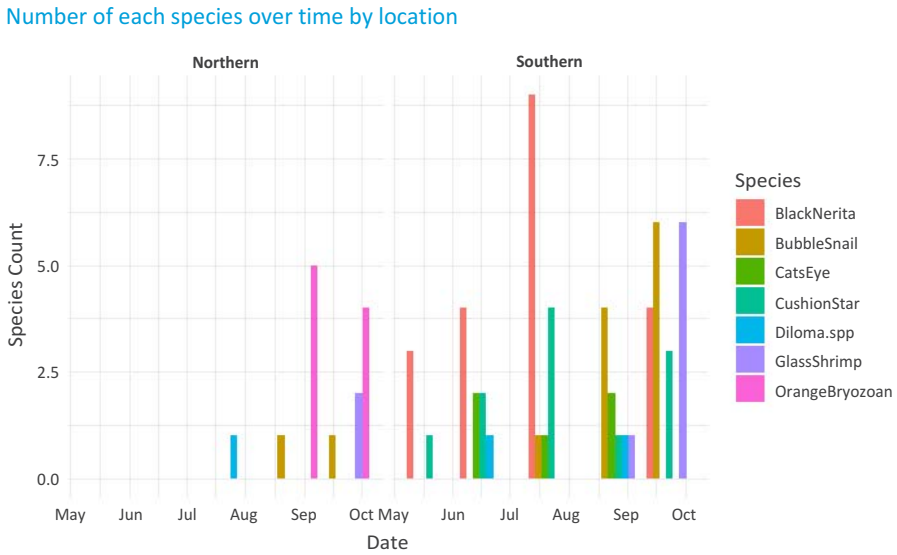


Figure 3: Abundance of top eight species found across all pods by month (Graphic: Toi-Ohomai).

Conclusions

In conclusion, the Tauranga Northern Seawall Renewal Project has:

- Provided an opportunity for the first application of the proprietary Living Seawall Boulder unit product in New Zealand.
- Contributed to the wider New Zealand construction industry by developing a viable and cost-effective procurement method for these products, using the local constriction supply chain. Future applications of these products will benefit directly from the pre-established supply chain.
- Provided a local research opportunity regarding the performance of such proprietary eco-engineering products in the local Tauranga Harbour area. Ongoing research should hopefully contribute to the improved targeted deployment of these products in future to deliver optimum results.

The redeveloped Strand reserve site is nearing completion and, at time of writing, is expected to reopen to the public in November 2024.

Figures 4 and 5 below show pre- and post-construction photographs of the seawall works.

Reference

Landlab (2023). Tauranga Moana Waterfront Plan (Version 002).

Figure 4 (left): Existing Strand reserve site prior to construction, November 2023 and Figure 5 (right): The reserve construction site following completion of the seawall works, September 2024; landscaping works are ongoing (Photos: WSP).

Eco-engineered rocky reef substrate designed for Aotearoa New Zealand

Bryony Miller, e3Scientific

Coastal marine restoration has become a beacon of hope in a world facing unprecedented ecological decline.

In Aotearoa NZ, there is growing interest in marine restoration for conservation and compensation purposes. Yet, marine restoration ecology is a relatively new discipline, and restoration projects face significant, documented challenges.

In 2021, e3Scientific was confronted with these challenges when researching options for rocky reef restoration in Bluff Harbour. Our team sought an ecologically and cost-effective substrate that would mimic the functions of New Zealand's rocky reefs.

Identifying a cost-effective substrate was the first hurdle. Artificial reef modules are available from overseas, yet the cost is very high. Overseas modules are also primarily designed for tropical and sub-tropical environments rather than temperate rocky reef habitats and are often constructed with concrete reinforced with plastic fibres.

This initial research made it clear that designing and producing our own module would be the best way to access a substrate that would meet our economic, ecological and environmental needs.

Module design

Our approach was to design a module to suit the ecology, target species and the conditions in which it would be deployed. This required the modules to mimic rocky reef habitat, provide a stable platform for organisms such as macro-algae and shellfish, and deliver the shelter, refuge and crevices needed to provide microhabitats for diverse rocky reef species. It also needed to be stable in areas of significant tidal flow.

To achieve this, substrate designs aimed to:

- Mimic the characteristics of natural rocky reef including provision of connectivity and complexity.
- Maximise habitat and attachment surface area and refuge area by amplifying rugosity and providing the maximum number of refuge holes while also maintaining structural integrity.
- Limit benthic habitat displacement (i.e. be hollow).
- Have capacity to be safety stacked (to maximise crevices and niches for species as well as enable cost-efficient transport and deployment).
- Be stable in significant tidal flow and wave conditions.

These goals needed to be achieved while ensuring that the modules would be long-lasting and would not contain any contaminants or unnatural reinforcing fibres.

Design, concrete and engineering collaboration

Delivering these objectives required collaboration with experienced engineering and concrete production professionals, and the team reached out to local concrete and pre-cast professionals, McGregor Concrete.

McGregor Concrete has extensive experience and a company-wide interest in making sustainable concrete products. McGregor Concrete worked closely with our team and with the team at McMaster Engineering to develop an optimal mould and modules that would meet our requirements.

The research and design process culminated in our first module, the Kokoru. Designed specifically for harbour environments the Kokoru is simple, stackable, and will last 100+ years in the marine environment. It can also be easily and cost-effectively produced, transported and deployed.

The carbon footprint of the module is reduced by using concrete 'overpours' that meet construction requirements, meaning that the modules are constructed using concrete that would otherwise go to waste.

OCEL Engineering assessed the module for its stability and suitability for the marine environment and assessed the module as being stable in tidal flows of up to 7.8 knots or 3.9 m/sec, or greater if buttressed. This has been confirmed through the deployment

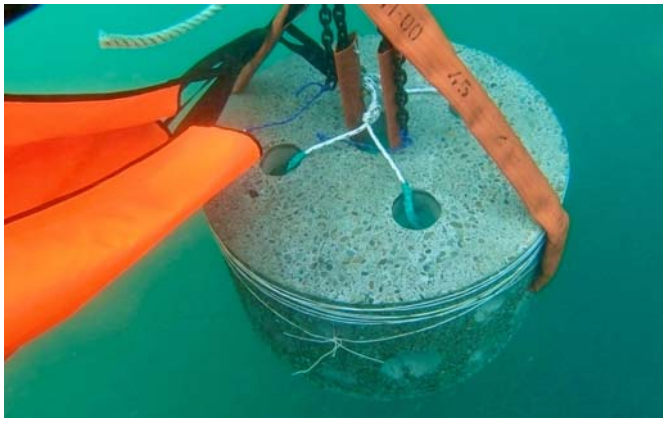


Figure 1: Deploying a Sea Nest in Bluff Harbour (Photo: Waka Miller, Sea Nest Ltd).

Figure 2: Sea Nests being poured and stored at McGregors Concrete yard (Photo: Waka Miller, Sea Nest Ltd).

of a small number of modules in Bluff Harbour to test performance in the marine environment.

Completion of the modules prompted the establishment of a new company – Sea Nest Ltd – to commercially provide the modules and develop and deliver associated marine restoration methods and services.

Designs are now being completed for larger modules.

Restoration and monitoring

Module trials are small scale and intensive to minimise risk, maximise data collection and enable and adaptive management approach.

Five monitoring dives have been undertaken from May to September 2024 to track benefits and impacts of the modules. The data collected is helping us to fill gaps in evidence on active restoration and artificial reef performance.

Results have been very positive. The reef is performing as expected and the modules have been stable with very minimal scouring or accretion.

Biodiversity benefits have exceeded expectation. Three months post deployment the reef was colonised by diverse rocky reef species including sponges, brown, red and green algae and seaweeds, a range of fish species, crabs, octopus, sea squirts, snails, sea slugs and sea stars.

Of note has been the unexpectedly rapid growth of diatoms on the substrate, even during winter months. The presence of this food source enabled Sea Nest to initiate active restoration efforts.

This included a collaboration with Foveaux Pāua to release a small number of hand-reared pāua on the reef three months post deployment. The release was deemed successful, with the hand-reared pāua successfully attaching to the substrate and some of the pāua being located sheltering in the modules three weeks post deployment.

Sea Nest has also been partnering with the Kelp Blue hatchery at Ocean Beach in Bluff to cultivate *Macrocystis pyrifera* from locally collected spores. The cultivated kelp has been out-planted onto the artificial reef using a variety of methods and substrates. Laboratory and out-planting methods have been actively refined to respond to variations in success rates and to increase efficiency. This has resulted in very high rates of survival of recently deployed kelp.

Next steps

Sea Nest Ltd deployed additional trial modules in Bluff Harbour in October to trial different reef designs, including stacking. *Macrocystis* restoration trials will also be diversified and scaled up during October and November.

Sea Nest will also be seeking opportunities to deploy or trial existing or larger modules for restoration, compensation, coastal protection or aquaculture purposes.

The power of partnership and innovation has enabled the affordable delivery of this project and has proven that quality marine restoration can be delivered cost effectively in Aotearoa New Zealand. Sea Nest hopes to continue our collaborative journey by establishing new partnerships to trial and deploy our modules and marine restoration.

For additional information, contact Bryony Miller (bryony.miller@e3scientific.co.nz).

Video link

To see a video presentation of the project, covering deployment and the first five months of monitoring, go to: https://vimeo.com/1024540697?share=copy (use the password 'seanest').

Figure 3: Blue cod and spotties investigating newly rewilded pua on Sea Nests in Bluff Harbour (Photo: Waka Miller, Sea Nest Ltd).

Figure 4: Māori octopus has made itself at home in the Sea Nest reef (Photo: Waka Miller, Sea Nest Ltd).

Get your message out – Advertising in *Coastal News*

Coastal News is published three times a year (in both print and electronic formats) and is distributed to the Society's 400 members and corporate members, as well as being publicly available on the NZCS website.

The total readership per issue is estimated at 500+, comprising professionals in coastal science, engineering and planning, and employed in the engineering industry, local, regional and central government, research centres, and universities. If this is a group you would like to connect with, *Coastal News* has a range of advertising opportunities available, from small notices to a full page.

If you are interested in placing an advertisement, download the *NZCS Advertiser's Guide* from www.coastalsociety.org.nz/view/publications or email the NZCS Administrator at nzcoastalsociety@gmail.com for further details (please note that advertising space may not always be available in any specific issue, and that advertisements should be in keeping with NZCS aims and values).

Remembering Emeritus Professor Bob Kirk

Deirdre E Hart, Roger F McLean, Sebastian J Pitman, James Shulmeister, Martin B Single & Wayne J Stephenson

In 2024 we lost Emeritus Professor Robert (Bob) Miller Kirk (b. June 7, 1944 Tāmaki Makaurau Auckland – d. March 4, 2024 Ōtautahi Christchurch). This article celebrates Bob's lasting professional legacy.

Over four decades as researcher, teacher, beach advocate, consultant, administrator, and post-academia as an elected Environment Canterbury councillor, Bob was a prolific and vocal scientist, philosopher and leader. His scientific career evolved through University of Canterbury (UC) roles as geography lecturer and supervisor of over 120 research theses (1971-2004). Bob inspired and enthralled students with his enthusiasm for learning about our dynamic landscape, its formation processes, and the interactions between people and their environment. He challenged students to question textbooks, interrogate the world through observation, measurement and analysis, and to enjoy learning, continuing to add to his own understanding of Earth processes, resource use and management to share with his students.

Bob taught in a way that made science practical and relevant, showing how process knowledge could underpin effective environmental management. Strong in his students' memories are his passionate 100-level orations (lowered dunes vs tsunami and storms-in-series), field teaching (Southshore, Cass, Pareora, Kaikōura, Waimate, South Island hydro-lakes), his dedication as a supervisory research coach, and his tireless coastal community outreach. The number of Bob's students who subsequently engaged in coastal work is a testament to his success. After three decades teaching and time as Geography Head of Department, Bob transitioned into roles as Pro Vice-Chancellor Research, and eventually as Acting Vice Chancellor. In addition to major academic and research reforms, he was proud (as a former smoker) to approve the first smoke-free UC campus policy in the latter role.

In 2013 Bob's contributions to geography were recognised with a Distinguished New Zealand Geographer Medal. His many lasting areas of research contribution include over 90 scientific papers and 150 technical reports on mixed sand and gravel (MSG) beaches, coastal hydrosystems, shore platforms, and lake shores, as highlighted briefly below.

MSG beaches

Research began for Bob with a Masters on Canterbury Bight beach morphologies and sediments (Kirk 1967), and a PhD supervised by Professor Roger McLean on Kaikōura MSG swash zone processes (Kirk 1970), a thesis that sparked the interest of a young Welsh geographer in beach sediment transport (Williams, 2020), who later became the leading Welsh coastal geomorphologist. A 'lay' engineer, Bob designed and made novel swash measuring tools for what remains a difficult-to-instrument environment. These early works underpinned many subsequent contributions, including the seminal Kirk (1980) which defined MSG beaches according to their process environments, with work spanning Kaikōura to Southland and inspiring significant contributions in areas such as MSG beach storm dynamics (Single 1992), and coarse sediment transport (Dawe 2006). Bob established a lasting foundation for understanding how sediment composition directly shapes beach morphology and coastal process responses. This insight continues to guide modern scientists studying sediment dynamics and coastal resilience (MacDonald et al., 2023; Pitman et al., 2024).

Coastal hydrosystems

From the late 1980s, inspired by the work of researchers such as Todd (1983) and growing pressures on braided rivers, Bob turned his attention to the processes and management of coastal hydrosystems on MSG coasts, focussing on dominantly-freshwater river-mouth lagoons (hāpua) and coastal lakes (waituna). As explained in Kirk (1991) and expanded on in Kirk and Lauder (2000), these systems lack regular seawater inflows and tidal prisms, such that they cannot be managed according to estuarine process understandings or management models but are better understood according to the balance of river-flow stage versus wave energy as moderated by coarse beach processes. Kirk's work underpinned subsequent decades of resource and environment investigations and advances in MSG coast hydrosystem management principles, including recent recognition of the broad spectrum of hydrosystem types and their potential climate change responses in Aotearoa (e.g. Hume et al., 2016; Hart and Hume, 2020).

Photo supplied by Dr Judy Kirk

Shore platforms

Early work in Kaikōura led to an interest in shore platforms. In 1973 and 1974 Bob installed a micro-erosion meter (MEM) network, one of the earliest applications of the then new technique. Significantly this was the first set of measurements used to establish the age and rates of development of shore platforms. Subsequently this network and the resulting Kirk (1977) paper spawned two PhDs and numerous papers advancing our understanding of erosion rates and processes on shore platforms (e.g., Stephenson et al., 2019). Since 2016 this network has yielded data to understand the impact of the Kaikōura earthquake and uplift on rock coasts, plus more PhDs. In February 2024 the network reached 50 years of service, the world's longest measured MEM network. Kirk (1977) is today one of the 12

most-cited papers in the *NZ Journal of Geology and Geophysics*, receiving regular international citations, making it one of Bob's most significant scientific contributions.

Lake shores

Bob's approach to understanding shore change as a response to wave processes and changes in water level on the beach extended his research realm to lakeshores. Supervision of a PhD on Lakes Te Anau and Manapouri by Richard Pickrill developed into assessment of the effects of hydro-electric schemes (HES) on lakeshore change and shoreline development, leading to lake level management principles (Mark and Kirk 1987) still applied today (e.g., James et al. 2002). Bringing lakes into the coastal curriculum at UC enabled a series of significant postgraduate studies (on Lakes Coleridge, Pūkaki, Dunstan and Waikaremoana) progressing our understanding of how these systems behave and their similarities and differences to coastal shores (Allan and Kirk 2000; Allan et al., 2002). Outcomes included the successful design of Lake Dunstan's shores, maintenance of 'natural' lakeshores under HES control in Fiordland National Park and Te Urewera and the management of significant lake erosion hazards (at Pūkaki, Te Anau, Taupō and Hāwea).

Beyond the research contributions highlighted here, Bob contributed to the scientific understanding of estuarine and sand beach systems, boat wake effects on beaches, sediment resource and harbour management practices, and to Antarctic and tropical coast processes, amongst many other topics. His legacy remains strong, not least due to his contributions as mentor, colleague and friend of many emerging and established coastal professionals.

With his passing, kua hinga he totara i te wao nui a Tane | a totara has fallen in the forest of Tane. Bob is survived by his wife Dr Judy Kirk, his children, grandchildren, two remaining siblings, and the thousands of former students and colleagues he inspired to take a rigorous and joyful approach to understanding and managing coastal systems.

References

Allan, JC & Kirk, RM (2000). Wind wave characteristics at Lake Dunstan, South Island, New Zealand. *NZJ Marine and Freshwater Research* 34(4): 573-591.

Allan, JC, Stephenson, WJ, Kirk, RM & Taylor, A (2002). Lacustrine shore platforms at Lake Waikaremoana, North Island, New Zealand. *Earth Surface Processes and Landforms* 27: 207-270.

Dawe, IN (2006). *Longshore sediment transport on a mixed sand and gravel lakeshore*. UC PhD Thesis (GEOG).

Hart, D and Hume, T (2020). Coastal hydrosystem responses to sea level rise. *Coastal News* SP 4: 45-54.

Hume, T, Gerbeaux, P, Hart, DE, Kettles, H & Neale, D (2016). *A classification of New Zealand's coastal hydrosystems*. NIWA report for MFE no. HAM2016-062.

James, M, Mark, AF & Single, MB (2002). *Lake Managers' Handbook – Lake level management*. Ministry for the Environment, 88pp.

Kirk, RM & Lauder, GA (2000). Significant coastal lagoon systems in the South Island, New Zealand. *Science for Conservation* 146.

Kirk, RM (1967). *Beach morphology and sediments of the Canterbury Bight*, MA. DOI 10.26021/8789.

Kirk, RM (1970). *Swash zone processes: an examination of water motion and the relations between water motion and foreshore response on some mixed sand and shingle beaches, Kaikoura, New Zealand*, PhD. DOI 10.26021/5620.

Kirk, RM (1977). Rates and forms of erosion on intertidal platforms at Kaikoura Peninsula, South Island, New Zealand. *NZJ Geology and Geophysics* 20(3), 571-613.

Kirk, RM (1980). Mixed sand and gravel beaches: Morphology, processes and sediments. *Progress in Physical Geography* 4(2), 189-210.

Kirk, RM (1991). River-beach interaction on mixed sand and gravel coasts: A geomorphic model for water resource planning. *Applied Geography* 11(4), 267-287.

MacDonald K, Hart DE & Pitman S (2023). Geomorphic responses of uplifted mixed sand and gravel beaches: Combining short-term observations from Kaikōura, New Zealand with longer-term evidence. *NZJ Geology and Geophysics* 66(2), 228-243.

Mark, AF & Kirk, RM (1987). Lake levels and lakeshore erosion. In: *Lake Managers' Handbook*. Water and Soil Conservation Authority 22: 215-23.

Pitman SJ, Coco G, Hart, DE & Shulmeister, J (2024). Observations of beach cusp morphodynamics on a composite beach. *Geomorphology* 447, 109026.

Single, MB (1992). *High energy coastal processes on mixed sand and gravel beaches*. UC PhD (GEOG).

Stephenson, WJ, Kirk, RM & Hemmingsen, MA (2019). Forty three years of micro-erosion meter monitoring of erosion rates on shore platforms at Kaikōura Peninsula, South Island, New Zealand. *Geomorphology* 344, pp.1-9.

Todd, DJ (1983). *Effect of low flows on river mouth closure in the Opihi River*. UC MSc Thesis (GEOG).

Williams, AT (2020). Beach people. *Journal of Coastal Research* SI 101, p25-29.

Announcing the Professor RM (Bob) Kirk Memorial Award

An NZCS conference award to be presented annually by the Canterbury Coastal Group

The Bob Kirk Memorial Award is presented by the Canterbury Coastal Group in recognition of Bob's decades as researcher, teacher, beach advocate, consultant, administrator, mentor and leader. His roles at the University of Canterbury (1971-2004) as geography lecturer, and as an environmental consultant, inspired and enthralled students through his enthusiasm for our dynamic landscape, its formation processes, and the interactions between people and their environment and resulted in practical coastal and lakeshore management throughout New Zealand.

The award recognises the presentation at the NZCS annual conference that best represents the application of understanding of coastal or lakeshore processes in addressing a solution to a shore management conundrum.

Conference presentations are judged by representatives of the Canterbury Coastal Group (who reserve the right not to award in any given year). Award winners will be announced and celebrated at the NZCS conference awards and closing ceremony.

SCHISM Coastal Circulation Modelling Workshop: A new opportunity for coastal modellers

Christo Rautenbach, NIWA

This workshop is being run with support from the New Zealand Coastal Society's Professional Development Award, and is being organised by the 2024 recipient, Christo Rautenbach. While Coastal News normally reports on the winner's PDA activity once it has been completed, we are running this article now since there is an opportunity for NZCS members to take part in the workshop in July 2025.

I am excited to announce that the upcoming SCHISM (Semi-implicit Cross-scale Hydroscience Integrated System Model) Coastal Circulation Modelling Workshop has been successfully approved and scheduled. This workshop will be a unique opportunity for researchers, practitioners, and students working in coastal oceanography and hydrodynamics to enhance their understanding of advanced coastal circulation models. The event is expected to take place in July 2025 at NIWA in Hamilton. The workshop will be taught by Dr Vanessa Hernaman, senior research scientist in the Coastal Extremes Modelling and Projections team at CSIRO, Australia.

Why SCHISM?

SCHISM is an open-source modelling framework widely used for addressing complex multi-scale circulation, hydrodynamics, and sediment transport in coastal and estuarine environments. Its flexibility and robustness make it an invaluable tool for both academic research and real-world applications. The upcoming workshop will guide participants through the process of setting up coastal circulation models using SCHISM, with a focus on addressing challenges specific to New Zealand's unique coastal systems.

The workshop will provide in-depth instruction on topics such as unstructured mesh generation, open boundary condition handling, and case studies from past coastal applications. Practical sessions will also cover post-processing, visualisation, and interpreting model outputs, making this an invaluable hands-on experience for anyone working with or interested in coastal systems.

Collaboration and external participation

While the workshop is initially tailored for NIWA's internal team and research associates, we are thrilled to offer three extra spots for external participants. These places will provide an opportunity for students, researchers, and professionals in the coastal oceanography community to join the workshop and interact with SCHISM experts.

External participants will gain first-hand experience with cutting-edge coastal circulation models and contribute to collaborative discussions that may help shape future modelling approaches across New Zealand.

Looking ahead to July 2025

With the growing impacts of climate change on coastal environments, having reliable tools to simulate circulation patterns, sediment transport and hydrodynamics is more important than ever. By hosting the workshop in July 2025 at NIWA, we hope to equip participants with the necessary skills to address critical coastal management challenges, and foster collaboration across different sectors of New Zealand's marine science community.

For those interested in attending, more information on registration and application processes will be released soon. Keep an eye on the New Zealand Coastal Society's updates as we finalise the details. We look forward to seeing you at NIWA in July for an engaging and informative workshop!

About Dr Christo Rautenbach

Christo is a highly experienced physical oceanographer with a PhD in Applied Mathematics and Physical Coastal Oceanography. He has been involved in numerous research initiatives and academic collaborations, particularly in the field of coastal dynamics and numerical modelling. In addition to his academic background, Christo has led successful workshops and research programmes, and is passionate about mentoring emerging scientists. His work spans across disciplines, with a particular focus on bridging scientific research and practical applications in coastal management.

About the NZCS Professional Development Award

The purpose of the NZCS Professional Development Award is to:

- promote continual improvements in individual education, skills and experience in coastal management, and
- encourage leadership in coastal disciplines.

Successful applicants receive up to NZ$5,000 towards the expenses of pursuing a professional development opportunity that aligns with and advances the mission and vision of the NZCS.

NZCS archive & downloads site

The NZCS website houses an extensive archive of the Society's publications from its inception, including:

- **back issues** of *Coastal News* (1996 to date) and 'hot topic' reprints of significant articles from previous issues;
- newsletter **author and article indexes** from issue 1 to date (updated yearly);
- an **author's guide** to writing articles for *Coastal News* and NZCS special publications; and
- copies of the five completed **NZCS Special publications** (published 2014-2022).

All these can be accessed at www.coastalsociety.org.nz under the 'Media>Publications' tab on the main menu.

West Coast Marine Reserves turn 10!

Don Neale, West Coast Marine Ranger, Hokitika

Five of the South Island West Coast's special protected areas recently celebrated their tenth birthday.

It was on 7th September 2014 that five fully protected marine reserves were established – two in Buller and three in South Westland. The reserves were established after thorough discussions over several years that involved Poutini Ngāi Tahu, local community representatives and several stages of public consultation.

All sea life is protected within the reserves, so fishing and shellfish gathering are not allowed there. The reserves cover just over 1% of the West Coast's seas and 7% of its coastline length, leaving plenty of space for fishing elsewhere in the region. By the time the reserves came into being in 2014, the local and other public support for them was strong, and that's been reflected in how well the 'no fishing in the reserves' rule is followed.

While the main intent of marine reserves is as areas for scientific study, they have

Kahurangi Marine Reserve reaches along 16 kilometres of coast, alongside the Heaphy Track Great Walk and the Kahurangi National Park. The wide tidal zone of rocks and beaches in this large reserve are great to explore, with expansive mussel beds supporting starfish, octopus and seaweeds. Offshore, the broad continental shelf is home to sealife like fur seals/kekeno, red cod, gurnard and sharks (Photo: Andris Apse).

Punakaiki Marine Reserve is centred on the world-famous Pancake Rocks and Blowholes walkway, and the 'secret treasure' of the Truman Track coastline. The reserve extends the protection of the Paparoa National Park out into the Tasman Sea, to include rocky reefs where bull kelp swirls in the waves, and open ocean where seabirds like terns/tara, penguins/kororā and Westland petrels/tāiko catch their fishy food (Photo: Andris Apse).

Waiau Glacier Coast Marine Reserve reaches 11 km from Kohuamarua Bluff to Omoeroa Bluff, adjoining the Okārito Lagoon Mātaitai Reserve. The marine reserve complements the exceptional glacial landscapes of Westland Tai Poutini National Park to make it a truly 'Mountains to Ocean' sequence. Extending about 4 km offshore, it is one of the largest marine reserves in mainland NZ (Photo: Andris Apse).

Tauparikākā Marine Reserve is New Zealand's smallest marine reserve at just 17 hectares, but it importantly protects the 'watery' parts of the Ship Creek visitor site just north of Haast. Here you can enjoy walking the beach, watching the Hector's dolphins, and paddling in the tea-coloured stream mouth (Photo: Andris Apse).

also been celebrated as places to enjoy the natural environment, and as a kind of insurance against the impacts that people can have on the sea. They are places where fish and other sea life can grow, helping to sustain local habitats and breeding stocks, and each reserve has quite unique features.

The 44 marine reserves of Aotearoa New Zealand can be seen as 'a window into the ocean' for us all. They are protecting some of our special places, and revealing new things that might otherwise pass us by and go unnoticed. So get down to one of your wonderful marine reserves, celebrate their existence, and see what you can find!

Don Neale was interviewed by Nathan Rarere of First Up (Radio NZ) as part of the 10th birthday celebrations, and this can be heard at: https://www.rnz.co.nz/national/programmes/first-up/audio/2018952869/doc-marine-ranger-on-his-5-west-coast-marine-reserves

The remote Hautai Marine Reserve lies 50 km south of Jackson Bay and covers 8.5 km^2. This reserve protects some rocky coastal habitats where crayfish, kina, cod and other marine life can thrive. Further out from the Hautai Reserve, underwater canyons reach ocean depths of more than 3000 metres and add to the rich diversity of this area (Photo: Andris Apse).

Canterbury University marine biologists have been helping to monitor the reserves, alongside Ngāti Māhaki, NIWA and local DOC rangers. The knowledge gained from these surveys help us to better understand the sea and manage its resources (Photo: Don Neale, DOC).

Marine Ranger Don Neale collects an 'environmental DNA' sample to test for marine pests and other hard-to-find species. Monitoring has revealed that hundreds of species of marine life live in the five West Coast reserves, but there are no known marine pests yet introduced into our region. Scientific monitoring in the sea also helps us to notice changes over time that might otherwise be overlooked in the restless ocean, like the gradual declines of some whales, seals, birds and fish that have happened in the Tasman Sea over many decades (Photo: University of Canterbury).

A significant find in and beyond the reserves is the widespread loss of bull kelp throughout the West Coast over recent years, probably due to marine heatwaves and the warming climate over the Tasman Sea. Photos like this one from 2009 show that bull kelp was once abundant at Abut Head, but a recent visit in July shows it has disappeared. Bull kelp is a very important seaweed that swirls in the waves and creates habitat and shelter for other plants and animals (Photo: B Baker).

Want to know more about New Zealand's marine reserves? Or are you looking for a virtual tour? For an overview of all 44 marine reserves, plus links to their purpose and benefits, how they are monitored, and their 'report cards', see the DOC page at: https://www.doc.govt.nz/nature/habitats/marine/type-1-marine-protected-areas-marine-reserves/

News from the regions

New regional representatives

There have been some further recent additions to the regional representative network, and we would like to welcome our two new recruits – Sage Vernall and Corey Slimo (for their contact details, see page 15).

Sage Vernall (Auckland)

Originally from England, Sage grew up in Auckland, never more than 20 minutes from a beach. Her passion is the marine environment/marine conservation, with her favourite place to be either on, in or near the ocean.

With a background in Marine Science and Environmental Management (postgrad from the University of Auckland), Sage is a Senior Coastal Adaptation Specialist for Auckland Council, working as a core member of the team delivering the council's Shoreline Adaptation Plan Programme (SAPs). Her role involves supporting the delivery of the Shoreline Adaptation Plan programme, with a passion for environmental restoration, stakeholder management in the environmental realm, and upholding kaitiakitanga and the Mātauranga Māori in environmental policy, practices and planning.

Outside of work Sage spends her free time near the coast, exercising, pottering, travelling or trying to learn more about global nature-based solutions and climate adaption initiatives supporting indigenous communities and ecosystems alike.

Corey Slimo (Taranaki)

Corey grew up in the Kaipara District, Northland, and began his career at WSP in Whangarei while studying for a Diploma in Civil Engineering at NorthTec. After completing the diploma, he relocated to Taranaki to finish his Bachelor of Engineering Technology (Civil) and experience living on the west coast. Currently, Corey works as a Civil Engineering Technician at WSP in New Plymouth, with experience in geotechnical and civil projects. He's keen to grow his experience in coastal engineering, with a vision of working in an environment he is passionate about in the future. Outside of work, Corey spends most of his time surfing along the Taranaki coast, and checking out reef structures free diving (when the visibility allows!).

Northland

Laura Shaft, Regional Representative

Plastic pollution

Over the last few years Northland Regional Council has undertaken several research projects to help us better understand the plastic pollution in our moana. We undertake shoreline litter surveys at a number of coastal sites and have partnered with the Institute of Environmental Science and Research (ESR) and Scion to monitor microplastic contamination in our ocean and shellfish.

This monitoring has indicated that plastic is a significant contaminant in Northland. To better understand what impact plastic may be having on our native fauna we recently teamed up with the University of Auckland and Patuharakeke. Ten dead shorebirds from Bream Bay were sent to the University, who examined their stomach contents, to determine if any of the birds had ingested plastic. Of the ten birds, eight birds had no plastic in their stomach but, unfortunately, a Fairy Prion had three pieces, and a pied shag had a bundle of plastic fibres. While eight birds were plastic-free, finding plastic in any bird is very concerning.

Birds found with plastic in their stomachs.

Dune restoration

Coastcare had another successful dune planting season with over 18,000 plants provided to groups at 19 sites around the region. Just as importantly, several working bees were held to remove pest plants from dune areas, to allow the dunes to function more effectively.

Biosecurity

A new to mainland New Zealand red seaweed – *Asparagopsis taxiformis* – has been found at Tamaterau in Whangārei Harbour and at Iris Shoal, Kawau Island. While only spotted recently at Tamaterau, it's suspected that the new red seaweed has been here for some time and is likely to be in other spots too. The seaweed is considered native to the Rangitāhua/Kermadec Islands.

For more information: https://www.nrc.govt.nz/news/2024/september/new-red-seaweed-found-in-northland-and-auckland

The pest weed sea spurge (*Euphorbia paralias*) has been found recently at several sites along Te Taitokerau's west coast. Beachgoers can help by reporting any potential sightings to the Ministry for Primary Industries Pests-and-Diseases hotline on 0800 80 99 66.

Waikato

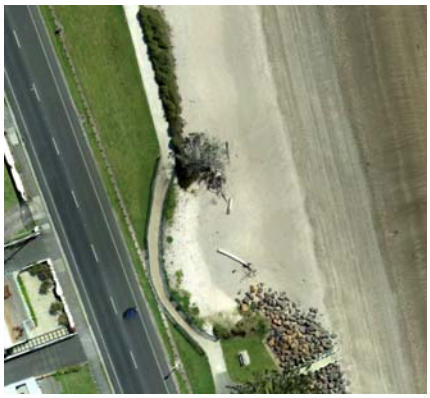
Jamie Boyle, Joshua Sargent, William Dobbin and Celeste Davies-Calway, Regional Representatives

Buffalo Beach seawall extension

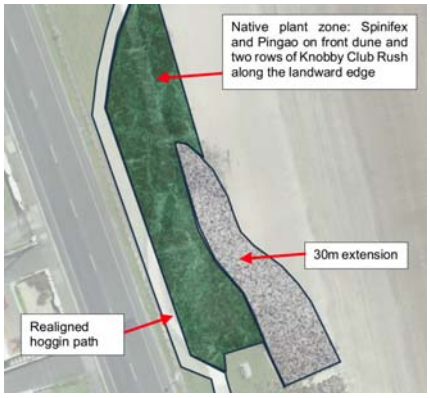
After the dramatic effects of coastal erosion post Cyclones Hale and Gabrielle, TCDC are constructing (as we speak) a 30 m seawall extension in addition to the existing 400 m seawall on Buffalo Beach in Whitianga, Coromandel. Approximately 9 m of erosion occurred following these two large events as what is termed an 'end effect' due to the existing seawall to the south. Waves expend their energy at the end of the structure and because this is where the sand begins and rock ends, increased velocities cause an uprush of water producing further erosion than what would have naturally occurred without any structures. The problem with adding another seawall is that you end up chasing your (erosion) tail. However, as part of the design we have minimised both the height and seaward extent of the wall (see image) to reduce how far the rocks protrude into the active waves zone. We still anticipate some minimal end effects and overwash, but dense native planting and realignment

landward are expected to reduce this to manageable effects.

For more, visit the TCDC project page at https://www.tcdc.govt.nz/Our-Community/Council-Projects/Current-Projects/Buffalo-Beach-Rock-Wall-Extension



Erosion at Buffalo Beach, due for restoration and landscaping.



Planned works for erosion at Buffalo Beach.

Bay of Plenty

Scott Murray and Cole Burmester, Regional Representatives

ACAN Hui

The Aotearoa Climate Adaptation Network (ACAN) Hui held its fourth annual Hui, 16-18 October at the Pāpāmoa Surf Club in the Bay of Plenty. Over 150 people attended the three day event, including local government staff, central government agencies, researchers, consultants, iwi and hapū. The theme of this year's Hui was 'Practice in action: accelerating climate adaptation through collaboration', with a mix of presentations and workshops including sessions from tangata whenua on collaborative action, MfE on adaptation planning, and the Climate Change Commission on the next iteration of the National Climate Change Risk Assessment. ACAN is working on transitioning to the Aotearoa Society of Adaptation Professionals (ASAP) with a broader membership base forming New Zealand's first and only professional society that brings together all those practicing and undertaking climate adaptation.

Ana Serrano presenting on the Waihi Beach Lifeguard Services Community-led adaptation project where BOPRC provided technical support.

ACAN members enjoying morning tea break with some amazing coastal scenery at the Pāpāmoa Surf Club.

Te Hononga ki Te Awanui boardwalk

The Te Hononga ki Te Awanui boardwalk in the Tauranga CBD was opened on 15 October, connecting the city centre with Te Awanui Tauranga Harbour. The boardwalk is a 170 m long shared pedestrian and cycle pathway that runs along the Tauranga waterfront linking the southern end of The Strand to a railway underpass. The opening of the boardwalk and railway underpass joins the recently reopened and upgraded Masonic Park as part of the city centre transformation.

Ōpōtiki Harbour development

The Ōpōtiki Harbour Development was officially opened by Deputy Prime Minister, the Rt Hon Winston Peters, and the Regional Development Minister, Hon Shane Jones, on 20 September. The opening of the harbour is a milestone for everyone involved after years of hard work. The harbour development has led to local employment opportunities in the construction and the aquaculture industry. The development of the Ōpōtiki marina and industrial Park is also underway with resource consents for the project recently being granted.

Wellington

Holly Blakely, Greta Stuthridge and Karen Bell, Regional Representatives

Evaluating EcoReef, Cape Palliser (South Wairarapa)

Cape Palliser Road is a vital link to the Ngawi community and an important section of the South Wairarapa District Council's transport network. The road is vulnerable in several locations to coastal erosion and washouts, which pose risks to users and leads to closures. Multiple repairs have been required in recent years and have required in excess of $2.4m in emergency work expenditure.

Previously, rock revetments have been used to manage erosion risk along the corridor. The high costs associated with the sourcing and transporting of large armourstone rock from quarries near Tinui, Linton and Ohakune for these structures have led the council to investigate alternative options. One option that has been trialled in two sections of the coast is EcoReef cellular retaining walls. These comprise interlocking hexagonal concrete blocks filled with locally won materials to create a modular retaining wall structure.

EcoReef offers potential cost and carbon savings compared to rock revetments and other coastal erosion measures. In the pilot sites blocks have been filled with river-run gravels and coarse sand sourced from Cape Palliser. There is also notable cost savings as the concrete units are less expensive and quicker to install than a comparable rock revetment.

Consents from the regional council require the council to monitor the effectiveness of the wall and monitor any impact on the coast. Jacobs' inspection of the two EcoReef pilot sites in Cape Palliser forms the basis of the consent reporting. At the NZCS conference Matt Balkham (Jacobs), Charlotte Duke

EcoReef cellular retaining walls.

(Jacobs), and Tim Langley (South Wairarapa District Council) presented their paper, 'Evaluating EcoReef: An economical approach to mitigate coastal erosion in Cape Palliser'. The team provided an overview of observations on the wall's condition and performance over the year since it was installed. The team also provided their thoughts on the likely longevity of this erosion risk management approach and some design considerations for future similar structures based on their observations.

Canterbury

Kate MacDonald, Tommaso Alestra and Jessica Green, Regional Representatives

Final stages of Coastal Hazards Adaptation Plan for Whakaraupō Lyttelton Harbour and Koukourarata Port Levy

Christchurch City Council's Coastal Hazards Adaptation Planning (CHAP) programme is nearing its final stages in the development of the adaptation plan for Whakaraupō Lyttelton Harbour and Koukourarata Port Levy. Completing this first adaptation plan is an exciting milestone in the programme that will eventually cover the rest of the Christchurch District.

The draft adaptation plan is the result of two years of work with the Coastal Panel, a group that is made up of community and rūnanga representatives. This panel is responsible for co-creating the adaptation plan and recommending adaptation pathways to the Council for decision. Community objectives – developed by the Whakaraupō Lyttelton Harbour and Koukourarata Port Levy Coastal Panel – have been central to shaping the adaptation pathways, ensuring they reflect the values and needs of the wider community. These objectives included considerations of access to natural areas, retention of community and culture, community resilience, infrastructure resilience, and the protection of environment and landscapes. Guiding the Coastal Panel was the Specialist and Technical Advisory Group (STAG), a group of experts from across a range of agencies, which helped the panel make informed decisions.

The Coastal Panel identified six Priority Adaptation Locations (PALs) around Whakaraupō Lyttelton Harbour and Koukourarata Port Levy, where public assets are most vulnerable to coastal hazards. Through CHAP's co-creation approach, adaptation pathways have been developed to manage risks to public assets in each PAL. Pathways were developed using a modified Dynamic Adaption Pathways Planning (DAPP) approach.

The draft adaptation plan includes 23 asset-specific adaptation pathways, for assets such as roads, pipes, parks and a landfill. Of these pathways, around half include a preference towards long-term removal/closure of the

NZCS Regional Representatives

Auckland	**Lara Clarke** lara.clarke@aucklandcouncil.govt.nz
	Matthew McNeil Matthew.McNeil@aucklandcouncil.govt.nz
	Eddie Beetham EBeetham@tonkintaylor.co.nz
	Sage Vernall sage.vernall@aucklandcouncil.govt.nz
Bay of Plenty	**Scott Murray** SMurray@tonkintaylor.co.nz
	Cole Burmester cole.burmester@beca.com
Canterbury	**Kate MacDonald** Kate.MacDonald@jacobs.com
	Tommaso Alestra Tommaso.Alestra@boffamiskell.co.nz
	Jessica Green Jessica.Green@beca.com
Gisborne	**Murry Cave** Murry.Cave@gdc.govt.nz
	Dylan Barnfield Dylan.Barnfield@wsp.com
Hawke's Bay	**José Beyá** jose@ihbeya.com
	João Albuquerque joao.albuquerque@hbrc.govt.nz
Northland	**Laura Shaft** lauras@nrc.govt.nz
Otago	**Sorrel O'Connell-Milne** sorrelomilne@gmail.com
	Amanda Riddle Amanda.Riddle@orc.govt.nz
	Mojgan Razzaghi Mo.Razzaghi@dcc.govt.nz
Southland	**Ash Rabel** Ash.Rabel@es.govt.nz
Taranaki	**Corey Slimo** Corey.Slimo@wsp.com
Upper South	*Temporarily vacant*
Waikato	**Jamie Boyle** jamie.boyle@tcdc.govt.nz
	Joshua Sargent js535@students.waikato.ac.nz
	William Dobbin William.Dobbin@stantec.com
	Celeste Davies-Calway Celeste.Davies-Calway@waikatoregion.govt.nz
Wellington	**Holly Blakely** hblakely@tonkintaylor.co.nz
	Karen Bell kbell@doc.govt.nz
	Greta Stuthridge Greta.Stuthridge@jacobs.com
West Coast	**Don Neale** dneale@doc.govt.nz

public asset or to a reduction in level of service. The Coastal Panel has demonstrated a willingness to compromise on service provision, while emphasising the importance of retaining key access routes and promoting ecological enhancement. On the 16th of October 2024, Christchurch City Council endorsed for consultation the Draft Coastal Hazards Plan for Whakaraupō Lyttelton Harbour and Koukourarata Port Levy. Christchurch City Council is now seeking public feedback on the Coastal Panels' preferred adaptation pathways and the plan more widely, before it is presented to the Council for a final decision in 2025.

Regional news from our international correspondent

Hurricane Milton, Florida

Matthew McNeil normally reports on news and events in the Auckland region, but in this issue he has provided a distinctly different story from somewhat further afield. While in Florida in October, Matthew directly experienced Hurricane Milton – the second most intense hurricane to ever be recorded in the Gulf of Mexico – and sent us this report on his experience.

The term 'Florida man' is used to describe a person performing irrational or maniacal actions in the state of Florida. I may have fitted that description when heading down State into the path of Hurricane Milton. When in Florida...

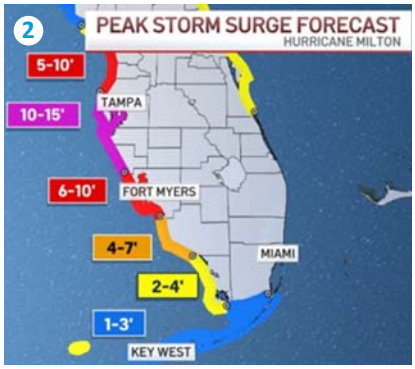
Fuelled by record high ocean temperatures in the Gulf of Mexico, Hurricane Milton rapidly intensified from a tropical storm to a Category 5 Hurricane. At its peak, wind speeds exceeded 175 mph, with the air pressure dropping as low as 900 mb.

The storm was forecast to make landfall on the west coast of Florida, less than two weeks since Hurricane Helene severely impacted Florida and North Carolina.

A storm surge of up to 10-15 ft was forecast for the central Florida west coast, including the vulnerable coastal city of Tampa. A storm surge of 1-5 ft was forecast for the northeast coast, generated as the storm moved offshore.

On the evening of 9 October Milton made landfall on the west coast as a category 3 hurricane with sustained winds speeds of 120 mph. The resulting storm surge was greatest at Sarasota south of Tampa, at around 8 feet. I was staying at Cocoa Beach on the east coast. In the hours before the arrival of Milton, an Atlantic storm system off the east coast generated significantly strong, dry onshore winds. This triggered the highest number of tornado warnings issued in Florida in one day. A large number of tornados touched down, resulting in significant damage and casualties. One tornado damaged commercial buildings just 500m away. Hurricane Milton passed directly over us as a Category 1 Hurricane in the early hours. The storm surge on the east coast was greater north of Cape Canaveral due to the path of Milton, with reduced storm surge at Cocoa Beach.

The storm's passing left extensive damage, flooding, power outages, and beach erosion across the State, and large public beach jetties I visited post-Milton remained closed for post-storm inspection by coastal engineers. Hurricane Milton was the third hurricane to make landfall in Florida in the 2024 season.



1: Forecast path of Hurricane Milton.

2: Storm surge forecast.

3: Storm onshore winds prior to Milton's arrival, Cocoa Beach.

4: Hurricane Milton makes landfall.

5: Tornado damage across the road.

6: Dunes at Cocoa Beach, washed over by storm surge.

7: Crescent Beach, remaining swell 3 days after Hurricane Milton moved offshore.

News from the Pacific

This is the first in an occasional series of news items highlighting the work that New Zealand coastal consultants are doing for our Pacific neighbours. Our thanks go to NZCS Treasurer & Special Projects Coordinator Mike Allis (now based out of Rarotonga) for sourcing and collating these items.

Forests on the brink: Exploring the fate of Pacific atoll mangrove forests under rising seas

Andrew Swales, NIWA

Mangrove forests and the ecosystem services they provide are vulnerable to climate change as they must keep pace with sea level rise (SLR) by accumulating sediment. On continental margins, reduced sediment supply from rivers, land subsidence and deforestation pose ongoing threats. The situation is more critical on low-lying Indo-Pacific atolls distant from rivers, where mangrove forests must rely on organic-sediment production alone. The Njimec mangrove forest of Ouvéa Atoll (New Caledonia) provides an ideal laboratory to explore the fate of these endmember systems under rising sea levels. A NIWA-led project has been exploring the fate of these sediment-poor systems over the last several years and research findings have implications for the future resilience of New Zealand's coastal wetland systems to SLR. Researchers from the US Geological Survey, Universities of Queensland, New Caledonia and Otago, Tulane University and Louisiana State University have contributed to the study, which has been supported by the National Geographic Society, French Pacific Fund and the Téouta people whose lands include the Njimec mangrove forest.

The study's major finding is that organic sediment production will be insufficient to maintain mangrove forest elevation relative to sea level that is optimal for long-term survival. Modelling the forests' future trajectory suggests that large mangrove trees may survive until the 2080s through organic sediment production, whereas scrub mangroves will likely be lost mid-century due to insufficient carbonate sediment supply. On Ouvéa, tectonic subsidence and substrate elevation loss (several mm/yr) is compounding SLR impacts. Our findings highlight the importance of sediment supply and local tectonic setting to the resilience of coastal wetland systems to SLR over the coming decades. Integrated catchment-to-coast management will be needed to mitigate adverse effects of SLR and avoid unanticipated outcomes. Research findings from Ouvéa are informing NIWA's Future Coasts Aotearoa Programme, which is exploring the future fate of New Zealand's coastal wetlands under rising sea levels.

More information about the project can be found at: https://storymaps.arcgis.com/stories/df2808743df34d9992168ffa7d693d56

Ouvéa Atoll, Loyalty islands, looking west across the lagoon. The Njimec mangrove forest is located at the northern extremity of the atoll (right side of photo). Photo credit: Guy Wilkinson Photography (2010), https://www.guywphoto.com/

Cook Islands vulnerability and adaptation assessment

Cole Burmester, Beca

Beca International Consultants Limited (Beca) has been engaged by the Government of the Cook Islands, acting by and through the Director of the Development Coordination Division of the Ministry of Finance and Economic Management (MFEM), to carry out vulnerability and adaptation assessments for the 12 inhabited and three uninhabited islands.

The project's objective is to address knowledge gaps that remain for the Cook Islands' vulnerability to climate change. Using the best available science and information regarding the impacts of climate change on the Cook Islands, the project is exploring the knowledge gaps and recommending adaptive measures at the national level and island-level using a multi-sectoral approach and strong stakeholder engagement within each island community.

The client has already identified relevant gaps including the lack of island-specific vulnerability data, the lack of ocean-based changes being driven by climate change and their impacts on atoll islands, and the low utilisation of traditional adaptation practices. To address these gaps, Beca is comprehensively exploring and attempting to understand, through consultation and site visits, each of the island's vulnerabilities and the adaptation pathways that should be considered to support ongoing adaptation to a changing climate within the Cook Islands.

Overall, the project's key deliverable is to complete a vulnerability and adaptation assessment, thereby supporting delivery of the Cook Islands' Enhancing National Adaptation Programme while improving coordination of the Cook Islands' responses to climate change. The vulnerability and adaptation assessment will outline the vulnerabilities for communities and the public and private sectors, enhance the planning and implementation of multi-sector approaches to vulnerability reduction, and support existing adaptation planning and measures already underway for slow-onset impacts. The adaptation pathways need to be flexible, provide for the wellbeing of the

community, and avoid expensive investment in potentially unsustainable infrastructure that may result in maladaptation. Adaptation pathways should also include consideration of indigenous traditional knowledge and practices, ensuring that traditional knowledge is not overlooked nor treated as a 'box ticking' exercise.

For each island, Beca is setting out the level of exposure, sensitivity to climate change, and adaptive capacity from a multi-sectoral approach, all of which will inform adaptation planning pathways. The outcomes include detailing the climate, environment, topography and levels of exposure of each island. This also involves assessing the climate change vulnerabilities of water and food security, infrastructure, and the other ways in which people sustain themselves (shelter, health, education and sources of income). Social impacts will also be evaluated at the community-level in terms of gender equity, vulnerable populations, population changes, and community values. Further, the assessment is addressing the resilience and adaptive capacity of the island's natural resources and biodiversity, livelihoods, economy, infrastructure and communities.

The work continues on this project, with Beca continuing to engage at a local community level across the islands. A number of NZCS members from Beca are involved in the delivery, including Mike Allis, Laura Robichaux, and Cole Burmester.

University news: Catching up with our recent graduates in the coastal domain

The Society would like to congratulate our recent coastal graduates, and we have asked four of them to tell us about their research, their interests, and what they intend to do in the future. If you know of any recent graduates you would like to see profiled in *Coastal News*, please contact Sophie Horton (University & Education Coordinator) or the Editor – contact details are on page 19.

Rachel Irvine

University of Otago, Supervised by Professor Wayne Stephenson

In May I graduated with my Master of Science in Geography from the University of Otago. My masters research focused on investigating Ōtepoti Dunedin beach user understanding and awareness of rip current hazards, particularly their ability to identify rips. Traditionally, rip current identification is assessed through the use of photographs, with beach users being shown images with or occasionally without rip currents and asked to identify the rip, or the safest place to swim.

My research investigated the use of 15 second videos as an alternative medium to assess rip identification ability in beach users when compared to photographs. I also looked into the methodology of using videos for identification assessment of beach users and the value of this medium in future rip current education.

From October 2024, I am beginning my PhD at the University of New South Wales, supervised by Rob Brander, Amy Peden, Jaz Lawes, and Mitch Harley in the UNSW Beach Safety Research Group to investigate the role of a generative AI rip current detection tool to improve rip current education and the identification ability of beach users.

Seth Smith

University of Auckland, Supervised by Dr Tom Shand and Dr Colin Whittaker

In May 2023, I moved to London with a half-baked thesis and two hard drives of laboratory data to process. Unbeknownst to me, if I had stayed, my supervisors Tom Shand and Colin Whittaker would have convinced me to do more tests and extend my research to a PhD! Nevertheless, I finally finished my Masters thesis while treading water in a foreign city, and I have recently graduated (in absentia) with first class honours. A big thank you to my supervisors Tom and Colin, and Tonkin + Taylor NZ and the Resilience to Nature's Challenges (RNC) programme and team: Liam Wotherspoon, Mark Dickson, and Emma Ryan, for co-funding and supporting this research project.

My thesis was entitled 'A laboratory investigation of the parameterisation and repair of hydraulic damage to rock-armoured slopes' (a bit dry, I am well aware). As part of this investigation, I constructed 19 physical revetment models and ran 123 wave train tests in the University of Auckland wave flume.

My primary aim was to determine the stability of single layer armour overlay repairs using rock and Hanbar concrete armour units, as well as the stability of these units within minor 'spot' repairs, and moderate 'band infill' repairs. My secondary aims were to compare damage parameterisation and measurement techniques within the laboratory and field, and to identify damage progression under varying wave trains. My thesis is currently published on the University repository, and I plan to also write a paper over the next couple of months (alongside my supervisors) to summarise my research.

Being halfway across the world has had its perks! I was fortunate enough to attend and present at two exciting conferences: the Young Coastal Scientist and Engineers Conference (YCSEC 2024) hosted at HR Wallingford's campus where I witnessed their massive wave basins in action, and the International Conference of Coastal Engineering (ICCE 2024) in Rome where I caught up with university friends and supervisors alike. These were both amazing opportunities to learn, meet people, and get excited about my future within the field.

I am currently working as a Coastal Modeller at Mott MacDonald UK, but I continue to weigh up the pros and cons of committing to a PhD. Open to suggestions...

Dr Amandine Bosserelle

University of Canterbury, Supervised by Dr Matthew Hughes and Associate Professor Leanne Morgan

Recent University of Canterbury PhD graduate Amandine Bosserelle continues at UC as a post-doctoral researcher in the School of Earth and Environment. Her thesis was 'Sea-level rise effects on coastal shallow groundwater dynamics in the built

environment' in Civil and Natural Resources Engineering. Amandine's interdisciplinary doctoral research included a comprehensive literature review, data analysis, numerical modelling and interviews with industry practitioners, and she has published three peer-reviewed articles since 2022 from her PhD, and another two articles are under review in international journals.

Dr Mike Chen

University of Auckland, Supervised by Associate Professor Melissa Bowen and Professor Giovanni Coco

My PhD thesis 'The transport of salt and buoyant plastic particles in well-mixed estuaries' aimed to understand the transport of salt and buoyant plastics in an understudied type of estuary. The Waitematā Estuary, a short , well-mixed drowned river valley with strong tides and low freshwater discharge in Auckland, New Zealand, is the site for observational and modelling studies. The transport of salt is studied as a proxy to understand the role of tides and freshwater discharge in regulating particle transport.

Spring tides often result in net landward salt transport while high freshwater discharge leads to a net salt outflow. The salt influx is dependent on the amplitude of spring-neap tidal volume flux.

The classification of the estuary varies from well-mixed during spring tides to SIPS (strain-induced periodic stratified) during neap tides. The whole estuary becomes partially-mixed when the freshwater discharge increases to 100 m^3/s. This unsteadiness with the spring-neap tidal cycle and episodic freshwater discharge events leads the Waitematā Estuary to occupy a range of estuarine parameter space different from other well-studied estuaries.

The transport and retention of buoyant plastics in the Waitematā Estuary are investigated by drifter experiments and numerical simulations. Both studies find that 50%-90% of river-sourced buoyant plastics are retained within the estuary. Spring tides result in further downstream transport and less retention of buoyant plastics. Fewer than 20% of buoyant plastics can escape the estuary mouth within ten-day simulations.

The proportion of plastic particles leaving the estuary mouth does not increase with increased freshwater discharge (peak flow of 300 m^3/s), contrary to observations in estuaries with higher river flows.

These results show that most plastics are retained in this estuary regardless of the tides or freshwater flows. It suggests shoreline clean-ups are very effective in removing plastics from this type of estuary as most plastic particles are grounded even after storms. This study provides insights into how this type of estuary transports salt and plastics, which is beneficial to address future management questions.

I started to work for the DHI NZ Marine & Coastal Team from last February and consult for water quality issues across all New Zealand coastal and estuarine water bodies using MIKE models powered by DHI. I have applied my knowledge and experience from my PhD studies and developed solutions for broader coastal and estuarine contaminants including nutrients and sediments based on DHI sophisticated models with my colleagues.

NZCS Management Committee

Co-Chairs
Colin Whittaker & Sam Morgan
c.whittaker@auckland.ac.nz
sam.morgan@wsp.com

Deputy Chair
Ana Serrano
ana.serrano@boprc.govt.nz

Treasurer & Special Projects Coordinator
Mike Allis
mike@allisco.nz

Deputy Treasurer & National Regional Coordinator
Ryan Abrey
ryan.abrey@stantec.com

Te Komiti Māori
Shari Gallop & Bryony Miller
shari.gallop@pdp.co.nz
bryony.miller@e3scientific.co.nz

***Coastal News* & Special Publications Coordinators**
Ana Serrano & Connon Andrews
Ana.Serrano@boprc.govt.nz
Connon.Andrews@niwa.co.nz

Conference Coordinators
Alison Clarke & Shari Gallop
alison.clarke@slrconsulting.com
shari.gallop@pdp.co.nz

Awards and Scholarship Coordinator
Bryony Miller
bryony.miller@e3scientific.co.nz

University & Education Coordinator
Sophie Horton
sophie.horton@canterbury.ac.nz

Emerging Career Representative
Holly Blakley
HBlakely@tonkintaylor.co.nz

Regional Reps Coordinators
Andrew Allison & Alison Clarke
andrew.allison@niwa.co.nz
alison.clarke@slrconsulting.com

Membership Coordinators
Andrew Allison & Amy Robinson
andrew.allison@niwa.co.nz
Amy@arplanning.co.nz

Administration & Communications Coordinators
Renee Coutts & Belen Rada Mora
nzcoastalsociety@gmail.com

***Coastal News* Editor**
Charles Hendtlass
cellwairmonk@gmail.com

Accessing weblinks in the printed newsletter

Web links are an invaluable source of further information for readers, but in the printed version of *Coastal News* we can't include active links as we do in the pdf version.

We realise that manually copying long strings of seemingly random characters can be frustrating for readers, so for each issue we now produce a pdf file of live links – this can be found on the NZCS website at www.coastalsociety.org.nz/publications.

To make things even easier, you can access the pdf file by using the QR code to the right. The file contains every link published in each newsletter, organised by the pages where they appear, and all are active (clickable) links.

Te Hunga Takutai o Aotearoa
NEW ZEALAND COASTAL SOCIETY

Find us online...

www.coastalsociety.org.nz

www.instagram.com/nzcoastalsociety

www.facebook.com/NZCoastalSociety

or email us at
nzcoastalsociety@gmail.com

The New Zealand Coastal Society would like to acknowledge our corporate members for their support:

SLR · NIWA Taihoro Nukurangi · Bioresearches A Babbage Company · NZDS New Zealand Diving & Salvage · pdp Pattle Delamore Partners · Hawthorn Geddes engineers & architects ltd · ocel · GEOFABRICS · Tonkin+Taylor · Environment Canterbury Regional Council Kaunihera Taiao ki Waitaha · Beca · wsp · DML Discovery Marine Ltd · ENGEO · Nelson City Council Te Kaunihera o Whakatū · awa · STF Group

Disclaimer

Opinions expressed in *Coastal News* are those of the contributing authors and do not necessarily represent those of the editor, the NZCS management committee, or the New Zealand Coastal Society. While every effort is made to provide accurate and factual content, the publishers and editorial staff, however, cannot accept responsibility for any inadvertent errors or omissions that may occur.

Contributing to *Coastal News*

We welcome contributions for forthcoming issues of *Coastal News*. Please contact the Editor, Charles Hendtlass, at cellwairmonk@gmail.com if you'd like to submit an article, contribute a news item, have content suggestions or a photo to share, or to give some feedback on the newsletter.

The submission deadline for the next issue is 21 February 2025.

A Contributor's Guide is available for download from the Society's website at www.coastalsociety.org.nz (under the 'Publications' tab). This provides information on the style and format requirements when writing for NZCS publications. An index of articles previously published is also available for download.