Coastal News

Te Hunga Takutai o Aotearoa

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Photo: Ports of Auckland.

Ports of Auckland – Fergusson Deepening Project

by Shelly Biswell, Editor

Fergusson Container Terminal is the centrepiece of Ports of Auckland (POAL). The 32-ha facility is New Zealand's largest container terminal and features five ship-to-shore cranes that can service Post Panamex vessels (ships larger than those that can travel through the Panama Canal) on 650 m of berth.

POAL obtained a resource consent in 2009 for works to deepen the outer berth (FZ berth) at Fergusson from -12.2 m to -15.5 m below chart datum. POAL is undertaking the work in stages, with works currently underway to deepen the berth to -13.5 m below chart datum.

POAL Civil Engineer Alistair Kirk says, "There are two distinct parts to the Fergusson Deepening project: 1) lengthening the berth by constructing a new mooring dolphin, and 2) deepening the berth. The new mooring dolphin was constructed by Brian Perry Civil and the deepening work, which is about 70 per cent complete and is expected to be finished by mid 2012, is being undertaken by Heron Construction."

Completed in December 2011, the new mooring dolphin extends the berth to over 650 m. This extension will allow POAL to simultaneously work two 4100 TEU (twenty-foot equivalent unit) vessels at the berth or to work one 5500 TEU vessel. Just to put ship size in perspective, ships are now being built that are 18,000 TEU. While New Zealand is not expected to be a port of call for these giants of the sea, in an increasingly globalised economy POAL does need the ability to cater to larger vessels than ever before.

Alistair says both parts of the project have had unique challenges, including when the work can actually be carried out.

"Deepening work has to be undertaken around tide windows and busy shipping schedules."

Auckland is known for its large tidal range, which is great for business since it allows larger vessels to access the port during high tide. For deepening, however, high tides can push the limits of the dredging equipment reach.

"It was important to keep the berth operational for shipping, which limited the windows of opportunity for the contractor to work on the site. POAL was keen to avoid downtime costs, and getting Heron involved in a routine maintenance dredging contract within the port, achieved this," Alistair says.

Deepening the berth

To say that berth deepening is not a conventional project is an understatement. Nearly every aspect of the project has demanded specialised technical solutions.

"For starters," says Alistair, "as the actual work takes place at a depth of 12 m to 15 m under

Deepening the outer berth at Fergusson Container Terminal. Photo: Ports of Auckland.

water, divers are the 'eyes' of the project. That means the divers need to be able to convey exactly what's happening below to the engineers."

Beyond that, before deepening work could even begin, the existing rock bund (the batter slope beneath the wharf) needed to be reinforced. The first step was to use high-pressure air hoses to flush out marine sediment from the rock riprap. The divers then grouted the voids in the riprap to stabilise the rock ahead of toe removal. The next step was to dredge a 3-m deep trench along the toe, in a hit and miss fashion (6-m long segments at a time), and backfill the segments with mudcrete (a mixture of mud and concrete). Once cured, the mudcrete acts as a mass block retaining wall to support the bund toe when the berth is deepened.

The Fergusson Deepening project will deepen the berth from -12.5 m to -13.5 m at lowest of low tides. Photo: Ports of Auckland.

"With the stabilisation work completed, we are now beginning the actual deepening," says Alistair.

The *Kimahia*, a back hoe dredger that can dredge to depths of 17 m, is being used to deepen the berth from -12.5 m to -13.5 m at lowest of low tides.

Planning for the future

Plans for the container terminal extension were tabled in 1989, when the Port Company, the Auckland Regional Authority, and the Auckland City Council agreed on the original 1989 *Port Development Plan*. POAL then obtained consent for 9 ha of reclamation to expand landside capacity at Fergusson Terminal. Since then, POAL has completed over 6 ha of the reclamation. The project was a finalist in the Transport Infrastructure category of the 2009 New Zealand Engineering Excellence Awards.

The latest work at Fergusson Container Terminal represents the next step for meeting the growing needs of the POAL.

Alistair says, "The current project is seen as an intermediate step for preparing Ports of Auckland for future use. Under our resource consent we can deepen the berth to a depth of -15.5 m below chart datum, but that will only be done if there is an economic imperative to do so and it would help meet New Zealand's port needs."

Container trade volumes by the numbers

Between 1989 and 2007, Ports of Auckland recorded an average growth rate in container volumes of 7 per cent. In 2007/08, the volume increase was 8.8 per cent, to 840,993 TEU. In 2008/09 volumes reached 843,590 TEU.

Despite the economic downturn across the world, 2009/10 saw volumes increase to 867,368 TEU. In 2010/11 volumes increased to 894,383 TEU.

NZCS Conference

Planning is underway for the NZCS conference in Auckland. Tentative dates are from 14 to 16 November 2012. A suitable venue is still being confirmed. While the conference theme is yet to be finalised, being the 20th anniversary of the NZCS there will be an opportunity to reflect on changes in coastal management over the past 20 years and look forward to how things may change over the next 20 years.This is particularly relevant in Auckland where the population, and therefore pressures on many finite coastal resources, is increasing at twice the national rate.

Auckland's population is currently at 1.5 million and is expected to be around 2 million by 2032.

Tohoku Tsunami: Understanding the Human Elements of a Coastal Disaster

by Christopher Gomez[1*], Deirdre E Hart[1] and Patrick Wassmer[2]

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This report describes field evidence from a devastating near-field tsunami and asks what are the implications for preparedness in New Zealand and elsewhere?

On the afternoon of 11 March 2011, a Mw 9.0 undersea megathrust earthquake 70-km offshore from northeast Japan displaced the ocean floor, sending tsunami waves west towards Japan and out east across the Pacific to South America, New Zealand, and Antarctica. Waves at 0.5 m in height arrived on our shores within 15 hours, creating visible sediment plumes (see Daykin and Robinson, *Coastal News* 47 for effects in Napier).

This earthquake, known as the 'Tohoku Earthquake', was the largest ever in Japan and the fifth largest since 1900. Resulting tsunami run-up reached over 29 m above sea level along the Miyako City coast (Gomez and Wassmer, in preparation); elevations comparable to those from the 2004 Boxing Day tsunami in Sumatra (Gomez and Wassmer, 2011). Waves travelled 10 km inland in Sendai Province, inundating 560 km^2 in all. Human deaths have been estimated at 15,880, with a further 3800 missing. The very high toll has to be linked to a number of physical, built-environment and human-cultural factors. Here we provide evidence of this based on a month-long investigation in Sendai Province in December 2011 and make comparisons with the state of New Zealand's tsunami preparations.

Coastal area damage

The combined Tohoku event has been described by the World Bank as the most expensive disaster in history, even excluding the 30-km damage radius around the Fukushima Power Plant. The Japanese Fire and Disaster Management Agency reports that over 720,000 buildings were impacted: 109,862 destroyed, 127,100 partially destroyed, and more than 480,270 severely damaged. The unexpected inland reach of waves hampered evacuation and inundated over 100 officially designated tsunami evacuation centres.

Field observations revealed the tremendous wave energy, which moved 2-m high boulders and destroyed vulnerable cliffs (Figure 1). Salt-laden water and sediment was carried 4 km overland at Sendai City and even further up rivers, killing vegetation and crops in its path (Figure 2). Estuaries and streams were eroded and denuded of vegetation. River flood banks channelled tsunami flows further upstream: we found 60-cm thick tsunami deposits on river banks and within stop-banks 5.4 km upstream of the coast.

Figure 1: Cliff section eroded by the tsunami. The cliff stands over 7 m at the highest point shown and 4 m in the gap (Dec. 2011). Photo: C Gomez.

Figure 2: Tsunami inundation and sediments turned rice-fields into sterile land. Remediation workers are attempting to remove these deposits from each field in an area extending 4 km from the coast near Sendai City. In the Iwate, Miyagi and Fukushima prefectures 20,000 ha of agricultural land have been contaminated by seawater (Dec. 2011). Photo: C Gomez.

Inappropriate 'protection'

Like New Zealand, Japan is a mountainous, island nation: 71 per cent comprises steep topography. Accordingly, 75 per cent of the country's assets and half its population are based on the limited coastal plains (Kokusai Kogyo Group, 2011). These areas are prone to numerous hazards, including tsunamis, storm surges, typhoons and *arashi* (strong wind and rain), explaining why Japan is famous for its extensive engineered protection works. Coastal defences include ubiquitous jetties, groynes, submerged offshore breakwaters and harbours sheltered by large seawalls. Elevated roads, up to a few kilometres inland, function as coastal stop-banks and evacuation routes.

Most Japanese tsunami defences were designed based on the characteristics of the Meiji Sanriku tsunami, generated by a Mw 7.2 earthquake in

1896, that killed 22,000 people. The Meiji Sanriku waves are considered to have been lower amplitude than those of March 2011.

Widespread failure of the hard-engineered coastal protection structures resulted in 2011 (Figure 3). This event illustrates the tragic result of a disaster-development cycle, where extensive coastal development occurred in areas thought to be protected by 'tsunami-proof' structures. It suggests that it is near-impossible to design hard structures to withstand extreme tsunamis and that design/event mismatches magnify impacts.

Soft-engineered defences were also destroyed along the Japanese coast, as in the aftermath of the 2004 tsunami in Sumatra. Coastal forests were flattened, trees uprooted and transported, with this debris enhancing the tsunami destruction. Observations from India and Thailand in 2004 indicate coastal forest cover as well as vegetated dunes and coral reefs can help to reduce tsunami damage by reducing wave energy via friction and, thus, the inundation extent. Our observations from both Sumatra and Japan add another layer of complexity to the understanding of tsunami/surface-cover interactions, suggesting that, at the extreme end of tsunami power, erodible covers can exacerbate damage by supplying mechanically abrasive and impact-enhancing debris.

Disastrous construction materials and infrastructure impacts

The extreme tsunami waves did not determine the ensuing disaster scale alone. The location and nature of the infrastructure and buildings played a very significant role in determining the impacts. In areas affected by the waves, 15 to 60 per cent of residential buildings were timber framed, 5 to 25 per cent were made of reinforced concrete and usually less than 10 per cent made of steel. The predominance of flexible, light timber structures was historically due to their ability to survive earthquakes but these buildings were easily swept away by the tsunami waves (Figure 4).

Transport infrastructure was heavily impacted, creating domino effects across Japan. The affected cities of Sendai, Miyako, Kamaishi, Oofunato and Ishinomaki contained Japan's major northern ports, critical nodes in the import/export and passenger networks. Resulting economic impacts have been

Figure 3: Failed breakwater in the harbour of Minami-Sanriku City (Dec. 2011). Photo: C Gomez.

Figure 4: Concrete slabs and foundation walls are the only remnants of most timber-framed buildings that were in the tsunami's path. Before being swept away, the timber frame was anchored to a concrete base using the steel bolts visible in this picture as protruding black sticks (Dec. 2011). Photo: C Gomez.

severe. At the local scale, the loss of sea transport has slowed recovery. Immediately after the tsunami 3200 people wanting to return to the mainland from Oshima Island had to wait for space in a 12-passenger boat, the only surviving ferry. Over 2000 fishing boats were also lost.

Conclusions and New Zealand implications

The March 2011 event is described as the most destructive tsunami in Japanese history. In this technologically advanced county, where tsunami risk management is a top government priority, a number of well-intentioned human factors helped create the catastrophe. One key factor, reliance on coastal structures designed to withstand the largest previous tsunami, and the subsequent failure of these structures, led to damage beyond the worst predictions.

The Tohoku event illustrates in typical development-disaster cycle fashion (1) how difficult (impossible?) it is to hazard-proof coasts from extreme events using hard structures; (2) how the construction of protection works can increase risk by encouraging high levels of coastal development; and (3) how structures designed to protect can, in fact, create greater impacts by channelling flows and enhancing

Figure 5: Former train track and bridge between Rikuzentakata and Minami-Sanriku, destroyed by the tsunami. To the right: debris deposits have filled low-lying areas in front of the raised train line, with only the tips of remaining structures now visible (Dec. 2011). Photo: C Gomez.

the reach of inundation, as well as in providing tsunami debris materials.

In light of this evidence, it could be argued that most coastal towns and cities in New Zealand are fortunate that our coastal hazard mitigation systems are not heavily reliant on hard structures. Although the potential role of the lower reaches of our river stop-banks in an extreme tsunami is perhaps unrecognised.

Like Japan, New Zealand is a country comprising a string of high islands perched atop the seismically active Pacific Ring of Fire. A 2006 Statistics New Zealand report indicates that over 60 per cent of our population lives within 5 km of the coast, that figure rising to over 70 per cent at 10 km. We are exposed to far-field tsunamis from across the Pacific and near-field tsunamis from submarine landslides and/or nearby earthquakes. The risk of near-field tsunamis is likely underestimated due to a dearth of research quantifying the submarine deposits of our extensive canyon head and continental shelf systems as well as that examining offshore faults.

If the recent Canterbury earthquakes, with predicted return periods of greater than 15,000 years, can teach us anything, it is that long-term planning systems must take account of extreme natural events. The layer of understanding that the Tohoku tsunami adds is that the way we respond as coastal practitioners to the risk of such hazards can dramatically shape resulting human outcomes.

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Three Areas Identified for *Undaria* Farming

In January, the Ministry of Agriculture and Forestry (MAF) announced three coastal areas (Wellington, Marlborough, Banks Peninsula) where the marine farming of *Undaria pinnatifida* (*Undaria*) will be allowed subject to MAF and local council approval.

Accidentally introduced to New Zealand waters in the 1980s, *Undaria* is now found in New Zealand's eastern and southern coastal waters from Auckland to Stewart Island, as well as the Snares, Fiordland and Chatham Islands. *Undaria*, a marine pest species, grows from the low intertidal area to subtidal depths of around 15 m. It grows on any hard surface including shells, reefs, ropes, wharf piles, vessel hulls, moorings and other artificial structures.

Undaria is an unwanted organism under the Biosecurity Act 1993 and in May 2010 MAF revised the policy allowing for greater commercial use of *Undaria* that:

- allows farming in selected heavily infested areas;
- allows harvest when *Undaria* is growing on artificial surfaces (including marine farms);
- allows harvest when *Undaria* is cast ashore in selected areas not vulnerable or sensitive to commercial harvest processes; and
- prohibits harvest when *Undaria* is growing on natural surfaces, except when part of a programme specifically designed to control *Undaria*.

With the revised policy in place, MAF consulted with iwi, technical experts, central and local government, industry, and environmental groups and identified three areas (Wellington, Marlborough, and Banks Peninsula) where it is believed *Undaria* can be farmed without increasing the risk of new or greater infestation in other areas.

For more information, see: www.aquaculture.govt.nz and www.biosecurity.govt.nz/biosec/pol/statements

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

Applications for membership should be sent to NZCS Administrator Renee Foster (email: raf10@waikato.ac.nz).

Floating Vegetated Islands – Combating Stormwater Pollution

by Shelly Biswell, Editor

Forty kilometres north of Auckland, along NZTA's State Highway 1, researchers are monitoring an artificial 'island' in the middle of a stormwater treatment pond as a potential solution to reducing pollutants found in stormwater runoff.

Designed and delivered by the Auckland Motorway Alliance, University of Auckland, Auckland Council, and Kauri Park Nurseries, the floating island is a hydroponic system made of four layers of recycled plastic fizzy drink bottles with foam injected between the layers to make the island float. The top layer of the island is covered by coconut coir which protects the plastic mat from UV degradation, in the early stage, when plants don't yet cover the entire island. The roots of the plants grow within the fibrous layers to reach the underneath of the mat and hang in the water below.

The stormwater pond serves a 1.75-ha catchment that is mainly comprised of roadway. In fact, 75 per cent of the catchment's surface is impervious. The pond has been divided into two equal 100 m^2 parts. One part features the floating vegetated island and the other is a control.

A new area of research

University of Auckland Senior Lecturer Elizabeth Fassman says that floating wetlands are now frequently used in wastewater treatment ponds, but their use in stormwater ponds is relatively untried.

"This project is one of the first field-scale tests with this type of application for floating islands. That's in large part because of the dynamic nature of stormwater ponds. Unlike wastewater treatment ponds, stormwater ponds have highly variable water flows. Additionally, both the type and amount of pollution that enters stormwater ponds can rapidly change."

Installation day with from left to right: Terry Wearmouth (Kauri Park), Elizabeth Fassman (UoA), Karine Borne (UoA), Fiona Lyttle (OPUS). Photo: University of Auckland.

The floating vegetated island the day it was installed (Dec 2010). Photo: University of Auckland.

The project research team, led by PhD candidate Karine Borne, is already two years into the project with field research to be completed in 2012.

Elizabeth, who is Karine's PhD supervisor, says that Karine's research is unique for a number of reasons: "While the islands 'make sense' from a management perspective and are being considered in a number of countries, no one has looked at the effect of the design parameters on the performance of a vegetated island in a stormwater pond."

For choosing plants for the island, the project builds on previous lab-scale studies that Auckland Council and NIWA conducted to determine the potential pollutant uptake for various plant species. In the end, the plant species selected for the project was the wetlands grass *carex vigarta*.

"We needed a hardy plant that had extensive root systems to assist in filtering pollution. We also had to look for relatively low-lying plants. For example, one of the plant species initially considered had to be rejected because due to its height and shape of its leaves the plant could literally act as a sail – not what you want on a floating structure," Elizabeth says.

An environmental imperative

Urban stormwater pollution is a significant environmental problem across the Auckland region. "The development of sustainable and cost-effective solutions is a high priority for Auckland Council. The council is responsible for over 400 stormwater treatment ponds, three of which already have floating vegetated islands in them," says Grant Ockleston, Manager Auckland Council Stormwater Unit.

As part of its commitment to the promotion of sustainable stormwater solutions, Auckland Council will be including a chapter on floating vegetated

The stormwater pond after the floating vegetated island had been in place for one year. Photo: University of Auckland.

islands in its updated best practice guidelines (GD01).

Results and future applications

While it's still early days in the project, Elizabeth says that initial results are promising.

"The island appears to be effective at pollutant removal with cleaner water on the island side of the pond. In fact, early results show statistically significant differences on the two sides for zinc, copper, and sediment."

Elizabeth says that while this project is mainly focused on whether the vegetated island will remove heavy metal pollutants like copper and zinc, in the US and Canada researchers are currently studying similar structures and their ability to remove nutrients.

"Anecdotally, with this project we are seeing a reduction in algal blooms in the island side of the pond. This may be an area where more research is required, particularly in light of the concern around excess nutrients in coastal environments like the Hauraki Gulf," she says.

NZTA's Auckland Motorway Alliance Stormwater Asset Manager Peter Mitchell adds that the results of the research will assist the NZTA in making decisions on future stormwater pond maintenance and management, as well as determining the whole-of-life value and viability of using floating islands as a water quality and environmental improvement technique.

"What we learn through this project and how we apply that information will contribute to an improved environment – not just beside motorways but in our waterways and communities as well," Peter says.

Researcher Karine Borne lifts a potted plant on the vegetated island to check root development. Photo: University of Auckland.

Coastal Planning and Development Forum

by Hamish Rennie, Lincoln University

The Coastal Planning and Development Forum organised by professional conference company Conferenz and supported by the New Zealand Association of Economists was held in Wellington, 15 to 16 February 2012. The forum brought together an interesting mix of speakers ranging from economist Basil Sharpe, to landscape architect James Lundy, to developer Leigh Hopper, to Royden Summerville QC.

An international element was added to the forum by a presentation on work being done in Tasmania to address the potential future impacts of climate change, an issue which is clearly taken far more seriously and given greater attention there than it is here. But even so, the variation in the estimates of sea-level rise being used in different states in Australia was somewhat staggering (0.38 m to 1.1 m). I was left feeling it was time for New Zealanders to be again reminded with simple maps of the possible extent of sea-level flooding that different scenarios might result in for some of our more vulnerable coastal areas.

In a completely different vein, the strengthened role that iwi planning documents will have in coastal planning was also apparent from a number of speakers.

Rob Makgill, the chair for both days, had difficulty keeping the enthusiasm of the speakers in check, but still managed to ensure enough time for questions from the floor on most papers. A number of those present were popping in and out to make presentations at the simultaneous select committee hearings on the Exclusive Economic Zone and Continental Shelf (Environmental Effects) Bill and Rob's paper on this and the related discussion was a highlight, matched perhaps by the rather startling comment by former Environment Court Judge and Board of Inquiry Chair Shona Kenderdine that one policy in the *New Zealand Coastal Policy Statement* might be *ultra vires*!

Papers and presentations can be found at: www.conferenz.co.nz/conferences/coastal-planning-and-development-forum

Coastal News

Waikato University's Coastal Marine Field Station

by Alistair Gray, University of Waikato

Waikato University's new coastal marine field station is based at harbour's edge adjacent to the Sulphur Point Marina in Tauranga. The field centre is home to the University of Waikato Coastal Marine Group made up of staff and students who conduct research around the Bay of Plenty. Their focus is the coastal zone and adjacent estuarine shallow waters.

Professor Chris Battershill holds the inaugural Bay of Plenty Regional Council Chair in Coastal Science and heads this multidisciplinary group. Since starting his position at the University of Waikato in 2011, Chris, an expert in marine diversity, has initiated a review of marine life in and around Tauranga Harbour and the wider Bay of Plenty, with a focus on the biogeography of organisms and how they may adapt to environmental change.

"Waikato is one of the premier universities in New Zealand for multidisciplinary aquatic science and the only university in the Southern Hemisphere to have a working tertiary partnership amongst regional tertiary education providers dedicated to enhancing opportunity for education and training across a range of social, economic, and scientific disciplines. A start-up focus has been on research associated with marine opportunities and issues," Chris says.

"It's great for the students to have a dedicated marine lab to process their field work in. Due to the nature of coastal work, quick access to a facility for sample work-up is paramount and now we also have a base where we can do useful work when students' research is hampered by bad weather."

The Coastal Marine Group has more than 40 PhD and MSc students. It has relationships with iwi groups, Bay of Plenty and Waikato regional councils, Priority One, port companies, Ministry for the Environment, Department of Conservation, MAF, and other university coastal groups worldwide, so the work they do extends well beyond the Bay of Plenty.

Waikato University's coastal marine field station. Photo: University of Waikato.

The group is currently engaged in a number of case studies in the Tauranga Harbour, the Astrolabe Reef, Whitianga and as far afield as Dubai.

Chris Battershill. Photo: University of Waikato.

"We're always interested in increasing our experience around coastal processes so that we can benefit our understanding of New Zealand conditions and responses to climate change and other impacts.

"A great thing about being based in Tauranga is that we have access to all kinds of different habitat types from sheltered estuaries to open island systems and even active volcanoes with submarine vents. On top of this there are significant marine reserves on our doorstep," Chris says.

The *Rena* – tracking an environmental disaster

When the *Rena* ran aground on the Astrolabe Reef last October, University of Waikato and Bay of Plenty Polytechnic researchers, who are part of the tertiary partnership, were at the scene helping coordinate a fast response environmental programme to provide advice on the quality of the environment that exists around the *Rena* shipwreck site and likely impacts.

The work done created a baseline from which the effects of the subsequent oil pollution could be monitored and provided data to help estimate the recovery time.

Divers were sent out to the wreck to take video footage, as well as survey and take samples from the marine environment near the reef. Samples were also taken from the oil slick and beaches on the adjacent coast. The planning for this was informed by models of oil slick movement predicted by MetOcean Ltd for Maritime New Zealand in order to track the progression of the oil as it made its way towards the mainland shore.

Months later the longer-term effects of the oil are still being investigated says Chris, with plans now for continued monitoring to check on the rate of return to 'normal' conditions.

"The initial work carried out in the days after the *Rena* grounding, and before any oil arrived on beaches or rocky reefs, was built on a data set going back 20 years that was compiled by the Bay of Plenty Regional Council. It provides an

unprecedented opportunity to track the effects of an oil spill and the environmental recovery in response to clean-up activities," he says.

"This is a rare circumstance globally – in most other cases of oil pollution it has been difficult to quantify the extent of impact and even harder to determine when the ecology will be back to normal."

Chris says ongoing research would provide essential knowledge in responding to the impacts and determine how future marine disasters could be managed from an environmental perspective.

"Importantly, it will sharpen our ability to predict environmental effects and recovery."

Waikato University Coastal Marine Group and partnership students are currently investigating recovery time and process for the Tauranga Harbour and Bay of Plenty region following the spill.

Rena Update

In the early morning of 5 October 2011 the MV *Rena* struck Astrolabe Reef off Tauranga and grounded. In the ensuing months a dedicated response team and thousands of volunteers have been involved in the clean-up and recovery.

Oil removal

The *Rena* had 1733 tonnes of oil when it grounded. Fuel removal began on 9 October and most of the remaining fuel was removed by 13 November. After the removal of 10.3 cubic metres of fuel in late February, Maritime New Zealand estimated oil remaining on the vessel to still be in the tens of tonnes.

The total of oil and oily waste collected by oil spill response teams to date is 1041 tonnes.

Wildlife response

Nearly 2300 dead birds have been collected during the response. Over half of the dead birds were oiled.

At the height of the *Rena* response over 400 birds were being cared for at Te Maunga wildlife rehabilitation centre. Seabirds cared for at the centre included 345 little blue penguins, 60 New Zealand dotterels (that were pre-emptively caught and cared for) and four pied shags. The centre was dismantled in early February with remaining birds being cared for at Massey University.

The last oil-affected birds being cared for were successfully released in mid-February. On 24 February, the National Oiled Wildlife Response Team (NOWRT) was stood down from the Tauranga-*Rena* Incident Command Centre. Local wildlife experts and the Department of Conservation will continue to respond to reports of affected animals and a team at Massey University will be ready to treat any affected wildlife. NOWRT also remains on standby.

Container and debris recovery

Over 1000 tonnes of waste have been recovered since the incident. Over 8000 volunteers and 12 Adopt-a-Beach groups have been involved in beach clean-ups throughout the region.

Of the 1368 containers on board the *Rena* at the time of grounding, over 550 have been recovered

24 February, 2012: the wreck of the Rena sits on Astrolabe Reef, with the Smit Borneo alongside. Photo: LOC.

24 February, 2012: salvors have almost removed all of the containers from the top deck of the bow section of the Rena. Photo: LOC.

from the vessel by salvors and 71 containers have been recovered from the water and shoreline. There are 17 containers that have been located away from the *Rena* but have not yet been recovered.

In late February, beaches in the Hawke's Bay and Gisborne areas were surveyed following reports of possible *Rena* debris washing ashore. The debris recovered was not oiled.

On 11 March 2012 volunteers involved in Operation Beach Clean have been invited to a thank you event at Mount Main Beach, Mount Maunganui. The event is supported by Maritime New Zealand, Bay of Plenty Regional Council, Western Bay of Plenty District Council, Tourism BOP, and Tauranga City Council.

www.maritimenz.govt.nz and www.boprc.govt.nz

Word from the Chair

by Deirdre E Hart

Kia ora and welcome to the first *Coastal News* of 2012. The year ahead is shaping up to be an exciting one for NZCS with investigations into professional and community awards to be concluded, the new financial structure to be put in place and, not least, our 20th annual conference to celebrate. Regarding the latter, our conference will be held in Auckland in November. The conference will include a retrospective of the last 20 years of how coastal practices have evolved as well as a historical look at the society. This will be topped off with a 1992 fashion-themed conference dinner – so dredge up your Calvins, big collar suits and Air Jordans!

The first meeting of the new 2012 NZCS management committee resulted in some changes in roles and people (see list on page 15). Contact Christopher Gomez or myself if you are a student and interested in the role of student coordinator for the committee.

This first *Coastal News* issue of the year coincides with Term 1 of many tertiary coastal studies programmes around the country so I thought I'd take a moment to list some of these. For undergraduates these programmes include, amongst others: the degree in marine science at the University of Waikato; various coastal science and management programmes in the geography programmes at the Universities of Auckland, Canterbury and Otago; the Department of Marine Science courses also at Otago; marine and coastal studies at Auckland Unitec, the Bay of Plenty Polytechnic Marine Studies; and Lincoln University courses touching on coastal planning and management. For professionals and postgraduates, the above institutions offer tailored options as do NIWA, with short courses periodically offered by the Planning Institute and the Resource Management Law Association.

I encourage all our members to keep abreast of local coastal education offerings and, if you have the time and experience, to provide a curriculum critique. The input of coastal professionals and community can help make sure that the ongoing development of these programmes results in graduates who are able to meet the future needs of the New Zealand coast.

Last but not least, I would like to extend our best wishes to Hannah Hopkins, who is resigning from her role as NZCS Administrator. Over the last five years Hannah has been a model of efficiency, accuracy and just a wonderful person to work with. We will greatly miss her as a part of the committee team, but wish her well with her future endeavours. Hannah's position will be filled by Renee Foster of Waikato University.

Management Committee Members – Close-up

Christopher Gomez

Christopher is a lecturer at the University of Canterbury. He was born in France and spent his childhood between Paris, France; South-Devon, UK; and South Germany before moving to Singapore, Indonesia, Japan, and finally New Zealand.

As a graduate student at Sorbonne University, Christopher was awarded his PhD on 'Erosion and sedimentation linked to high energy flows and waves' at Paris 7 Diderot University before accepting a postdoctoral position on a shared programme between the French CNRS and University of California – Berkeley (US) to research environmental processes in the Sacramento floodplain. During these years, he also studied tsunamis in North Sumatra (2004), Java (2006), and Tohoku (2011).

Christopher is presently involved in tsunami and palaeotsunami research in New Zealand, studying associated sedimentation, erosion processes, hazards, and risk management. He is also presently looking at the continuum of environmental processes from headwaters to the sea in the Canterbury Plains, in order to develop a holistic understanding of our environment and develop best management. As a management committee member Christopher hopes to be able to make a difference by working with scientists, practitioners, and all the lovers of New Zealand's breath-taking coasts.

Jose Borrero

Jose earned a PhD in coastal engineering at the University of Southern California (USC) in Los Angeles, US in 2002. He then worked as a postdoctorate and research professor before coming to New Zealand in 2006 to join the team at ASR Ltd in Raglan.

Jose's background is in civil and environmental engineering with an emphasis on water resources and a specialty in numerical modelling. He is particularly interested in tsunami hydrodynamics and the coastal effects of tsunamis. Jose's other research interests include coastal processes, sediment transport, wave breaking, and design of erosion control and beach protection structures and schemes. He is also involved in laboratory physical modelling projects. As a management committee member, Jose is keen to support New Zealand's coastal management community – from researchers to practitioners to decision-makers – and help out with the organisation of important events such as the annual conference and the Coasts and Ports Conference when it is held in New Zealand.

Queensland Coastal Planning

by Derek Todd, Coastal Principal Scientist, Environment Planning, Department of Environment and Resource Management

As many of you know, I have recently crossed the ditch, trading the shaking of Christchurch for the sun of Queensland. As a result I have swapped from consultant and university lecturer to working for the Queensland State Government as a coastal scientist in the Environment Planning section of the Department of Environment and Resource Management (DERM).

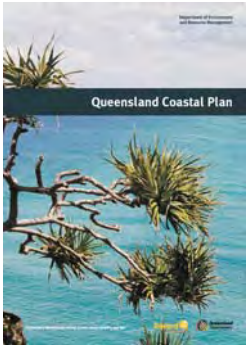
To put a New Zealand perspective on DERM, it is best described as a cross between the Ministry for the Environment, the Department of Conservation, an office of climate change, and a regional council; and has around 5000 employees spread across the state. So some smart person (e.g. Deirdre!) decided it would be a good idea for me to contribute pieces to *Coastal News* on comparisons of coastal management and planning between Queensland and Godzone. And before you jump to conclusions, while I may be living in the West Island, I am still very much a Crusaders and All Blacks rugby supporter!

The big job at the moment in Queensland coastal planning has been preparing the new *Queensland Coastal Plan* (QCP) for release. After a few hiccups and last minute changes, this plan, which is prepared under the Coastal Protection and Management Act 1995, came into effect from 3 February 2012. The new QCP replaces the *State Coastal Management Plan* (2001) and associated regional coastal management plans.

The coastal plan has two parts:

- the State Policy for Coastal Management; and
- the State Planning Policy 3/11: Coastal Protection (SPP).

The State Policy for Coastal Management provides policy direction for natural resource management decision-makers about land on the coast, such as coastal reserves, beaches, esplanades and tidal areas.



The SPP provides policy direction and assessment criteria to direct land-use planning and development assessment decision-making. It is a state instrument adopted under the Sustainable Planning Act 2009 (SPA) and the Coastal Protection and Management Act 1995.

The QCP is supported by maps for planning purposes that indicate where particular policies of the coastal plan apply. Property-scale maps of all coastal plan mapping layers and map sheets for coastal hazard areas are available on the DERM website at www.derm.qld.gov.au/coastalplan

As part of the release, DERM is proposing refresher information sessions on the QCP for coastal planners from other state government departments, local government, and consultancies.

Further information on the QCP is available on the DERM website or by emailing coastal.support@derm.qld.gov.au

My role leading up to the release of the QCP has been to check the calculation and mapping of the erosion-prone areas in the plan, which along with storm-tide inundation areas, form the basis for defining the areas where the SPP is to apply under the plan. Explanation on methodology in defining these areas, however, will have to wait until my next instalment.

NZCS 2011 Scholarship Winners

Each year the NZCS offers up to two scholarships for Master and PhD students. Winners of the 2011 awards were announced at our 19th annual conference in November 2011.

Scholarships are awarded to students conducting research that has the potential to lead to solutions to some of New Zealand's most challenging coastal issues. The winner of the PhD scholarship receives $5,000 toward study. The winner of the Master scholarship receives $2,500 toward study.

Winners and honourable mentions for 2011 were:

PhD scholarship winner: Amir Emami, Department of Earth and Ocean Sciences, University of Waikato. Thesis: *Seepage line influence on beach face volume at Muriwai Beach*.

Honourable mention: Shawn Harrison, Department of Earth and Ocean Sciences, University of Waikato. Thesis: *Modelling sediment exchange in and around ebb-tidal deltas in meso-tidal zones*.

Master scholarship winner: Megan Young, Institute of Natural Resources, Massey University, Albany Campus. Thesis: *Breeding biology of northern New Zealand white-faced storm petrels (Pelagodroma marina maoriana): in preparation for the first translocation of the species*.

Honourable mention: Lisa McCartain, Department of Biological Sciences, University of Waikato. Thesis: *The effect of a thin terrigenous deposit on porewater fluxes in permeable sediments in response to modified hydraulic activities of Macomona liliana*.

News from the Regions

Coastal News

Northland Region

by Michael Day, Regional Coordinator

Regional policy statement

The new draft regional policy statement (RPS) for Northland was released for public feedback from October to December 2011. The draft RPS contains policies on new development in the coastal environment and managing coastal hazards. It also includes a section on the efficient use of coastal water space and commits to establishing a coastal occupation charging regime. Northland Regional Council (NRC) received 163 written submissions on the draft RPS. The intention is to have a notified RPS ready for formal public consultation by June 2012.

Mapping project

The NRC mapping project to identify the coastal environment, high/outstanding natural character areas in the coastal environment, and outstanding natural features and landscapes region-wide is progressing with draft maps for these areas scheduled for completion by early April 2012. The maps are intended to be included in the proposed RPS once they have been approved by the NRC Regional Policy and Development Committee and have been publicly consulted on.

Pilotage movements

Pilotage movements in the Bay of Islands was expected to reach 110 this past summer. This is the highest number of pilotage movements ever scheduled in the region.

Dual cruise ships in the Bay of Islands. Photo: Northland Regional Council.

Navigation safety bylaw

The NRC has recently finished consulting on proposed changes to the Northland Regional Council Navigation Safety Bylaw. Some of the proposed changes to the current bylaw include new and altered areas designated for high-speed activities, removal of some existing ski lanes, restrictions on the transfer of mooring licenses in full mooring areas, changes to some prohibited anchorages as a result of alterations to underwater cable areas, and an increased emphasis on mooring maintenance.

The NRC received over 500 submissions during the consultation period on the proposed bylaw. Hearings to consider public submissions on the proposed bylaw are expected to be held in March or April 2012.

Pollution monitoring

Marine pollution regulation patrols were completed in Whangarei, Tutukaka, Bay of Islands, and Whangaroa. These patrols target popular anchorage locations and involve staff educating yachties on the rules regarding sewage. Details on each vessel's location and means of containment or treatment are collected. Patrols found 77 per cent of vessels had holding tanks, 16 per cent had treatment systems, and 7 per cent had direct discharge systems.

Mangrove mapping

A Bay of Islands mangrove and seagrass habitat digital mapping project was recently completed using 1977 and 2009 aerial images. The digital mapping is part of a larger project investigating sediment accumulation rates in the Bay of Islands and the impacts on the health of the coastal environment.

Consents

Since the aquaculture reforms went into effect two new applications have been lodged for marine farms in Northland. One of the applications is for a 125-ha mussel farm offshore of Stephenson Island near Whangaroa Bay. The NRC is awaiting further information before proceeding with processing this application.

Economic development

Enterprise Northland (the economic development agency for the Northland region) held the inaugural meeting of Northland's Aquaculture Development Group in Whangarei on 13 December 2011. This group is industry led and includes iwi, regulatory experts, and research and development companies. The group plans to hold an aquaculture forum in 2012.

Bay of Plenty

by Reuben Fraser, Regional Coordinator

Opotiki cycleway

In April 2011 the Opotiki District Council and the Department of Conservation were granted resource consent to construct and maintain an 8.5-km cycle trail along Opotiki's Hikuwai and Tirohanga coastal sand dune area. The dune area is typically vegetated with both native and exotic coastal species and is considered to be ecologically significant with some key areas of native pohuehue vinelands vegetation identified.

Opotiki Coastal Cycleway.
Photo: Opotiki District Council.

The sand dune section from Snells Beach to Wairakaia Road of the cycleway is now complete. Additionally, the connecting Department of Conservation section onto the Waiau River with a slight diversion out to the beach around the Tirohanga Bluff is in place. The Waiau Bridge is also complete and open.

Coastal plan

Provisions relating to restricted coastal activities were removed from the *Bay of Plenty Regional Coastal Environment Plan* on 22 February 2011. Policy 29 of the *New Zealand Coastal Policy Statement* 2010 directed that restricted coastal activities be removed from coastal plans without using the plan change process set out in Schedule 1 of the Resource Management Act 1991. A plan change to provide more specifically for aquaculture is now underway.

Port of Tauranga dredging

The Port of Tauranga was granted consent in June 2010 by the Bay of Plenty Regional Council to widen and deepen the shipping channels of Tauranga Harbour. This decision was appealed to the Environment Court by three tangata whenua groups. Just before Christmas last year the Environment Court granted consent to the application subject to final conditions being worked through. This decision has been appealed to the High Court by two of the three appellant groups with a hearing scheduled for April 2012.

Hawke's Bay

by Neil Daykin, Regional Coordinator

Haumoana – Te Awanga coastline report

The modelling and feasibility study of coastal protection works for the Haumoana – Te Awanga coastline is due for release soon by Hastings District Council and Hawke's Bay Regional Council. The report provides UNIBEST shoreline evolution model analysis of the feasibility of protecting the Haumoana coastline with a groyne field. The modelling will clarify the physical coastal processes, the impacts and/or mitigation measures required of a groyne field, and revised costs for potential coastal protection works.

Joint consent hearing for seawall

Hawke's Bay Regional Council and Hastings District Council have held a joint resource consent hearing to determine whether or not a seawall can be built in Haumoana. The proposed wall would be built 2.5 m seaward of an existing wall which was built in 2004 to protect the residential property from the fast-encroaching sea. The existing wall has a 50 per cent chance of failing in the next seven years.

The applicant says that the proposed seawall will provide protection for his property while more permanent options, such as a groyne field or managed retreat, are considered. The effect of the proposed wall on neighbouring properties was one of the main considerations given during the hearing. The commissioners have adjourned the hearing to allow time for staff to address some of the matters raised in evidence.

Oil and Gas Exploration in the News

Fact-finding trip to Canada

In February, Trevor Freeman, Gisborne District Council's Environmental Services Manager, and Bryce Lawrence, Hawke's Bay Regional Council's Manager – Compliance and Pollution Response, visited Canada to assess oil and gas exploration and production activities, including the practice of fracking (fracturing oil bearing rock strata at depth).

The purpose of the trip was for the two councils' staff members to learn about new approaches to oil and gas exploration to assist them in providing impartial, well-informed advice to councillors and decision-makers on resource consent applications.

Meetings and site visits were arranged mainly by the organisations that regulate oil and gas exploration in British Columbia and Alberta. As part of the visit, the Calgary-based Apache Corporation, a partner in the proposed well-drilling activities on the East Coast of the North Island, showed the two council staff aspects of their Canadian operations.

Look for more on this emerging issue in the July issue of *Coastal News*.

Hydraulic fracturing – GNS Science report

The GNS Science report, *An Assessment of the Effects of Hydraulic Fracturing on Seismicity*, was released in February. Commissioned by the Taranaki Regional Council, the report examines seismic data for any evidence of seismic activity associated with hydraulic fracturing or deep well re-injection operations in Taranaki, from 2001 to 2011. The report is available at www.trc.govt.nz/hydraulic-fracturing

Tasman Bay – the TASCAM view

by Shelly Biswell, Editor

Thanks to the TASCAM if you are a Tasman Bay fisher, boatie, marine farmer, or council planner over the past year you have had a way of finding out conditions ranging from speed of winds to sea surface temperature to salinity levels.

The TASCAM system was installed in April 2011 – the result of a collaborative effort by the Cawthron Institute and the US-based Monterey Bay Aquarium Research Institute (MBARI).

The TASCAM (an aggregated acronym for TASman Bay, CAwthron, and MBARI) system includes a buoy and instruments in the water column and on the seafloor that can measure weather conditions, currents, temperature, salinity, turbidity, and chlorophyll in the surrounding environment.

The Cawthron Institute designed the system using technologies passed on from MBARI's long-term research and development of remotely operated deep-sea observation systems. MBARI contributed mechanical drawings, software, and an electronics package called the OASIS mooring controller. This electronics package collects the data from all the different instruments and then relays this data to shore.

Cawthron Marine Scientist Chris Cornelisen says that while Cawthron scientists have installed scientific instruments in Tasman Bay before, this was the first time they have set up a long-term, real-time monitoring system.

"The immediacy of the data means that it can be used, for example, to alert a fisher that the water temperature is ideal for catching a certain species, or to advise marine farmers of the presence of a chlorophyll bloom, or to alert scientists that there has been a drop in salinity that may mean a higher likelihood of contamination from river plumes."

Chris says that over the past year the TASCAM has allowed scientists to capture and distribute data about Tasman Bay online – an information boon for stakeholders. The data from TASCAM is transmitted to shore using radio frequency via the Nelson City Council's radio tower. This means data can be downloaded both reliably and economically.

"Instead of having to attach our monitoring instruments to anchor cables and then rely on data cabling to retrieve data, we have used inductive technology, whereby instruments deliver data through the same cable that moors the buoy to the seafloor. The inductive technology combined with MBARI's OASIS controller enables us to 'talk' to individual instruments and retrieve the data remotely by computer back in our office where we have programmes to generate graphs that can immediately provide the information in a variety of ways."

A year on since the installation of the TASCAM and Chris says the results have been promising.

The TASCAM includes a buoy and instruments in the water column and on the seafloor below. Photo: Cawthron Institute.

"The system provides an incredibly effective and efficient way to monitor our coastal waters. It also ensures that all stakeholders have the same level of access to the information they need."

This April, members of the MBARI team will return to New Zealand to trial an environmental sample processor (ESP) alongside TASCAM. The ESP is a 'molecular lab in a can' that will be remotely operated to detect DNA gene products from human faecal bacteria, native and invasive invertebrate larvae, and bloom-forming phytoplankton.

Chris says, "TASCAM has allowed us to establish baseline conditions and better understand coastal processes in Tasman Bay. This information is crucial for understanding environmental change in response to upstream land uses and development of aquaculture.

"The vision is for a national coastal observation network of systems like TASCAM, which would provide accessible datasets for use by a range of end-users across New Zealand and internationally where the data can be used to develop a much better picture of what is happening in our oceans."

Visit www.cawthron.org.nz/coastal-freshwater-resources/tascam.php to learn more.

Deploying the TASCAM mooring in Tasman Bay. Photo: Cawthron Institute.

Coastal News

Contributions

We welcome contributions for each issue of *Coastal News*. Please contact Shelly Biswell at shelly@biswell.net if you'd like to submit a news brief, article, or have content suggestions. The submission deadline for the next issue is **4 June 2012**.

Now delivered in pdf format

At the 2011 AGM, members voted that the default distribution of *Coastal News* will be in pdf format and delivered to members via email. When registering with NZCS, members will still have the option to have print copies of *Coastal News* delivered, however, if this option is not selected members will only receive the environmentally friendly pdf version.

Missed an issue?

Back issues of *Coastal News* are available on the Coastal Society website. Members will need to log in to access the latest issue, but back issues (from Issue 6, April 1996) are freely available.

Visit www.coastalsociety.org.nz and follow the 'Publications' link on the front page.

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Every region has a NZCS Regional Coordinator who is available to help you with any queries about NZCS activities or coastal issues in your local area.

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Coastal News

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Corporate membership enables organisations and companies to become part of the New Zealand Coastal Society and support the society's mission of taking a leading role in facilitating a vibrant, healthy and sustainable coastal and ocean environment.

Organisations and companies can show their support for the aims and activities of the society and achieve public recognition of that support.

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- Website listing of services provided by corporate organisation, contact details, and links to recent projects or corporate member website.
- One free individual membership for the person nominated as the corporate contact or any subsequent replacement alternate.
- Five complimentary copies of *Coastal News* published three times per year.
- Discounted registration at member rates for the corporate contact to all NZCS conferences.
- Short feature on a corporate member in the *Coastal News* newsletter.

For more information on corporate memberships please contact:

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

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