



Pollution time bombs

The storm-breached Fox River landfill spread rubbish and debris across kilometers of rivers, bush and beaches. This was not the first such event, and unlikely to be the last – old dump sites up and down the country are at risk from erosion and inundation. Read more about this threat on page 3.

*Fox River landfill litter
(Photo: S Sanson, DOC)*



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Word from the Chair

Paul Klinac

Kia ora koutou

This is my first Chair's message, and I want to start by thanking Tom Shand for his leadership and continued commitment to NZCS as the outgoing Chair, and to also welcome on board Mark Ivamy as the incoming Deputy Chair.

A meeting of the NZCS executive committee in June provided an opportunity to focus on our strategic planning and associated benefits provided to NZCS members. This work will be shared with members over the coming months, but as the incoming chair this was a timely reminder that the committee is focused on developing the Society in a way that ensures we continue to promote and advance knowledge and understanding of the coastal zone.

This issue of *Coastal News* includes an article on the development of a freely accessible database for storm surge data, future research priorities for marine science, a fanworm incursion into Gisborne port, and solving New Zealand's litter problem. Of particular interest is the discussion on managing landfills along our dynamic shorelines, which is particularly topical following the devastating March floods that exposed an historical landfill site in South Westland. Finally, news from the regions continues to present a diverse summary of national projects and investigations from NZCS members.

Abstract submissions are now open for this year's conference in Invercargill on the 12th to 15th November. The submission deadline for abstracts is the 30th of August. This year's theme of 'Life on the Edge, Mataora kei runga i te Tapatai' will explore the challenges of



living on the edge of the great Southern Ocean and the coastal diversity this creates. The conference will be supported by field trips that are unique to this part of the world, whilst providing an opportunity for scientists, planners and engineers to network and exchange knowledge. With this in mind, I would really like to encourage as many of you as possible to attend this year's conference and be inspired by all that Southland has to offer.

Ngā mihi nui

See page 12 for further information on the 2019 Conference and abstract submissions, or check out the conference page on the NZCS website at www.coastalsociety.org.nz/conferences/nzcs-2/

NZCS Mission Statement

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 currently has over 300 members, including representatives from a wide range of coastal science, engineering and planning disciplines, employed in the consulting industry; local, regional and central government; research centres; and universities.

Membership applications should be sent to the NZCS Administrator Renée Coutts (nzcoastalsociety@gmail.com).

Pollution time bombs – Managing landfill at our dynamic shorelines

Andrew Brown and Tom Shand

Across New Zealand, low-lying coastal lands, river banks and estuaries have been used for landfill, industrial and other waste sites for decades. In some instances, waste has even been used to reclaim land. Over time, the effects of coastal erosion and inundation as well as catchment flooding have resulted in waste becoming exposed, littering our shorelines and marine environment to untold detriment.

In March this year the closed landfill of Fox Glacier Township in South Westland was uncovered as heavy rainfall caused the banks of the Fox River to breach. Hazardous waste has since been transported throughout the estuary and surrounding shoreline. In February last year, the shoreline fronting the old Cobden rubbish tip in Greymouth was eroded by a large storm resulting in thousands of plastic bags and other waste littering the coast. Another example is from 2014 when asbestos was released from the Kaiaua landfill on the Firth of Thames due to storm erosion. The clean-up process from events like this are costly and lengthy, and are made worse by coastal processes moving waste material along and offshore widening the affected area.

In the future this problem is likely to be exacerbated as the effects of climate change cause sea levels to rise and storms to intensify, resulting in greater areas of our shorelines becoming susceptible to erosion. This will ultimately increase the number of sites at risk as illustrated by Figure 1. There is therefore a need to take action to prevent other sites releasing waste to the dynamic and sensitive environment of our coast.

A recent publication by Local Government New Zealand revealed some preliminary statistics for landfill exposure to varying increments of sea level rise across the country. The data, provided by the local councils, identified that nationally there are around 110 closed landfills and two active landfills at only 0.5 m above MHWS leaving them potentially at risk from storm surge inundation and future increases in sea level. Of those 112 sites, Auckland dominates the numbers with responsibility for 88 of them. It is noted that these statistics represent

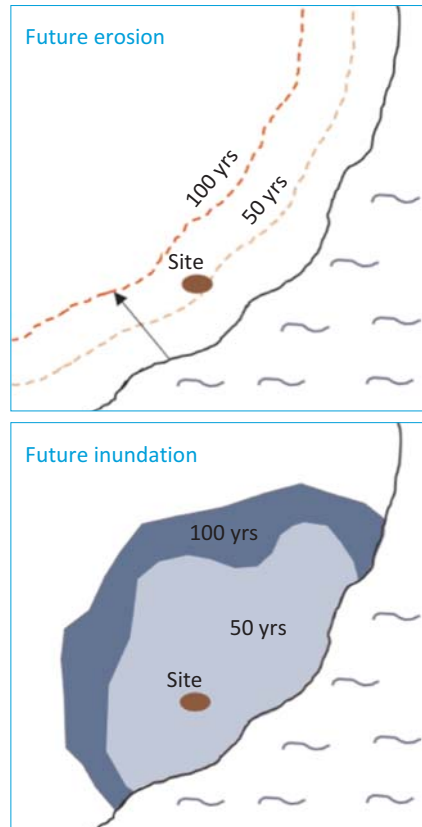


Figure 1: Future vulnerability from erosion and inundation (adapted from CIRIA, 2012).

potential for inundation only and have not investigated erosion, which is likely to have much more severe consequences to the release of waste from inadequately protected sites. They are also likely to have not captured the vast number of unknown historic sites that were created pre-environmental regulation. These sites are the real challenge for the future as their location, boundaries, volumes and types of waste are often undocumented meaning the first time we hear of their existence is when they become a problem.

So what can be done? Well, this is not a problem just faced by New Zealand. In the UK it has been approximated that 1,200 historic landfill sites are at risk from coastal flooding or erosion over the next 100 years. Given the scale of the problem, guidance documents were prepared in 2012 by CIRIA (Construction Industry Research and Information Association) that bring together the complexities of managing landfill sites

and land contamination on eroding or low-lying coastlines. The guidelines recognise the importance of the broad expertise required from coastal scientists, geomorphologists, engineers, contaminated land specialists and planning experts to work with the local councils and communities to find appropriate solutions.

Tonkin + Taylor (T+T) has been involved in supporting government agencies and local councils to solve these complex problems for a number of years. In 2005, with the closure of the Brady Road Landfill in Auckland, T+T rehabilitated the coastal area to create Seaside Park, which later received awards from IPENZ and NZPI. In 2010, T+T supported Dunedin City Council to determine the existing and future risks an historic landfill at Ocean Beach posed. This included developing a range of potential management options over the short, medium and long term. In 2015, three landfills in South Tarawa, Kiribati, located at the coast protected by grouted sandbags were damaged. T+T assessed each of the sites to provide a range of options for closure, land rehabilitation and upgrades to provide sufficient coastal protection. Most recently, in 2018, T+T has helped Moyne Shire Council with two historic landfills located in the eroding sand dunes of East Beach at Port Fairy, Victoria, Australia (see Figure 2).

In the case of East Beach we defined the landfill boundaries, volume and type of waste through site inspections, geophysical surveys, test pits, and interviewing the old landfill operators, as well as reviewing historic aerials and archive records held at council. Using this information the pollutant pathways (i.e.



Figure 2: Daylighting rubbish from the sand dunes at East Beach, Port Fairy (source: www.abc.net.au).

how the waste could be released) were defined to establish the receptors (i.e. public, fauna and flora) at risk. An assessment of the coastal processes and erosion hazard over a range of timeframes and sea level rise scenarios provided the potential present and future risk of exposure. Combining these two datasets (see Figure 3) we were able to determine volumes of waste at risk over a range of timeframes over the next 100 years.

With greater knowledge of the site we were then able to identify and appraise a range of management options. These included:

- status quo 'do nothing', i.e. allowing the coastline to erode with waste material cleaned up on a case-by-case basis;
- removing the waste incrementally up to the different erosion hazard lines (see Figure 4); and,
- breaking the pollutant pathway by creating a barrier to provide erosion protection, e.g. dune stabilisation, beach nourishment, rock revetment, offshore breakwater and groynes (see Figure 5).

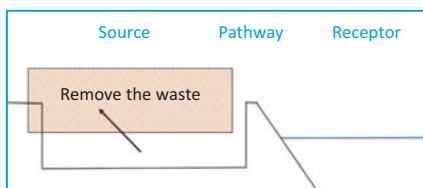


Figure 4: Removing the waste (adapted from CIRIA, 2012).

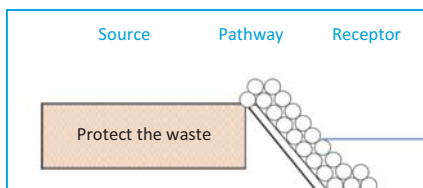


Figure 5: Breaking the pathway by protecting the waste (adapted from CIRIA, 2012).

Each of these options were technically, economically, environmentally and socially appraised with the findings presented to the local council.

To aid decision making, the dynamic adaptive policy pathway (DAPP) tool developed by Deltares (and contained within MfE's Coastal Guidance Manual) was used in conjunction with the option evaluation described above, to provide a number of pathways that could provide the long-term management plan required. This approach recognises that options can be used in combination or concurrently through time to achieve the protection over the long term without over-committing in the short term. Figure 6

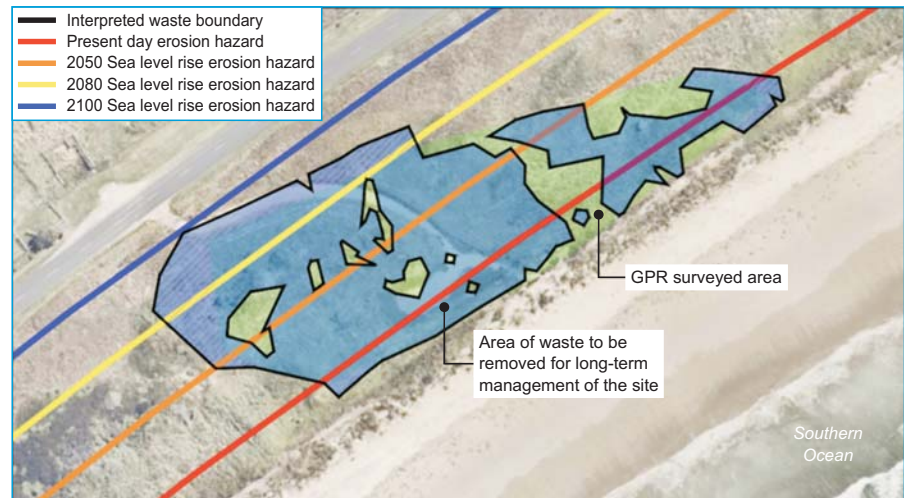


Figure 3: East Beach landfill at risk due to erosion over the next 100 years.

illustrates the possible combinations considered for East Beach where the discontinuation of a line represents a tipping point where the preceding option is no longer feasible. At this point a decision has to be made to move to another available option shown as the circle icons. The dashed lines represent uncertainty in the viability of the option over the given timeframe.

Using this approach, and based on available funding, a number of options were recommended to the local council that included:

- removing a portion of the waste in a trial cell to more accurately determine waste removal and disposal costs;
- extending an existing revetment as a short-term measure to protect the most high risk area; and,
- undertaking and monitoring a beach replenishment campaign to calibrate longshore drift models.

In summary, this article has highlighted the

existing and future problem we face with managing landfills at eroding shorelines. Regional erosion and inundation assessments will help to better define the extent of the problem across New Zealand for those landfill sites that are known. However, more information is needed on the historic (pre-regulation) sites that are largely undocumented and litter our shorelines. Once the extent of the problem is known and sites at risk have been identified, site specific assessments can be undertaken to find the most appropriate solution considering the range of options available. In some instances removing the waste will be possible, but in others protecting the shoreline from erosion may be necessary. In all instances, taking a long-term view and using an adaptive management approach will allow for the uncertainties with climate change effects to be accounted for. By doing this, the most appropriate solutions may be found to remove short-term risk and properly plan for future protection.

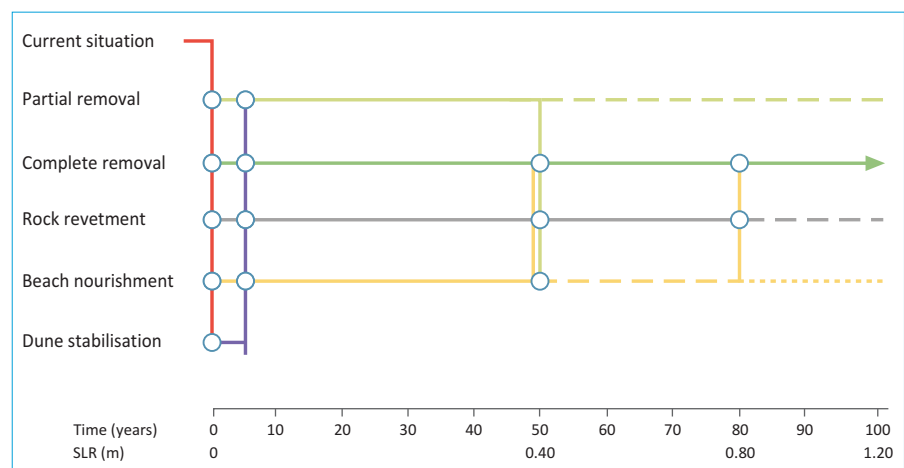


Figure 6: Example of a Dynamic Adaptive Policy Pathway (DAPP) map for East Beach.

Storm surge around New Zealand: From hindcasts to future projections

Laura Cagigal and Giovanni Coco, University of Auckland



Figure 1: Storm of 5th January 2018 in Raglan (Photo: Stephen Hunt).

What is storm surge and why is it important in New Zealand?

Storm surge is defined as the rise of water level generated by a storm over and above the astronomical tide. It is primarily caused by the strong winds generated with a storm and by the influence of sea level pressure changes. As a weather system approaches land, storm surge tends to increase, particularly at the shoreline, resulting in flooding of coastal areas especially when combined with large astronomical tides and wave-induced contributions.

Although storm surge in Aotearoa New Zealand is generally lower than in other areas in the world, as it 'only' reaches maximum values of approximately 0.8 meters compared to 3-9 meters in places such as the Gulf of Mexico or the North Sea, it is still a key contributor to total water elevations that ultimately control coastal flooding in low-lying areas. Furthermore, because of high tides and large storm surge, oceanic waves can approach closer to the coast, release more energy at the shoreline, and exacerbate coastal erosion (Bell et al., 2000). In addition, and as a result of climate change, the rise of sea levels will only increase existing flooding and erosion problems and cause new ones.

In New Zealand, the scarcity of long records and the sparse spatial distribution of tidal

gauges makes it difficult to study the spatial and temporal variability of storm surge. For this reason, we developed a database of storm surge data around New Zealand for both hindcast and projections, and provide the data, free of any cost, to the New Zealand coastal community.

Modelling storm surge

To predict storm surge we need to be able to model how the large-scale global climate patterns relate to local storm surge at the coast. There are two different approaches to address this problem. Dynamical downscaling usually involves running climate models into a subdomain and reproducing the physical processes that ultimately lead to storm surge. The other approach is usually called statistical downscaling and consists of finding a relationship between the large scale weather patterns and the local storm surge.

In this study, performed in collaboration with scientists from the University of Cantabria (Spain), we decided to use statistical downscaling as it is computationally less expensive and it allows us to reproduce long time series over large regions. A similar technique has already been successfully applied to reconstruct storm surges from tidal gauges and from numerical models globally (Cid et al., 2017a; Cid et al., 2017b).

To develop our algorithm, we found a relationship between the daily maximum storm surge from DAC (Dynamic Atmospheric Correction, <http://www.avisio.altimetry.fr/>) and the principal components of the mean sea level pressure fields and gradients from ERA-Interim, a global atmospheric reanalysis from the European Centre for Medium-Range Weather Forecasts (ECMWF). Assuming such a relationship holds in time, we were able to reconstruct the storm surge from 1870 based on the 20th Century Reanalysis (hindcasts). We also developed a storm surge database from the present until 2100 using the output from different Global Climate Models (projections).

Comparing the model against real data

In order to validate the reconstructed time series in the historical period, we made a comparison against 17 tidal gauge records around New Zealand (with data kindly provided by NIWA). Figure 2 shows a two year comparison of both series for Charleston and Kapiti Island. For every tidal gauge, we obtained errors as low as 7 cm (on average) and high, significant correlations.

Dealing with climate change

When we deal with climate change projections, Global Climate Models are the most useful source of information. However, one of the first questions that arises is which of the dozens of available models we should use. The most common approach nowadays is to use multi-model ensembles, but even in that case we need to make a choice on the number and models to use.

To make an informed decision about the models we are using, we performed a ranking of the best models at reproducing the past climatology of New Zealand following the methodology proposed in Perez et al. (2014). This methodology ranked the model ACCESS1.0, produced by CSIRO and the Bureau of Meteorology in Australia, to be the most accurate model to reproduce past conditions, followed by EC-EARTH, developed by a consortium of 11 European countries.

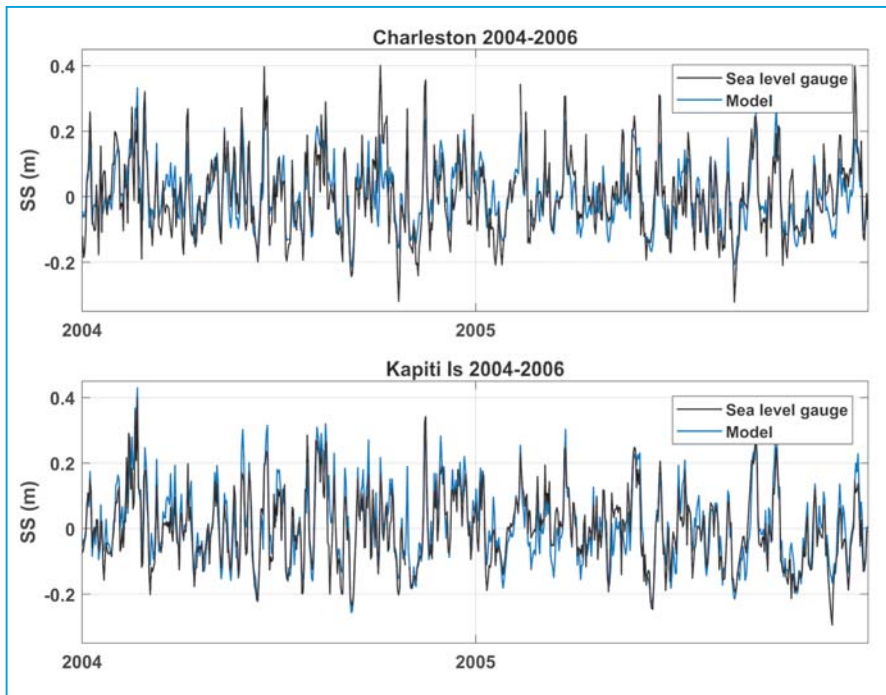


Figure 2: Comparison of model reconstruction against sea level gauge storm surge (data provided by S Stephens, NIWA).

We then generated storm surge time series until 2100 for these two models (we also tried five others to look at the impact of model ensembles). To have a better

understanding of the future storm surge conditions in New Zealand, we compared a 50 year return period level in the future and in the past for the different models and

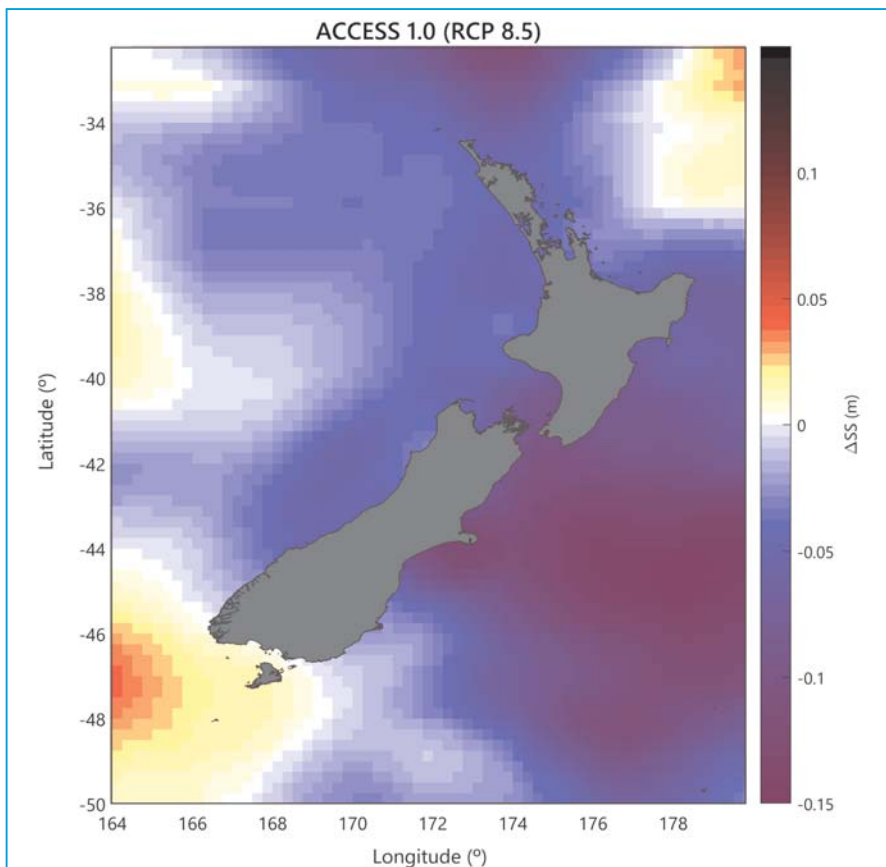


Figure 3: Change in 50 years return level for ACCESS1.0 and rcp8.5 scenario between 2070-2100 towards the reference period 1975-2004.

model ensembles. Figure 3 shows the changes expected in the New Zealand area for ACCESS1.0 under the worst case emission scenario, rcp8.5. Our results are encouraging in the sense that a general reduction of storm surge will be experienced in most areas of the North Island, while an increase will be experienced in some areas of the South Island. It is not all good news unfortunately, since our results also indicate that in the future, larger storm events than previously experienced are likely to occur.

Storm surge data tool

As part of our research, we make all databases freely available. Here we present a storm surge data tool developed with the help of the Centre for eResearch of the University of Auckland. This tool is available online at <https://coastalhub.science/storm-surge> and provides a user-friendly environment to visualize and export all the databases we have generated at $0.25^\circ \times 0.25^\circ$ spatial resolution. This means that data from 1871 to 2100 is available for the area shown in Figures 3 and 4 and for different climate change scenarios and models. Figure 4 explains in detail the different functionalities of the tool and the steps to be followed by the user in order to download the data of interest.

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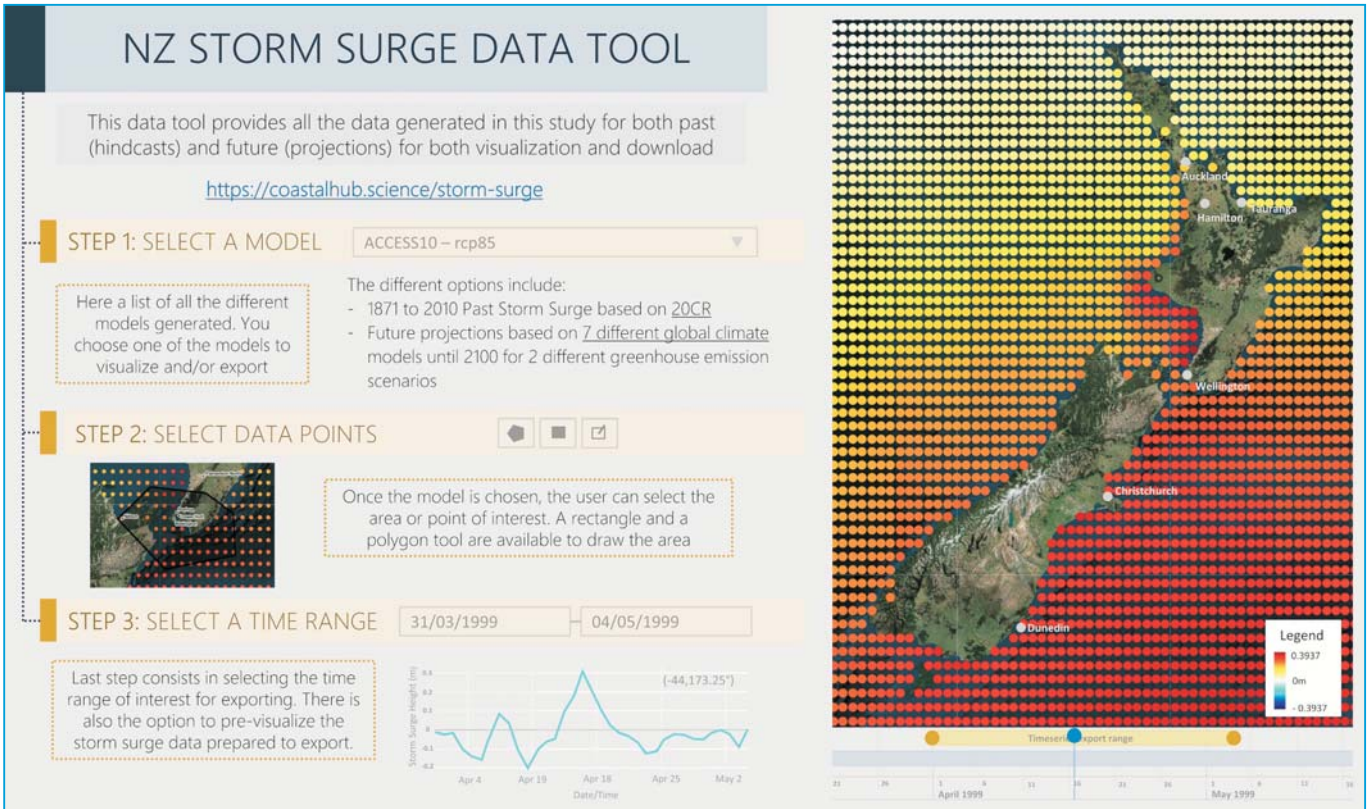


Figure 4: New Zealand Storm Surge Data Tool.

Central government news

Amy Robinson, Central Government Representative

New Zealand Coastal Policy Statement guidance ‘roll out’ continues

A roll out of guidance on the New Zealand Coastal Policy Statement 2010 (NZCPS 2010) is continuing. The Department of Conservation (DOC) has been working with the Regional Councils’ Coastal Special Interest Group, MfE, MPI and other agencies to produce guidance notes on the policies in the NZCPS 2010.

See <https://www.doc.govt.nz/about-us/science-publications/conservation-publications/marine-and-coastal/new-zealand-coastal-policy-statement/policy-statement-and-guidance/> to view the existing guidance.

New DOC guidance notes completed since the last *Coastal News* include:

- Policy 11 Indigenous biological diversity (biodiversity) guidance was published on the DOC website in May 2019;
- Policy 5 Land and waters managed or held under other Acts guidance was released on the DOC website in February 2019;
- King Salmon guidance – was published on the DOC website in January 2019;
- The water policy guidance notes were released on the DOC website in December 2018 and include guidance on:
 - Policy 21 Enhancing water quality,

- Policy 22 Sedimentation, and
- Policy 23 Discharge of contaminants.

New guidance is currently being developed for:

- Policy 12 Harmful aquatic organisms.

The existing guidance is being refreshed for:

- Policy 13 Preservation of natural character, and
- Policy 15 Natural features and natural landscapes

in light of the implementation experience since the *King Salmon* case.

For further information, contact Karen Bell, kbell@doc.govt.nz or 027 5570 579.

Newsletter archive & downloads

Back issues of *Coastal News* (from 1996 onwards) are available to download from the Society’s website at www.coastalsociety.org.nz (under the ‘Publications’ tab). Also available for download are author and article indexes for issues 1 to 65 (these will be updated each year), a Contributor’s Guide to writing articles for *Coastal News*, and copies of the three NZCS Special publications – *Rena: Lessons learnt* (2014); *Adapting to the consequences of climate change* (2016); and *Shaky shores: Coastal impacts & responses to the 2016 Kaikōura earthquakes* (2018).

The March 2019 fanworm incursion into Gisborne Port

Murry Cave

When late on the 6th of March 2019 I heard of a man-overboard incident off Tolaga Bay, I didn't think much about it apart from wondering how someone could fall overboard in such benign conditions.

But when I arrived at work early the next day I was advised by our newly-appointed Harbour Master that the yacht involved had been towed into the marina and found to be infested with the Mediterranean fanworm (*Sabella spallanzanii*). This triggered an emergency response under the Regional Pest Management Plan and the Biosecurity Act. Our Integrated Catchments biosecurity team was activated to deal with the incursion and Maritime New Zealand and MPI Biosecurity advised.

We then headed to the marina to assess the situation. Our first problem was that the crew had disappeared leaving the boat apparently abandoned. The yacht was boarded and inspected. Alarm bells rang when a military grade semi-automatic shotgun and a handgun were found unsecured in the cabin. An inspection of the hull confirmed the presence of an extensive infestation of *Sabella* and the decision was made to urgently remove the yacht (SV Wahoo) from the water.

A number of significant safety issues were also identified, which included the main motor being inoperable with the crew relying on a dinghy motor bolted to the stern boarding ladder as the only motive power. As the yacht was reported to be bound for Brazil, the lack of food and water raised further concerns, as did the lack of charts and navigational aids on board. Our safety concerns were forwarded to Maritime New Zealand who elected to detain the vessel pending a full safety survey.

At the same time we enacted our rules under the Regional Pest Management Plan. These rules included the following:

- All vessels entering Gisborne waters must be sufficiently cleaned so that they have no more than a slime layer on the hull,
- GDC will undertake control of these pests should they arrive in the district, and

- GDC's Regional Pest Management plan allowed for the Council to use s.100v of the Biosecurity Act to instigate emergency control of new incursions of the pest organism.

This drove our decision to remove the yacht from the water. Both of the operators of the travel lift were away on holiday so a crane was mobilised to lift the yacht and put it into a secure hardstand. The yacht was warped across to the lift out point and preparations made to lift the yacht. The crane and a dive crew arrived at around the same time.

At this point the crew also arrived with a local gang member in tow. They were advised that the vessel was detained and would be lifted. They were not keen on this option, but also did not want to be formally identified or interviewed although they relented the following day and were duly interviewed by Maritime New Zealand and our Harbour Master. The results of the interviews did not provide much comfort. At the same time, the biosecurity team and Eastland Port staff mobilised to remove the fanworm and other material from the hull.

It transpired that the crew had been engaged by the vessel's owner in Brazil and he had paid US\$7,000 to the crew to prepare the yacht for the voyage and this included motor repairs, new house and engine batteries, hull cleaning, and paying for outstanding marina fees in Auckland. None of these things were



The SV Wahoo being lifted from the water (Photo: Murry Cave).

done. To provide motive power, a fitting was bolted to the transom so that the dingy outboard could be used as an auxiliary. This also meant that the wind vane could not be used for steering. Food supplies would have been suitable for one to two weeks and water supplies were restricted to sixteen 1-litre water bottles.

Consequently we were faced with a yacht sitting on the stand with no real idea about who was in charge of the vessel and what was going to happen next. Attempts to meet



The hull of the SV Wahoo prior to cleaning and antifouling treatment (Photo: Phillip Karaitiana).

with the two crew always resulted in no action and eventually they did not respond to emails, texts or Facebook messages. Communication was then finally established with the owner in Brazil, but the tyranny of distance did not assist clarity.

Ultimately the owner, Felipe Gomez, arrived from Brazil and he was able to provide appropriate information and documentation that allowed for us to establish who was in the right and we were able to approve the release of the vessel and after further cleaning and antifouling it was returned to the water.

It was great to see the local community step up to help once it was clear what the story was. A local diesel mechanic provided his labour free to fix the motor and the local radio communications specialist also helped out. The Port came to the party and the Council wrote off much, but not all, of its costs. Finally, on the 8th of May, Felipe slipped his mooring and steered SV Wahoo to Auckland where it will be loaded onto a ship for transport to Brazil. I'm not sure if we'll get back any of our costs, but ultimately



Cleaning underway on the hull of the SV Wahoo (Photo: Murry Cave).

quick action averted a \$100,000+ ongoing monitoring and decontamination cost, so I guess it was money well spent.

There were plenty of things we learnt:

1. Quick action is vital
2. Multi-agency co-operation is critical
3. A rigorous investigation is always necessary, and

4. Expect the unexpected!

Next steps

The incident made me realise that we needed someone with a marine biosecurity mandate on the team and I am hoping to appoint someone to our team with the appropriate skills over the next couple of weeks.

NZCS Regional Representatives

Every region has a NZCS Regional Representative who is available to help you with any queries about NZCS activities or coastal issues in your local area. If you are interested in becoming involved as a regional representative, please get in touch with Paul Klinac (paul.klinac@aucklandcouncil.govt.nz).

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New report identifies research priorities for the future of marine science

Rebecca Jarvis and Tim Young, AUT

There are massive knowledge gaps regarding how our New Zealand marine environment functions, and how best to manage it. To address the deficit, two Auckland University of Technology ecologists went to New Zealand's marine science community and asked them to prioritise the key areas needing research. Invitations were made through the NZ Coastal Society and NZ Marine Sciences Society mailing lists, and private email. Dr Rebecca Jarvis and Dr Tim Young received responses from 244 marine-based researchers across various disciplines who submitted 322 research questions. These were clustered and prioritised into nine research areas, with the top 10 most pressing questions for each. The research areas are:

- Climate change
- Fisheries and aquaculture
- Biosecurity
- Marine reserves and protected areas
- Ecosystems and biodiversity
- Policy and decision making
- Marine guardianship
- Coastal and ocean processes
- Other issues caused by human activity.

The report, just being published in the journal *Marine Policy* (<https://www.sciencedirect.com/science/article/pii/S0308597X18309059>), is aimed at industry, tangata whenua, researchers, policy-makers, communities, New Zealand citizens, and funding bodies.

This new research fostered a collaborative multidisciplinary approach towards setting priorities to help deliver a wide range of benefits for New Zealand's marine

environments and its people. Drs Jarvis and Young hope the questions will be used to drive the development of new and important research areas, complement ongoing science initiatives, encourage collaboration, and guide the formation of inter- and trans-disciplinary teams dedicated to working towards these priorities.

The priority research questions posed in Jarvis and Young's study may also be relevant to four of the government's 10-yr National Science Challenge (NSC) programmes (i.e., Sustainable Seas, Our Land and Water, Deep South, New Zealand's Biological Heritage). The authors say that many of the issues raised in their study by the scientific community are multifaceted and inextricably linked with various activities on land and in the water, providing strong support for intertwining research across some of the Challenges programmes.

"New Zealand is currently undergoing a progressive change in the dynamics of how research can be conducted at different scales for greater national benefit, and within a comprehensive framework. This is a crucial step forward to future-proof our environment, economy, and society. It is very exciting to think about how the research questions identified by the New Zealand marine science community can help deliver benefits to New Zealand while complementing the various objectives and goals of different Challenges. Investments in answering these questions will undoubtedly lead to new knowledge, enabling better-informed decisions to be made around the management of our coastal and marine systems for the future."



At the beginning of a new era in recognition for the importance of a healthy world ocean, this New Zealand-based survey is also highly relevant for the newly announced United Nations Decade of Ocean Science (2021-2030). The UN aims to support efforts to reverse the cycle of decline in ocean health and gather ocean stakeholders worldwide behind a common framework that will ensure ocean science can fully support countries in creating improved conditions for sustainable development of the ocean. New Zealand will play an important role in realising these goals.

There may also be some golden nuggets in the report useful for prospective graduate research students thinking about embarking on a marine science based project that can deliver impact!

Reference

Jarvis, RM, and Young, T (2019). Key research priorities for the future of marine science in New Zealand. *Marine Policy*, doi: [10.1016/j.marpol.2019.103539](https://doi.org/10.1016/j.marpol.2019.103539)

Web links

Link to the Journal Article:
www.sciencedirect.com/science/article/pii/S0308597X18309059

Link to the the Policy Brief:
tiny.cc/PolicyBrief

For a pdf copy of the article and/or policy brief, please contact rjarvis@aut.ac.nz or tyoung@aut.ac.nz

Key research priorities for the future of marine science in New Zealand



Fisheries & aquaculture



Biosecurity



Climate change



Marine reserves & protected areas



Ecosystems & biodiversity



Policy & decision-making



Marine guardianship (kaitiakitanga)



Coastal & ocean processes



Other anthropogenic factors



Intelligence to solve New Zealand’s litter problem

Camden Howitt, Sustainable Coastlines

Litter is a major risk to New Zealand’s people, culture, environment and economy, especially when it enters the marine environment. A 2018 World Bank report ranked New Zealanders as the tenth highest producers of urban waste per capita in the world, with Kiwis producing over 3.6 kg of waste per person every day. These figures are shocking to most people who call Aotearoa home.

To help solve this challenge, charity Sustainable Coastlines is leading Litter Intelligence, a long-term programme that collects data, provides insights, and inspires action for a litter-free Aotearoa. Launched in May 2018, the programme is funded by the Ministry for the Environment’s Waste Minimisation Fund and works in close collaboration with Statistics New Zealand and the Department of Conservation.

As New Zealand’s first national litter database, Litter Intelligence is helping build a better understanding of the problem by filling gaps in national data. As the data comes in, Microsoft technologies crunch the numbers, providing powerful insights and

employing data visualisation tools to tell the story. On top of the data and insights, the charity has curated a wide selection of locally-relevant actions that provide the inspiration and tools to help people around the country take action for a litter-free Aotearoa.

To collect and input litter data long term, Sustainable Coastlines is engaging communities around Aotearoa, providing the training, equipment and technology required for people to take part in the programme as ‘Citizen Scientists’.

By working to a United Nations Environment Program/Intergovernmental Oceanographic Commission methodology, data is collected at the highest standard of scientific rigour, allowing it to be used for national, regional and international reporting, including the relevant Sustainable Development Goals.

The technology is available now, and new features and functionality are being added as the programme progresses. Having recently won one of Microsoft’s sought-after AI for Earth grants, the charity is integrating artificial intelligence and other smart

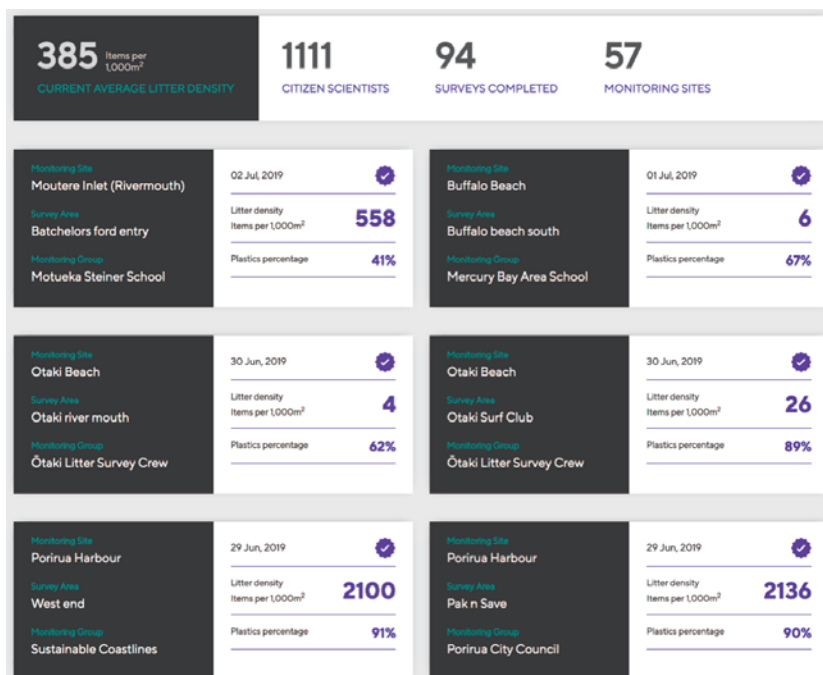
technologies to provide an even better understanding of the problem and how to solve it.

Sustainable Coastlines is taking Litter Intelligence into schools, building a ‘fence at the top of the cliff’ to help solve the litter problem long term. The charity’s new litter education programme is being piloted in schools in Gisborne and Auckland, and aims to inspire and enable educators and their students to take action on litter solutions while gaining curriculum credits.

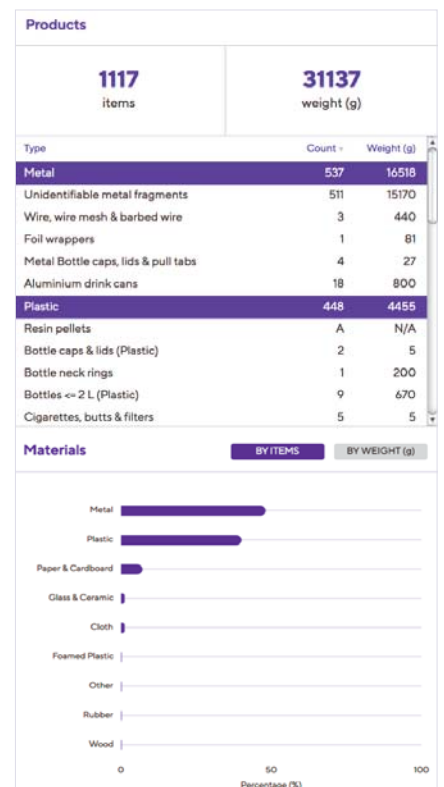
As the education programme develops, schools around the country will be invited to be involved, with training and support offered for teachers.

All data are freely, openly and publicly available through the purpose-built Litter Intelligence digital platform, giving politicians and business leaders, students and scientists, writers and researchers the right information to take action for a litter-free Aotearoa.

For more information on Sustainable Coastlines and Litter Intelligence visit www.litterintelligence.org



On the Data page of the website you can browse recent litter surveys submitted by Citizen Scientist ‘Monitoring Groups’ (top); clicking on a ‘Monitoring Site’ brings up detailed results on the nature and quantity of litter found at the site (shown right for Moutere Inlet).



2019 NZCS Annual Conference: 'Life on the Edge – Mataora kei runga i te Tapatai'

12-15 November 2019, Invercargill

The New Zealand Coastal Society Conference is your annual opportunity to share knowledge across a range of coastal management topics and meet with peers from around New Zealand.

The 2019 Conference explores the theme of living on the edge of the great Southern Ocean and the challenges and diversity that this creates. From the striking fiords representing the raised sides of Te Waka o Aoraki in Fiordland, to the pounding surf coast of Te Waewae Bay where Takitimu's voyage came to an end, life clings on, however precariously, adapting and thriving. This diversity and tenacity resonates throughout the coastline with a sense of adventure and kaitiakitanga/guardianship in those who reside here.

The concept of life on the edge ties past, present and future as we reflect on the roots that have held us strong, but also look to the future and how we must adapt to ensure survival in the coastal environment.

The 2019 conference in Invercargill aims to celebrate the bountiful islands and diverse stretch of coast that is Southland,

the challenges faced in these environments, and the people and species that call this unique part of the world home. It will provide a unique opportunity to meet and mingle with coastal professionals, local bodies, and policy makers and we encourage students, iwi, community groups, and professionals to attend and share your latest projects and/or research.

Abstract submissions now open

We are looking for a diverse group of presentations and posters that delve into issues related to our understanding of the important relationships between the land and the sea – how what we do on land influences our coastal and marine environment. The six conference themes listed below encourage cross-disciplinary contributions from the broad range of practitioners and community members interested in New Zealand's coastal environment:

1. Coastal Science
2. Coastal Hazards
3. Sea Level Rise, Climate Change and Resilience

4. Coastal Engineering
5. Coastal Planning and Integrated Management
6. Coastal Communities, Cultures and Livelihoods.

The conference will feature oral presentations as well as a vibrant poster session. We encourage you to think of how your proposed conference contribution can fit within one of these themes. We would also like to actively encourage submissions related to Mātauranga Māori and traditional aspects of coastal land use and resource management.

To submit an abstract, download the submission form from the conference website (www.coastalsociety.org.nz/conferences/nzcs-2/), fill it out, and email it to: nzcsconference@gmail.com – the deadline is **Friday, 30 August 2019**.

More information regarding the conference, schedule, travel, field trips and sponsorships will be added to the conference website soon. For any queries, please contact the NZCS Administrator at nzcoastalsociety@gmail.com

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News from the regions

Northland

Laura Shaft, Regional Representative

Mediterranean fanworm incursion in Opuā

In July 2018, a fanworm was discovered on a mooring near Opuā Marina in the inner Bay of Islands. That same month, a biosecurity response included dive checks that removed over 100 fanworms, up to 70 cm in length (several years old), from the Opuā Marina and surrounding area. In April 2019, a second round of dive surveys removed over 230 fanworms. Other areas were surveyed in the Bay of Islands with no fanworm found. Northland Regional Council (NRC) is working with the Ministry for Primary Industry (MPI) and science experts to determine the next steps of the incursion response. Opuā is the busiest port of entry in Northland (and a significant port of entry to New Zealand overall) as well as one of the most popular areas for recreational boating and tourism.

Dune planting winds up at Waipū Cove

For the past six years Waipū Primary School has been planting the dunes as part of a project to restore some of the natural function of the dunes that protect the heavily used camp and reserve. Each year another 100 m section has been reshaped then planted out with native sand-binders provided by NRC. Local businesses have funded the reshaping, work for which the Waipū Cove Domain Board holds a consent from NRC. This June the most northern section was planted out with 1,450 spinifex and pingao.



Waipū Primary School students, teachers and parents help plant out the dunes at Waipū Cove (Photo: NRC).

Kaitiaki programme helps protect Karikari beaches and dunes

A Kaitiaki Ambassador Programme ran over the summer in the Karikari Peninsula area in

response to a number of incidents and concern from the community related to issues such as damage caused by vehicles in the dunes and non-responsible freedom camping. Ngāti Kahu, in conjunction with the four local marae, chose two 'Kaitiaki Rangers' from each marae to ensure a Mana Whenua presence. From Christmas through Easter the rangers patrolled the Karikari area daily, talking with campers and beach users, providing them with information, and reporting incidents. Feedback from the community has been extremely positive and incident reports to all agencies for the area have been significantly lower than in previous summers. The programme is a collaboration between Far North District Council, Department of Conservation, Ngāti Kahu and Northland Regional Council with funding from the Ministry of Business Innovation and Employment.



The Kaitiaki Rangers and DOC staff with one of the ranger vehicles and certificates for one of the training courses they completed as part of the programme (Photo: NRC).

Auckland

Lara Clark, Greg Munford, Colin Whittaker and Matthew McNeil, Regional Representatives

A number of coastal structure renewal and new works projects have recently been undertaken around the Auckland Region. This includes the Shelly Beach foreshore upgrade project, outlined below.

Shelly Beach foreshore upgrade

Shelly Beach is a small settlement located on the southern Kaipara Harbour. The site was previously characterised by a perched shelly beach, with stacked rock groynes in poor condition. Mature mangroves had established at the beach's northern end, due to protection provided by a rock breakwater

structure. An all-tide boat ramp and wharf extend off the beach.

The aim of the Auckland Council project was to address beach erosion, and to improve amenity values for beach and reserve users.

The project involved removing the existing groynes, removal of a section of the breakwater, and removal of adjacent mangroves to enable beach re-establishment. A stabilised sediment backstop seawall and stabilised sediment groynes were constructed. The beach was then re-nourished with sand sourced from the Kaipara Harbour, with existing shelly beach sediment scraped off prior and placed on top of the imported sand.

Coastal erosion study

Auckland Council has commissioned a regional Coastal Erosion Study, due for completion in December 2019. The project will determine areas susceptible to coastal erosion under a range of planning horizons and sea level rise scenarios, aligned with national guidance. The project outputs are intended to assist communities' and Council's understanding of coastal hazards and long-term risk. The results will form a key evidence base for Council's Coastal Plan initiative, and long-term adaptation strategies for the entire Auckland coast.

Coastal inundation mapping update

Regional updates are currently underway to Auckland Council's coastal inundation mapping. The updates will refine understanding of coastal inundation extents by using a new regional elevation model produced from recently flown LiDAR data. The inundation mapping is also being extended to include Great Barrier Island, which was excluded from earlier studies due to insufficient data inputs. The projects are due for completion by November 2019.

Orewa seawall application

Auckland Council has recently appealed a resource consent application decision to the Environment Court (as the applicant), for a proposed 600 m long seawall to be constructed adjoining the Council esplanade reserve, which runs north-south between Kohu Street and Marine View at Orewa Beach. The application includes provision for

a pedestrian path (landward) and beach access ways at various locations to improve access along and onto Orewa Beach. Included is provision for beach sand transfers to the area seaward of the proposed seawall to improve amenity, and access to provide an additional storm buffer to the seawall acting as backstop protection. A decision is expected in September/October 2019.

Waikato

Christin Atchinson and Jacqui Bell, Regional Representatives

Shoreline management plans

Thames Coromandel District Council (TCDC) has taken a major step forward in the delivery of their Coastal Management Strategy with the appointment of international consultancy Royal Haskoning DHV (RHDHV) to support the development of Shoreline Management Plans (SMPs). RHDHV, an independent engineering and project management consultancy, has been awarded the \$1.9M contract, as part of the \$2.6M total budget, for what will be a milestone three-year project for TCDC and New Zealand more broadly.

While SMPs have previously been developed in a couple of other locations in New Zealand, the work TCDC is doing is distinct in that they are developing SMPs across the whole district through active involvement of all key stakeholders along the beautiful yet fragile coastline. These plans and subsequent action plans are a key outcome of TCDC's Coastal Management Strategy. SMPs will provide a large-scale hazard assessment of flooding and erosion issues and identify subsequent risk to people and the environment for the coastline over the next century. SMPs also identify the possible interventions for managing those risks in a sustainable manner. Read more about what's involved with TCDC's Coastal Management Strategy at www.tcdc.govt.nz/Your-Council/Documents-incl-Bylaws-Policies-and-Strategies/Coastal-Management-Strategy/

RHDHV has a strong understanding of the SMP process, having developed several of the first- and second-generation SMPs in England and Wales, and more recently undertaken a whole of New South Wales coastline risk assessment in Australia. The consultancy, which has offices in 30 different countries, has established an office on the Thames Coast for this three-year project, for

which it has assembled a consortium that includes the Coastal Management Collective in New Zealand and EMM Consulting in Australia.

The SMPs for Thames-Coromandel will be developed using Ministry for the Environment Guidelines for Councils (www.mfe.govt.nz/climate-change/climate-change-guidance/guidance-local-government-preparing-climate-change), which take into account a 1.88 m sea level rise by 2150, and by using the Dynamic Adaptive Pathway Planning (DAPP) tool, which sets out how to prepare for coastal change. The plans go beyond traditional asset management and include understanding the coastal environment more holistically, including the connections between people, catchments and waterways, landscapes, estuaries, and beaches.

Kaiaua coastal hazard management

A year on from the storm event that hit the Kaiaua Coast, including Pukorokoro/Miranda, Hauraki District Council (HDC) has taken a major step forward in finding a long-term strategy to managing coastal hazard risks, including sea level rise, in the area. The storm caused widespread flooding to around 240 homes and surrounding farmland when a king tide, combined with a low pressure system, swept through the area on 5 January 2018.

Funding has recently been approved for the appointment of environmental management experts Mitchell Daysh to work alongside the relevant councils (Waikato Regional and Waikato District councils), technical experts, and with the affected communities, iwi and other stakeholders. This work will result in a jointly developed and community-led strategy that will describe how the HDC will respond to coastal hazard risks in the future, recognising that the knowledge about these risks may change 10, 20 and 100 years down the track.

Coastal Inundation Tool version 2

The Waikato region's low-lying coastal areas are susceptible to inundation from tides, storms and projected sea level rise. The purpose of the Coastal Inundation Tool is to see what areas may be subject to inundation, and to identify those areas where we need to better understand the extent of the effects of inundation. Further information and the tool can be accessed at:

<http://waikatoregion.govt.nz/services/regional-services/regional-hazards-and-emergency-management/coastal-hazards/coastal-flooding/coastal-inundation-tool>

A new version of the Coastal Inundation Tool will be available by August, which will be more user friendly and functional. Version 2 is being developed by an external consultant (GBS), but is a collaborative project between WRC, the Bay of Plenty Regional Council (BOPRC), and Environment Canterbury. The aim of the new version is also to be more compatible with other Regional Council software to enable their own Coastal Inundation Tool for their region. Contact Rick Liefing at WRC or Mark Ivamy at BOPRC for more details.

Mussel spat catching proposal for Mercury Bay

Waikato Regional Council (WRC) is processing a resource consent application for a 30 hectare mussel spat catching farm in Mercury Bay. The proposed farm would be the first farm of its type in the Mercury Bay area. The application was publicly notified and attracted about 200 submissions. The matters raised in submissions are currently being worked through, and a hearing is expected to be held by the end of this year.

Marine biosecurity update

The WRC annual marine pest survey was undertaken on the west coast of the Waikato region in Whaingaroa (Raglan), Aotea and Kawhia harbours, and at various locations around the Coromandel Peninsula (from Colville on the north-western Coromandel Peninsula to Whangamata on the eastern Coromandel Peninsula, including Cuvier Island). The results showed that no new pests were found.

Regional Estuary Monitoring Programme (REMP) sedimentation measurements, results and review of methodologies

WRC has published a technical report (TR 2019/04) on sedimentation as part of the REMP. Sedimentation within estuaries is a natural process, but excessive sedimentation can lead to poor ecological health. To track patterns of contemporary intertidal sedimentation, WRC has been monitoring sediment accumulation rates (SAR) in the Firth of Thames and Whaingaroa (Raglan) Harbour since 2003 as part of an estuarine State of the Environment (SoE) monitoring programme. The programme measures

sediment depth above plates buried in the intertidal flats. The purpose of these measurements is to track SAR in each estuary and to pair the measured SAR with monitoring of ecological health. This report analyses the WRC SAR monitoring to assess the suitability of the methodology, including spatial distribution of plates, temporal distribution of measurements, and longevity of the plates. Sedimentation rates at each monitoring site have also been derived from the measurements. The purpose of this analysis is to determine if the sedimentation monitoring programme has been effective and to establish principles around which a standardised sedimentation monitoring programme can be designed in the future, for the purposes of both SoE monitoring and for implementation of monitoring set out in Sea Change 2016. The analysis found that sedimentation rates are highly variable, with areas of both erosion and accretion. This spatial variation in SAR can be tentatively related to the spatial distribution of hydrodynamics in each estuary. Sedimentation plates are effective at measuring annual rates of SAR, providing the plates are set out with an appropriate spatial array that takes into account the spatial distribution of hydrodynamics and are measured annually at regular intervals for at least ten years. Simple guidelines for installing the plates and a standardised methodology are also outlined in this report. The full report can be accessed at: www.waikatoregion.govt.nz/assets/WRC/Services/publications/technical-reports/2019/TR201904.pdf

Measuring sediment grain size

WRC science staff have published a paper related to measuring sediment grain size and associated estuarine health. The study areas include the southern Firth of Thames, Whaingaroa (Raglan) Harbour, and Tairua Harbour.

Sediment grain size, and specifically changes in the percent mud content (i.e. the fraction <63 µm) over time, is often used as an indicator of estuarine environmental health. Using sediment samples from three distinct estuarine systems, it is determined that different analytical methods (laser diffraction and wet sieving) gave significantly different results in terms of percent mud content. These differences are also ecologically meaningful when considering the influence of mud on estuarine macrofauna. The

authors propose an approach to measuring sediment grain size termed Environmentally Available Sediment (EAS), which advocates for the measurement of the sediment that biota are directly exposed to. For the purposes of environmental monitoring, it is also essential to monitor sediment grain size in a repeatable way that is likely to be achieved using consistent (or no) pre-treatment and the use of a measurement technique that is unlikely to change over time, e.g. wet sieving. The paper can be accessed at: www.tandfonline.com/doi/full/10.1080/00288330.2018.1553192

Bay of Plenty

Jonathan Clarke, Kieran Miller and Josie Crawshaw, Regional Representatives

Tauranga Harbour coastal hazard mapping

Tauranga City Council and Western Bay of Plenty District Council released coastal erosion maps for Tauranga Harbour in April. The mapping was completed by Tonkin + Taylor and shows potential and likely erosion hazard areas over current and future timeframes. The modelling behind the maps includes both coastal erosion and cliff instability processes and allowances for climate change. A series of public drop-in sessions were facilitated over the month of May for residents to ask questions of the experts and also share their concerns. This process has led to a better understanding of coastal hazards and also provided an important opportunity for Council to listen to the community (www.tauranga.govt.nz/living/natural-hazards/understanding-our-hazards-studies-and-available-data/coastal-erosion/coastal-erosion-in-the-inner-harbour).

Both Councils are planning to release the coastal inundation maps for Tauranga Harbour later this year once the NIWA modelling is finalised.

Emerging organic contaminants (EOCs) in Tauranga Harbour

Emerging organic contaminants (EOCs) are natural or manufactured chemicals in household personal care products, pharmaceuticals and agrichemicals; their use and discharge to the marine receiving environment is largely unregulated. The risk these unregulated contaminants pose to estuarine ecological health may be significant. However, it is currently poorly understood how widespread EOCs are in our estuarine environment. This summer Bay of Plenty Regional Council has joint teams with Streamlined Environmental and Northcott Research Consultants on a state of the environment monitoring programme that has investigated the presence of emerging organic contaminants in Tauranga Harbour estuary and river sediments and estuary water (through the use of passive samplers).

Te Pā Ika saltmarsh reconstruction project Maketū Estuary, Western Bay of Plenty

Locally known as Te Pā Ika, this 20 ha area is situated at the upper extent of Maketū estuary. Te Pā Ika has been highly modified over the past century through development of drainage canals and stopbanking around its perimeter to allow the land to be utilised for seasonal livestock grazing. As part of the Kaituna River Re-diversion and Maketū Estuary Enhancement Project, Bay of Plenty Regional Council acquired the land with the aim to restore ecological values of the site by removing stopbanks, filling drains, and contouring existing and imported material to support the establishment of saltmarsh habitat. A significant replanting programme will be undertaken over the next three years to create a range of habitats from estuarine rushland to terrestrial coastal shrubland.



Te Pā Ika saltmarsh, situated at the upper extent of Maketū estuary (Photo: BOPRC).

University of Waikato Maketū Estuary monitoring

The University of Waikato's CAPSTONE degree has developed an annual student monitoring programme within Maketū Estuary and the associated wetland restoration projects. Students will be undertaking vegetation monitoring at Te Pā Ika wetland, a 20 ha saltmarsh creation project associated with the Kaituna river re-diversion and Ngatoroirangi/Maketū Estuary enhancement project and at Papahikahawai island. This will involve establishing transects and quadrats to collect baseline information and compare changes in vegetation cover after the restoration has been completed. Students will also monitor and report on survival rates of salt marsh and other terrestrial coastal shrubs planted as part of the Te Pā Ika revegetation programme. The first monitoring took place in March 2019. Monitoring was conducted across the estuary and in the coastal vegetation. Small project teams have investigated a range of ecological indicators, including vegetation, sediments + pH, water quality, macrofauna/bivalves, plankton, fish and microplastics.

The project outcomes for BOPRC and the community include greater information gathered on the success of the Kaituna re-diversion project, and the opportunity for Waikato University students to be part of a long-term monitoring programme that complements the re-diversion consent monitoring programme.

Pukehina Beach soft engineering

After an erosion event in July 2018 the Pukehina Beach Ratepayer Association (PBRA) notified works under their resource consent, which allows sand push-up as a form of soft engineering to protect approximately 12 houses along the beach.

In early May 2019 a contractor began works to build a sacrificial dune in front of the 12 beach front houses. First, all the old erosion protection structures were removed – most dated back to the 60s and were starting to become a problem when trying to build self-sustaining dunes. Five truckloads of tyres, concrete and wood were removed from the frontal dune. Two bulldozers and an excavator worked for three days pushing up sand and shaping the new dune. Two weeks later, once the sand had settled and the elements had reshaped the sacrificial dune, landowners and the Pukehina Beach



Pukehina Beach soft engineering (Photo: Paul Greenshields, BOPRC).



Pukehina Beach community planting (Photo: Paul Greenshields, BOPRC).

community worked together to plant the top edge of the dunes with Spinifex and Pingao. It is hoped that these plants will establish and provide increased function of the dunes when the beach is in an accretion phase.

Te Tumu urban growth area

Tauranga has experienced considerable growth over the past 30 years, and is projected to continue growing. Seven urban development areas have been identified around the western Bay of Plenty to cater for this as part of a long-term SmartGrowth strategy. Te Tumu is one of these areas. Located in Papamoa East, Te Tumu is bounded by the Pacific Ocean to the north, and the Kaituna River and farmlands to the south. It's a place of great historic and cultural wealth, both for tangata whenua, and for European settlers who have lived and worked on the land since the 1800s.

The vision is for Te Tumu to be a coastal community that celebrates its significant history and environmental richness. It is estimated approximately 400 ha of the 740 ha of land at Te Tumu could be developed. The remaining 340 ha would be protected to preserve the natural and cultural history of the area, and protect the community from natural hazards. Te Tumu will provide new housing for more than 15,500 people, with residential development aiming to start in 2023.

Tsunami Hikoi

Whakatane and Opotiki District Councils got behind the national Tsunami Hikoi event in March. Whakatane District Council staff and Emergency Management Bay of Plenty (EMBOP) organised a Tsunami Hikoi to encourage people to prepare for evacuation to higher ground should natural signals (prolonged earthquake) occur or a tsunami alert be given. The Tsunami Hikoi in Whakatane started at Wharaurangi and ended at Waiewe Camellia Park and encouraged local schools to participate. Ōpōtiki Primary School also practiced their tsunami evacuation route to raise awareness about what might happen if an earthquake or tsunami event occurred in the Ōpōtiki district and the plans each person and whānau has in place to get inland or to higher ground. Both Tsunami Hikoi events were held in mid-March.

Hawke's Bay

José Beyá, Regional Representative

Cape Kidnappers landslide (update from last edition)

Cape Kidnappers beach was reopened after the landslide site was re-inspected at the end of May. Hastings District Council (HDC) confirmed that the site risks had been assessed and made the decision to re-open the beach. The area will be monitored on an ongoing basis. The Department of Conservation access and facilities will remain closed until a Quantitative Risk Assessment is completed, which is expected to be in September or October.

Clifton revetment

(update from last edition)

The civil works were completed in March 2019, but minor landscaping and signs are still remaining to finish the project.

Beach scraping at Haumoana

HDC has applied for a resource consent to carry out beach 'scraping' for temporary and minor emergency repairs on the gravel barrier crest at Haumoana.

Beach scraping typically involves the relocation of sediment from the active part of a beach. As part of the consent conditions, the scraping volumes will be less than 1,500 m³/year and, as a mitigation measure, nourishment equal to the scraping volumes will be placed updrift of the works.

Whirinaki outfall leak
(update from last edition)

The last (third) attempt to repair the pipe was successful when a polyethylene pipe with a 30 mm wall thickness was pulled through the original pipe and connected to an extension. This provided a more robust solution than the earlier consideration to either patch the holes or use a flexible liner.

Hardinge Road coastal protection

Works to protect the coast along Hardinge Road in Napier occurs every few years and is carried out by the Napier City Council (NCC). The latest works were undertaken in June 2016, with new works starting in July 2019. These involve placing limestone boulders along the existing rock protection and repairing damaged areas (see Figure 1 and Table 1).

Napier Inner Harbour channel dredging

The Napier Inner Harbour channel was last dredged in 2013 and this was scheduled to be repeated in 2017/18. Due to other commitments around New Zealand, the required equipment was not available until February 2019. During this delay Napier City Council commissioned additional depth soundings to ensure that the channel continued to meet its required minimum depth of 2.4 m below low tide. The channels did not fall outside required parameters (although they came close) and the two year delay resulted in an effective 50% gain in value of the previous dredge.

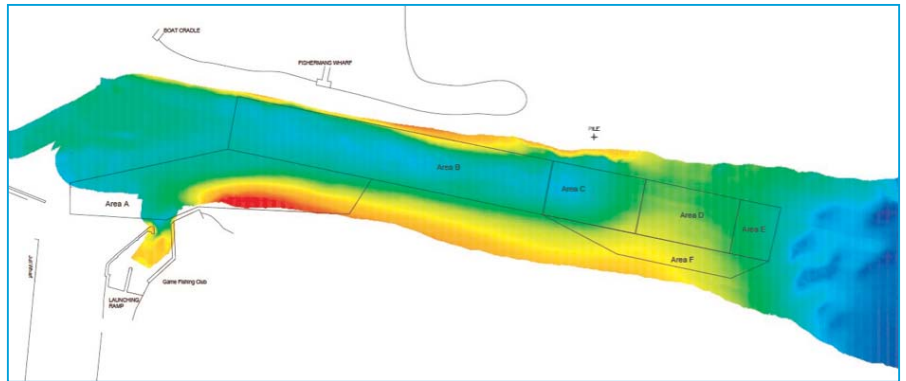


Figure 2: Multi beam sonar scan and dredge locations (Napier City Council).

A contract was agreed with Heron Construction, who have undertaken all Napier’s dredges in recent years to dredge the channel using a ‘backhoe’ dredge ‘Kombi’ and self-propelled hopper barge, ‘Soundcem III’. Kombi features a 50 tonne long reach digger mounted on a pontoon with stabilising spuds, capable of excavating 15 m deep.

Materials to be dredged were sampled and tested from locations along the length of the channel to ensure that they could be safely dumped in the consented disposal area off Westshore. The disposal consent specified an even distribution of materials across the disposal area, but following discussions with HBRC, dumps were concentrated as close to the Westshore beach as possible within the disposal area. Where dredged materials were more silty and would not contribute positively to Westshore, disposal was at the deeper limits of the area.

The dredge programme took five weeks (26th March to 29th April) with the crews working six days a week, with three dump runs each day. In total 18,871 m³ were excavated (see Figures 2, 3 and 4).

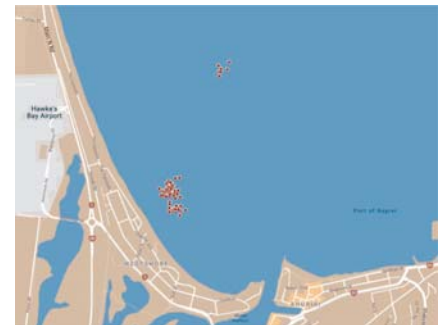


Figure 3: Dredge dump locations (Napier City Council).

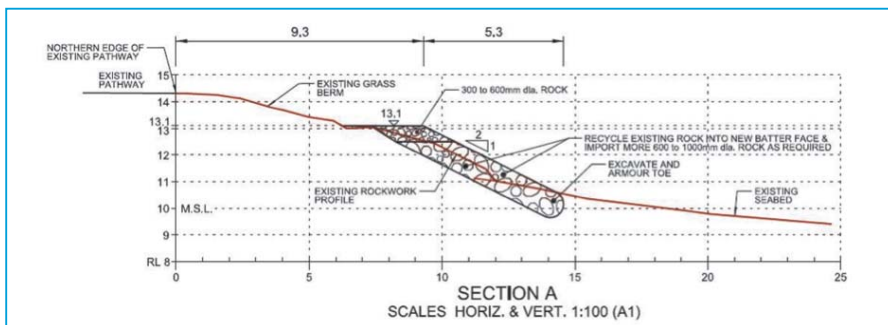


Figure 1: Proposed repairs to the Hardinge Road revetment (Napier City Council).

Table 1: Historical coastal protection works along Hardinge Road.

Stage	Date	Vol of rock m ³	Approx. Contract Cost \$k	Approx. length m	Typical \$/m
1	2012	800	145	70	2,000
2	2013	1700	220	120	1,800
3	2014	600	120	100	1,200
4	2016	1600	200	250	800
Proposed 5	2019	1600	275	170	1,600



Figure 4: Dredge in operation at the Napier inner port entrance (Napier City Council).

Debris on beaches

Hawke’s Bay communities have raised concerns with councils about debris accumulated on the shores being a tsunami risk. As debris also serves ecological and erosion protection functions, the councils are investigating.

NIWA mapping Clive Hard

The Clive Hard seabed was mapped in June 2019 through a joint project with NIWA and Hawke’s Bay Regional Council. The NIWA team arrived on their 14 m long research

catamaran, *Ikatere*, in early June to learn more about the seabed and marine environment in Clive Hard, the seabed stretching along the coast from Clive to Cape Kidnappers.

Ikatere uses a multi-beam echosounder sonar to map the seabed, and from that classifies ecosystems and habitats. The monitoring is to help NIWA and the Regional Council identify what areas are important for biodiversity habitat, and to improve ongoing reporting on the state of the marine environment.

Clifton to Tangoio 2120 Coastal Hazards Strategy (update from last edition)

The Clifton to Tangoio 2120 Coastal Strategy – Stage 4 is moving ahead with the concept design carried out by the Regional Council. The final outcome of this work is the costing and concept layout of the short-term preferred pathways for mitigating coastal erosion and inundation.

A set of signals and triggers will be co-developed with the community panels in the coming months. A funding model has been proposed to the joint committee, where a contributory fund paid by the general rates will be set. There is ongoing discussion about the public versus private benefit of the works to be undertaken, and more work on the funding model will be needed once the costing from the concept design is set.

The future work programme includes the implementation of the strategy through council statutory planning documents.

Hawke's Bay World Oceans Day celebration 2019

Nine local organisations contributed their time and knowledge on the first ever Hawke's Bay World Oceans Day celebration. A diverse array of marine topics was represented, from safe boating to the climate crisis and everything in between. A particular focus on the day was how to minimise our impact on the marine environment, especially with regard to plastic pollution. There were activities for the kids, stalls full of information, a demonstration and even a sperm whale jaw bone on display. A successful day after all until the wind and rain!

Port ownership (update from last edition)

On 26 June, Hawke's Bay Regional Council authorised Napier Port to proceed with a 45

per cent initial public offer (IPO) of shares in the Port. The 45 per cent IPO of Napier Port will deliver the funds needed to enable the Port to invest in its future growth, while protecting ratepayers from the costs, diversifying the Council's income streams and maintaining majority ownership and control. The Port is currently planning the development of a new wharf, which is estimated to cost between \$173 - \$190 million.

Regional Council Chair, Rex Graham said Hawke's Bay residents and non-resident ratepayers, iwi, and Port staff will be given a priority offer.

Napier Port will shortly launch a pre-registration website for residents and non-resident ratepayers interested in investing, with the IPO expected to launch in mid-July and close in August.

Upper South Island

Lisa Marquardt and Eric Verstappen, Regional Representatives

Coastal hazards engagement

Nelson City Council embarked on the journey to develop a coastal hazard adaptation strategy for Nelson in early 2019, in line with the approach recommended by MfE in its 2017 Climate Change and Coastal Hazard guidance. A first round of engagement in February and March aimed to hear from the community about what they know about coastal hazards to help inform and verify technical assessments. Engagement consisted of two public drop-in sessions, five community workshops, a hui and stakeholder meetings as well as a residents' survey and the launch of an online platform called 'Coastal Hub' (<http://ourcoast.nelson.govt.nz/>) for ongoing communication. We are currently working through the information collected, and are planning to report back to the community later this year to start a discussion about options and pathways.

Tasman District Council is also looking to better prepare its communities for the effects of ongoing changes to weather patterns and rising sea levels. It has been working on a district-wide project aiming to enable communities to work towards long-term adaptive planning for sea level rise and coastal hazards. As a starting point for the conversation, the extent of low lying coastal land in Tasman District that may be affected

by sea level rise has been mapped. The maps show the potential extent of inundation of a range of sea level rise scenarios and extreme storm-tides, as well as areas of historical coastal erosion and accretion, and the presence of coastal protection structures such as tide banks, walls and rock revetments. The maps will be available on the Council website from 22 July. Community consultation also commences, with a series of public drop-in sessions planned through to 13 September.

Pakawau rock revetment application declined

Resource consent applications by the Pakawau Community Residents Association (PCRA), to construct a 345 m long rock revetment in two stages on the esplanade reserve frontage of 1118-1154 Collingwood-Puponga Main Road in north-west Golden Bay, have been declined by Hearing Commissioner, Ms S McGarry, in a decision released on 29 April. The shoreline in this locality has been subject to periodic episodes of coastal erosion, particularly over the last 8-10 years. Many of the affected houses are located close to the reserve landward boundary and shoreline retreat at upper reserve level has occurred to within 2-5 m of private properties in the southern half of



View north of 1126 Collingwood-Puponga Main Road beachfront 10 January 2019 (Photo: Eric Verstappen, Tasman District Council).



View north of 1126 Collingwood-Puponga Main Road beachfront 28 June 2019 (Photo: Eric Verstappen, Tasman District Council).

the application area. Council 'beach pushup' replenishment works, along with Coast Care dune revegetation, have been undertaken to mitigate effects of the present erosion phase. These measures will be ongoing while an enduring management solution is sought by Council with the community, particularly over the southern 100 m where end-effect erosion from historic rock revetment structures to the south is most prevalent. Search 'Pakawau Community Residents Association' on the Tasman District Council website for the decision.

West Coast

Don Neale, Regional Representative

Fox River Landfill incident

In late March, a major flood event washed out up to 10,000 m³ of waste from a legacy

landfill next to the Fox River, South Westland. The waste spread down 20 km of riverbed and along 50 km of coastline, threatening natural landscapes and values. Initial clean-ups by volunteers, contractors and government agencies focused on the beaches and then moved to the upper river, but large amounts of rubbish remain on the river flood plain. Rock has been placed along the remains of the old landfill to give some level of protection from the river.

Funding and resourcing the cleanup response has been a significant challenge for all involved, and a local volunteer group has played a major part to date. The photo from the Fox River bed shows one of the many logjams that act as a sieve catching the washed-out landfill contents. These logjams take a day or more for a single volunteer to pick over.

For a discussion on the wider implications of coastal landfill erosion and inundation, see 'Pollution time bombs – Managing landfill at our dynamic shorelines' on page 3.



Wayne Costello (Dept. of Conservation), Ryan Kennedy (Volunteer) and Mike Bilodeau (Volunteer coordinator and 'South Westland Coastal Cleanup' spokesperson/leader). (Photo: DOC).

About the authors



Andrew Brown, originally from the UK, is a Chartered Coastal Engineer with nine years' experience as a consulting engineer holding a Master's degree in Coastal Engineering and a Bachelors in Marine Geography. Since immigrating to New Zealand two years ago to join Tonkin + Taylor he has worked on a range of design projects, undertaken hazard assessments, and provided coastal process expertise for effects assessments.



Laura Cagigal is a PhD student at the University of Auckland and specialises in the study of coastal hazards. Her research focuses on obtaining the different hydrodynamic components that lead to events such as flooding and erosion in the Pacific area.



Giovanni Coco is Associate Professor at the University of Auckland and specialises in the study of coastal physical processes and the interplay between physics, geomorphology and ecology. His research aims to apply quantitative tools to investigate the morphodynamic evolution of natural systems with a focus on natural hazards.



Murry Cave joined Gisborne District Council in late 2016 as principal science advisor and has been involved in establishing a new group within Council in the last six months to provide more focus on biodiversity and biosecurity issues in Gisborne/Tairāwhiti. With a strong interest in natural hazards, biodiversity and both mountains and the sea, the principal scientist and Integrated Catchment role has been a natural fit. The challenges that Tairāwhiti faces are enormous and it is confronting those challenges that keeps him inspired.



Rebecca Jarvis is a Research Fellow at Auckland University of Technology (AUT) and Honorary Research Fellow at the Sydney Institute of Marine Sciences (SIMS) in Australia. Her research interests include marine social science, conservation, knowledge exchange, the research:policy:action interface, and how we can deliver actionable, inclusive, socially-just marine management. You can find her on Twitter @rebecca_jarvis.



Tim Young is a Research Fellow in the Department for Applied Ecology at Auckland University of Technology (AUT). His research interests include fish and invertebrate physiology, larval biology, ecotoxicology, aquatic diseases, and how organisms might adapt to a changing ocean. You can find him on Twitter @LarvalNZ.

NZCS Media Catalogue

A new feature has recently been added to the NZCS website – the NZCS Media Library. Here you can view keynote presentations from past NZCS Conferences, as well as some recent seminars from NZCS regional events, with new content being added on a regular basis. Current webcast highlights include the following seminars:

NZCS Conference 2017

- Keynote Address: Dr Leigh Bull and Manea Sweeny, *North Canterbury earthquake – Environmental challenges and opportunities of the coastal reinstatement programme*
- *How do New Zealand communities currently participate in marine resource management decision making?* (Sustainable Seas Challenge)
- *Understanding community participation in marine ecosystem restoration initiatives: The Ongatoro/Maketū Estuary case* (Sustainable Seas Challenge)
- *Mauri Moana, Mauri Tangata, Mauri Ora* (Sustainable Seas Challenge)
- *Tipping points in New Zealand coastal ecosystems* (Sustainable Seas Challenge)
- *How current legislative frameworks in New Zealand enable Ecosystem Based Management* (Sustainable Seas Challenge).

NZCS Regional Events

- *Coastal engineering challenges in a changing world* – Speaker: Dr Steven Hughes (Colorado State University), May 2018
- *Coastal hazards and climate change: Preparing for change* – Tauranga Regional NZCS Event, August 2018.

View the webcast catalogue at:
www.coastalsociety.org.nz/media/

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The submission deadline for the next issue is 30 September 2019.

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