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## Shipping to go Green in Sea Change

With environmental sustainability the topic du jour these days, the Government is focusing on how improving our coastal activities can help us be green. The Ministry of Transport's recently-released raft of discussion papers shows a concerted effort to push maritime issues to the fore and make sure the legislative framework governing the area is ship-shape.

The revival of our coastal shipping industry is the focus of the aptly-named *Sea Change* policy put out by the Ministry last year. Currently we ship only 15 per cent of our domestic freight: by way of comparison, Japan has a similar coastline but transports almost four times that amount. By doubling the amount of freight moved by sea by 2040, the Ministry hopes to reduce both road congestion and greenhouse gas emissions.

But the policy is also aimed at ensuring economic sustainability: as the competition for cargo increases globally and shipping companies use bigger ships and fewer ports, New Zealand needs a strong, efficient operation to attract business. To do this, *Sea Change* looks at ways to improve access to funding for coastal shipping initiatives and

proposes the establishment of a Maritime Liaison Unit, which will effectively act as the shipping industry's PR agent, promoting its profile at both industry and government levels. The Ministry is also hoping to boost the industry's dwindling workforce with better training and education.

Of course, coastal freight is not always kinder to the environment: more ships on the water means greater risk of oil and cargo spills. The Ministry has acknowledged that our port and harbour safety management regime needs to be improved to deal with these environmental risks.

At the moment port and harbour safety, which covers things like navigational aids and hydrographic surveys, is managed through a voluntary code. This allows flexibility, but relies heavily on the level of commitment from the relevant players – port facility operators, councils, government bodies – to work properly. The Ministry's draft policy discusses whether to keep the status quo or to give the code more teeth by recognising it formally or even turning the code into a statute. Indications are that the Ministry prefers an intermediate approach,



making the code an approved code of practice and imposing duties and obligations on operators and those in the business of marine services.

And the focus on addressing environmental risks in our waters doesn't end there: the Ministry is also considering adopting four international marine conventions which provide global mechanisms to address and respond to pollution from hazardous or noxious spills and establish liability and compensation schemes for damage from maritime incidents such as bunker oil spills.

The Ministry has carried out a cost/benefit analysis of adopting these conventions and will review submissions, but given we already meet many of the standards and obligations contained in the conventions, it's likely we will become a

party to at least some of these conventions.

The Ministry for the Environment is also busy in this area. It is working on new legislation to develop an RMA-style, effects-based legislative framework – complete with a new breed of Exclusive Economic Zone resource consents – to fill gaps in the existing law.

From here, it's a case of wait and sea (misspelling intended): the Ministry of Transport now is to review the submissions received and, in the case of the two policies, work on adding detail to the drafts. The Ministry for the Environment, however, is now working on policy. We will keep you updated.

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## Replanting Mangroves in Asia

In 2007 an estimated 184,000 mangrove seedlings, covering about 18 hectares, were planted in the Stung Hav district, Sihanoukville, Cambodia.

The initiative, implemented to protect and rehabilitate the existing fishery resources, was funded by Partnerships in Environmental Management for the Seas of East Asia (PEMSEA).

In addition to the replanting, the Cambodian Department of Fisheries worked with the fishery community to erect 50 fish cages made of concrete, designed to also serve as artificial reefs, in the reforested area. The initiative was developed to encourage community members to guard the fishing grounds against illegal fishers, while

allowing low impact fishing efforts. Following the installation of these reefs, community members attest that there has been significant increase in the fish catch in the surrounding areas, consequently increasing the income among fishers.

Supporting these initiatives is a series of information, education and communication campaigns aimed at creating awareness among the community members on the importance of caring for their coastal and marine resources. Copies of a community regulation book and pamphlets on prohibited and permitted activities were distributed to community members.

# Wave Run-up and Overtopping at a Boulder Beach Near Raglan, New Zealand

Figure 1: Boulder bank at Whale Bay, Raglan

Cobble, boulder and gravel beaches constitute a significant portion of New Zealand's coastline. While general aspects of their morphodynamics have been well documented, quantitative analysis of run-up and overtopping characteristics has been less forthcoming. This limitation is relevant when defining hazard-based setback distances. Analysis using empirical based run-up equations developed for fine sediment beaches or artificial rock structures yield run-up and overtopping values well in excess of observed values, and consequently provide overly conservative hazard guidance. Additionally, the values predicted by these methods appear to be excessive given that they exceed the crest height considerably, yet these beaches typically build to an elevation roughly equivalent to the run-up of the most significant storm events (Kirk, 1975).

A field investigation was undertaken by Tonkin & Taylor at Whale Bay, Raglan to provide calibration data for existing generic run-up and overtopping models. This study was part of a detailed inundation assessment being undertaken by Coastal Systems Ltd (2007). The beach at Whale Bay is located on a Holocene barrier spit and is comprised of boulders ranging from 300 mm to over 1m in diameter (Figure 1). The crest elevation of the beach is approximately 4.7 m above mean water level (MWL), lowering slightly from the basal to the distal end of the spit, and intertidal slopes range between 5(H):1(V) and 7(H):1(V). Key variables which were assessed included: significant wave height ( $H_{sig}$ ); peak water period ( $T_p$ ); the run-up exceeded by the largest 2% of waves ( $R2\%$ ) and the still water level (SWL) at the time of surveys. Collection methodologies for acquiring these data consisted of a combination of observational and video imaging techniques and are discussed in full within Shand et al (2007).

Run-up surveys were undertaken on 6 occasions between July and October 2006 with significant breaking wave height ranging from 2.3 to 4.8 m and peak periods from 10 to 16.5 s. Resultant run-up elevations ranged from 1.05 m to 1.76 m above still water level. An empirical based equation (Hughes, 2005), which uses a wave momentum flux parameter to calculate run-up was adjusted to allow for depth-limitation of wave height and then calibrated to fit data by adjusting a roughness parameter. The calibration resulted in roughness parameter values varying from 0.35 to 0.5, with a mean of 0.4. Note that a lower roughness parameter value denotes a rougher surface and

consequently more energy dissipation and reduced run-up. Roughness parameter values for similar materials recommended by the Coastal Engineering Manual (USACE, 2003) and other design guides range from 0.5 to 0.6. This difference illustrates the very high permeability and roughness of these types of beaches.

However, once the run-up model predicts a run-up elevation which exceeds the beach crest, an alternative method for assessing the inland propagation of the wave-form is required. An overtopping model (HR Wallingford, 1999) was adapted using the above calibrated roughness parameter. Development and use of this model is described more fully in Shand et al 2007 but briefly; the method determines the mean overtopping discharge rate per linear metre along the slope and is able to include the effects of a crest berm width. This crest width has been defined as the landward distance from the crest of the boulder bank. A tolerable mean discharge during an overtopping event has been empirically determined by HR Wallingford (1999) at 0.001 l/s/m.

The calibrated run-up equation and overtopping models were then verified using hindcasted values from a particularly significant recent storm event which occurred over the 18-19th September 2005 and widely affected the west coast of the North Island. The event was characterized by a very high water levels, strong northwest winds and large northwesterly waves. Joint probability analysis showed that the inundation level had an annual exceedence of less than 1% (i.e. a return period of at least 100 years). The calibrated run-up equation predicted a 2% run-up elevation of 0.2 m above the boulder crest level. The overtopping model gave a 'zero building damage' distance (i.e. no significant flow) some 21.0 m inland from the crest of the boulder bank. This value agrees with the observed distances of 15 to 20 m that debris was transported inland by overtopping during the September 2005 storm event (Eco Nomos, 2005, Fig 6).

The calibrated and verified run-up and overtopping models were then used to produce run-up and overtopping values for a range of water level and wave combinations (see Figures 2 and 3). These results enabled the accurate identification of inundation hazard and determination of rational setback distances for events with different probabilities of occurrence.

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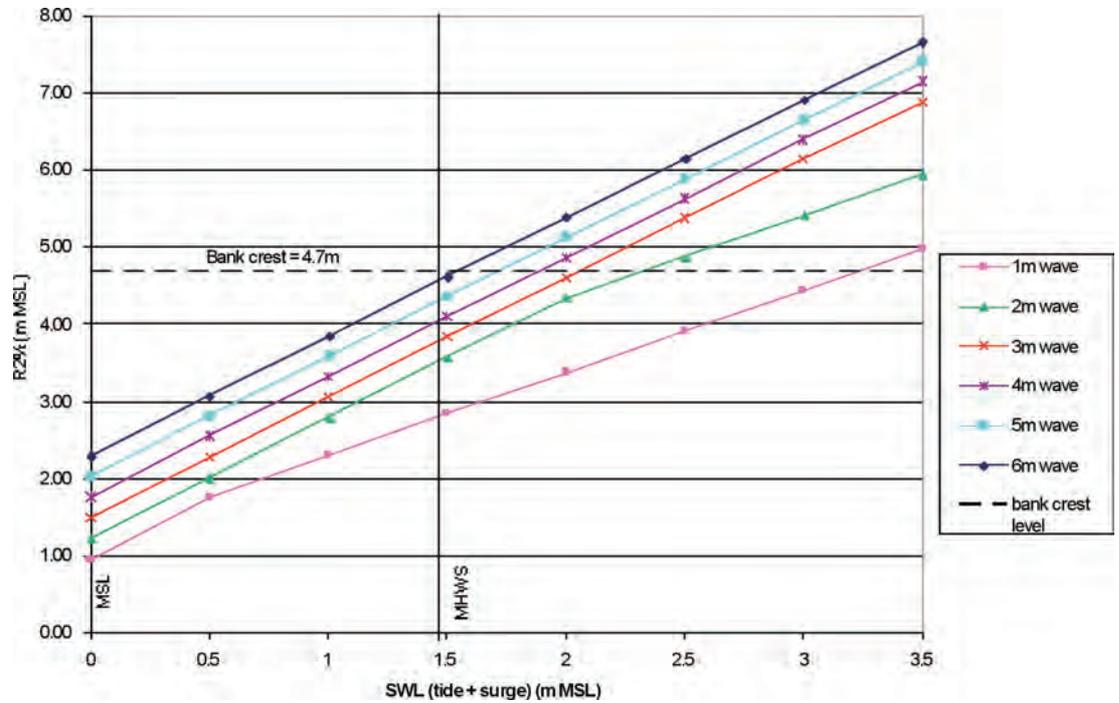


Figure 2: Run-up elevations exceeded by 2% of waves according to still water level and significant wave height

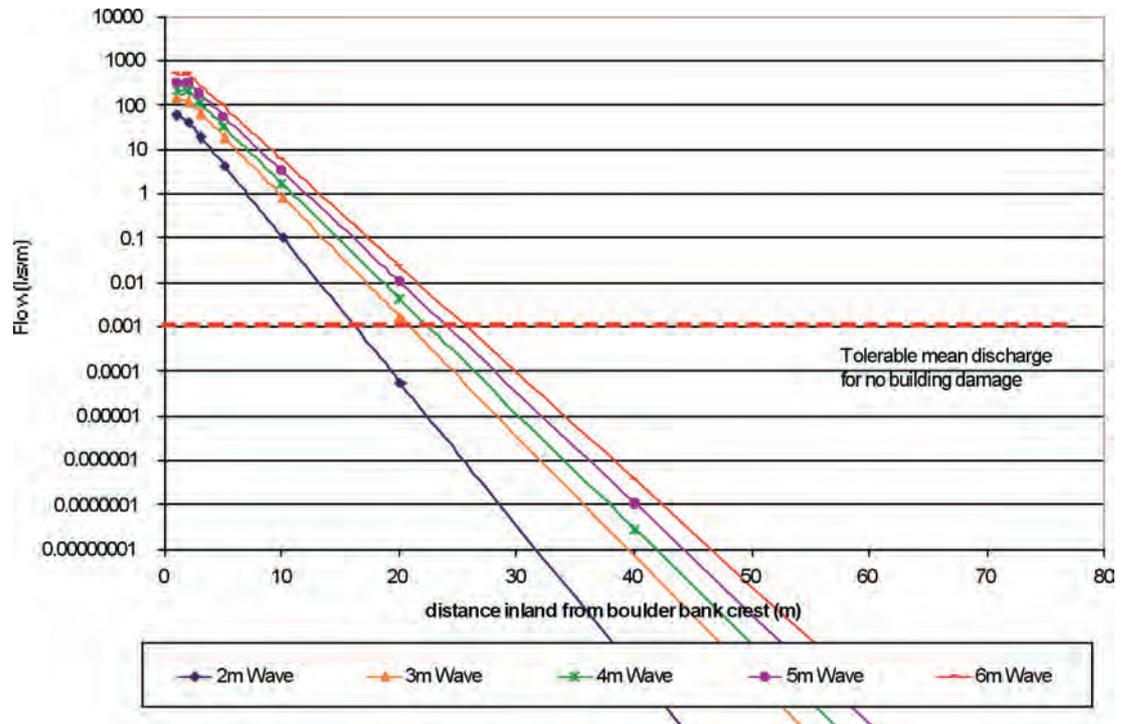


Figure 3: Mean overtopping discharge rate for a 1% AEP water level (2.5 m above MWL)

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# Kaipara Harbour Coastal Environmental Policy Review

## Issues facing Integrated Management

The Kaipara Harbour is the largest enclosed harbour in New Zealand and is significant for its intrinsic and amenity values, natural and physical resources, and cultural and historical significance. In recent years there has been increasing community concern over the cumulative effects of human activities on the harbour and its coastal environment.

This concern has been heightened by an increase in resource consent applications for activities within the harbour, developments within the harbour catchment, and a growing awareness of the effects of sedimentation and contaminants within the harbour. The management of these issues is complicated by the split jurisdiction of Kaipara Harbour between two regional councils, Northland and Auckland, and two district councils, Kaipara and Rodney. Significant disparities in funding between both regional and district councils also present a challenge to integrated management for the Kaipara Harbour coastal environment. The need for integrated management is expected to become more pressing in the future as the area comes under increasing



development pressure within the harbour catchment, and for activities in the harbour itself such as aquaculture, sand extraction, and tidal power generation.

## The project

The two regional councils have initiated a programme to improve the management of the Harbour and its coastal environment by enhancing integration between the relevant agencies. The councils have set out a sequence of actions to determine what commitments are required by each council (jointly and individually) to enable progress towards achieving integrated management.

A review of relevant statutory policy and planning documents was one of these key actions. In order to undertake this review, Beca was commissioned to examine the consistency of the policy and planning documents, and whether they enable integrated management of the harbour and appropriately address cross-boundary issues.

Following a desk-top review exercise and discussions with council officers and other stakeholders, a report was prepared making recommendations on potential policy and plan changes to improve integrated management and address cross boundary issues.



*Kaipara Harbour Location Map showing Local Authority and Regional Authority Boundaries*

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## Key findings

At a broad level, in order to facilitate a more consistent and efficient management approach to the Kaipara Harbour coastal environment (KHCE), the following key issues and opportunities have been identified:

1. At a regional level, there is a lack of specific policy direction for the Kaipara Harbour.
2. At a district level, there is a need for stronger protection and specific direction through zonings for the KHCE; and there is a need to develop more consistent subdivision provisions between both the district plans.
3. Assessing the relative impact of activities (such as earthworks, forestry and stock grazing) on

the harbour is hampered by a shortage of comprehensive environmental information.

4. Incomplete knowledge of areas deserving special protection or preservation, and minimal baseline monitoring, are key barriers to assessing effectiveness of current policy and methods for environmental outcomes for the KHCE.
5. There is a need for improved integrated monitoring to enable councils to more effectively review policy effectiveness and ensure better environmental outcomes are ultimately achieved.

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## Aquaculture News

### Aquaculture Hui

Iwi organisations were the primary target of a successful nationwide series of hui held in 2007 to provide information to Māori about their future participation in the aquaculture industry.

Te Puni Kōkiri (Ministry of Māori Development) in partnership with NIWA (the National Institute of Water and Atmosphere Research) ran the nationwide information hui. The hui targeted runanga, trust boards and iwi fishing companies, with Te Puni Kōkiri Deputy Secretary Alison Thom saying the nearly 190 attendees represented a broad spectrum of Māori and iwi interests.

The hui provided iwi and other groups interested in the aquaculture industry with information and guidance on three big aquaculture issues:

- region-specific aquaculture science, research and development;
- the Maori Commercial Aquaculture Claims Settlement Act 2004; and
- the Resource Management Act 1991 planning processes.

“The information hui were the first step in a longer process of government support being led by Te Puni Kōkiri to provide Māori with information about the aquaculture industry,” says Ms Thom.

“Māori are already a huge player in aquaculture – through collective industry holdings like Aotearoa Fisheries Ltd, through private and family companies, and through iwi business ventures.

“Many other iwi are very interested in developing aquaculture opportunities in their regions. These hui were about starting conversations within each rohe (tribal area) on how Māori can work to participate effectively in the aquaculture industry.

“Given that the aquaculture settlement specifically provides for participation by iwi, and given the large sums of money that will be required to enter

the industry, it was sensible to initially target iwi organisations with those sorts of resources.”

Te Puni Kōkiri and NIWA were supported at the hui by representatives from Te Ohu Kaimoana Ltd, regional councils, and from the resource management profession.

“The government is partnering with industry, councils and iwi to provide the foundation for future growth of the aquaculture industry,” says Ms Thom. “The hui provided an opportunity for iwi groups to directly kōrero for the first time with all these groups.”

The rich data presented to the hui will be further distributed on request and provides a sound basis not only for Māori participation in the sector but also for policy consideration and development by government says Ms Thom.

### Reviewing The Ecological Effects Of Marine Farming

To help councils and communities properly plan for marine finfish aquaculture, the Ministry of Fisheries has published the Review of the Ecological Effects of Marine Finfish Aquaculture: Final Report. The independent review was completed by the Cawthron Institute in 2007. Both an executive summary and the full report are available at:  
[www.aquaculture.govt.nz/finfish\\_report.php](http://www.aquaculture.govt.nz/finfish_report.php).

The Ministry of Fisheries is now embarking on a review of the ecological effects of farming shellfish and other species in the New Zealand marine environment. It is anticipated that this review will begin in early 2008. The Ministry of Fisheries has established a working group for the shellfish review that includes scientists, representatives from government, local councils and the aquaculture industry to ensure the final report is a well-balanced and accurate review.

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# Mosquitoes and Mangroves in Tonga

Mosquito-borne diseases kill millions of people around the world every year, including those living in coastal mangrove ecosystems and human-built environments throughout the islands of the tropical Pacific. These insect vectors also reduce biodiversity in coastal habitats. Large organised programmes to reduce mosquito populations are fundamental in reducing such impacts. A common approach to alleviating this problem is removal of coastal mangrove systems – but this has negative flow-on effects in terms of coastal protection, and on natural mosquito predators. This article reports on a project in the Kingdom of Tonga, conducted by the EcoCARE Pacific Trust in conjunction with the University of Canterbury (UC), examining how to work with natural coastal ecosystems and data on mosquito populations to reduce disease incidence in island populations.

A total of 42 sites were surveyed on 6 islands of the Vava'u group and beyond, including natural and artificial habitats such as coastal mangroves. These islands ranged from low reef islands, standing a few metres above sea level, to semi-active volcanoes standing up to 300 m above sea level. Eight mosquito species were collected, some widespread and others limited to particular islands. Throughout the islands larval habitat was found to be more abundant in towns than rural and coastal settings, including artificial water bodies such as disused concrete water tanks, 44-gallon drums and used car tyres. In rural sites habitats were generally sparse except for rain-filled branch stems of giant taro plants. Results indicate that deforestation of coastal mangroves is not a solution to the islands' mosquito problem and would, in fact, compound it through natural predator habitat loss. Instead, mosquito populations in artificial habitats could be markedly reduced by seeding disused water tanks with aquatic predators already present in Tonga, using mesh-net covers over 44-gallon drums and drilling holes in used car tyres.



Figure 1: Drs Felicity Jones (Macquarie University), Jon Harding (UC), Sharyn Goldstein (UC), and Culum Brown (Macquarie University) sampling for mosquito larvae at the rubbish tip in Nuku'alofa



Figure 2: Low reef islands in the Ha'apai group taken as we travelled north to the Vava'u group

In recognition of the importance of returning results to the affected communities, EcoCARE and UC returned to Tonga in 2007 to disseminate this research: speaking at schools and community centres, meeting with government and church ministers and via newspapers, radio and television.

EcoCARE's wider activities include the recent establishment of a nationwide science competition for 6-7 formers, where students conduct their own environmental studies. Their projects are then presented in scientific report format and assessed by staff at UC, with prizes awarded to the top three students. Indicative of the goodwill that has been developed, the Minister of Education in Tonga has offered UC and EcoCARE the use of three islands, representing different island characteristics encompassing low coral islands, coral cays formed on the surface of shallow atoll reefs and volcanic islands, as research and educational facilities. UC, Christchurch City Council and EcoCARE are now working together to develop initiatives that build capacity within these coastal communities on Pacific-wide issues.

For further information contact [russell.taylor@canterbury.ac.nz](mailto:russell.taylor@canterbury.ac.nz) or see [www.biol.canterbury.ac.nz](http://www.biol.canterbury.ac.nz), [www.freewebs.com/russellt](http://www.freewebs.com/russellt) and:

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"Change cannot be avoided. Change provides the opportunity for innovation. It gives you the chance to demonstrate your creativity."

Keshavan Nair

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# New Zealand Coastal Society: Chair's Report 2007

*Presented at NZCS AGM on 22 November 2007.*

This is my inaugural chair's report. In presenting it to this year's Annual General Meeting it is an opportunity for members to hear what the NZCS Executive Committee has done over the past 12 months and note current issues.

There are three main matters I wish to focus on:

- The 2004-2007 Strategic Plan Review and 2007-2010 Strategic Plan,
- Increasing activities and events at the regional level, and
- IPENZ's proposed rule changes to the membership status of Technical Interest Groups.

The Society's Strategic Plan governs what we do and is updated every three years. The NZCS Committee has completed a review of the 2004-2007 Strategic Plan. The new Strategic Plan covering the period from October 2007 to October 2010 will provide the direction for the Society over the next three years. Copies of both the reviewed and new strategic plan will be presented at the AGM and are available to read in the member's area of the NZCS website. I would recommend that every member read through what we have achieved in the past 3 years and what we intend to do over the next 3 years.

The financial growth of the Society will depend significantly on the success of the 2009 Australasian Coasts and Ports Conference being held in Wellington at Te Papa from 14-18 September 2009. The theme of the conference is 'Coasts and Ports in a Dynamic Environment' and we're aiming to have over 400 delegates attending from both here and overseas. The Chair, Andrew Laing, and his organising committee are doing a great job in making necessary preparations for the conference.

Thanks to the work of Rick Liefing, Regional Coordinator, we now have guidelines for Regional Events. These have been posted in the members section of the website. If you have any ideas for a regional event in your area, particularly with the end of year approaching, get in touch with you local regional coordinator. Their contact details are listed in *Coastal News*. Regional events may involve a guest speaker, presentation from your local council or consultancy on a local coastal project, or a site visit and discussion on a topical issue in your area.

Following a settling in period, our membership numbers have stabilised at around 330 members. The changes made to the membership structure have seen an increase in the number of financial members, although this has been at the expense of some of our corporate members. Our

Membership Coordinator, Vaughan Cooper, has worked hard to maintain and increase membership, and ensure the Society is delivering promised services to members. The corporate member's page is now up and running on the Society's website, which acknowledges the support of those organisations. Wherever possible please support our corporate members as they support us and are vital to the success of the Society.

As part of offering more to our corporate members, you will see that the back page of the November edition of *Coastal News* has been devoted to corporate membership and acknowledging our corporate sponsors. It is intended that we will profile a different corporate member each edition.

In terms of our student membership, I am pleased that we have been able to award three \$500 student travel scholarships to attend the 2007 NZCS Conference in Tauranga this year, with a high standard of applications for this award received.

The student travel scholarship and student research scholarship, along with an award for the best student paper presentation at the conference aims to recognise and encourage our student members to continue their interest in the coast and maintain their association with the New Zealand Coastal Society.

At the 2007 Conference dinner I will announce the recipient of the inaugural student scholarship towards tertiary research. This scholarship is for up to \$5,000 towards tertiary study at masters or doctorate level on a coastal related topic. This is a great initiative and special thanks must go to Deidre Hart and David Kennedy for coordinating this award.

The NZCS website is an important part of communicating with both our members and the wider coastal community and we are committed to making sure we are provided with the most cost effective service. The content and information available to members has gone from strength to strength. Earlier this year I announced the launch of our 'Members Only' page which includes our Strategic Plan, NZCS Rules and Members survey. Further changes will see more regular updating of the website.

The NZCS Email Digest is now a key means of communicating with all members. This provides updates on up and coming conferences, events and employment opportunities in the coastal field, and is available for all members to disseminate information.

There are some challenges ahead for the Society in 2008, which the NZCS Executive Committee will need to meet. One of those challenges is

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maintaining a workable relationship with IPENZ, our parent body.

Currently the Society is a Technical Interest Group of IPENZ (Institute of Professional Engineers of New Zealand). We are one of a number of engineering based groups, although we have a diverse membership of not only engineers but also planners, scientists, and other professionals. As a TIG we are governed by IPENZ's Rules. A paper is being presented at the AGM for member discussion. IPENZ has proposed amending the Rules that would have the effect of all NZCS members, who are not full members of IPENZ, being referred to as Affiliate Members of the New Zealand Coastal Society. We have had discussion with IPENZ on this issue and believe that such a change would not be in the best interests of the Society. We continue to work well with IPENZ on all other matters and enjoy a positive relationship.

Another key challenge is to maintain our membership and make the Society attractive to new members to join and keep an interest in New Zealand's coast. In part, I believe that we need a greater presence at a local level for members. To achieve this we need to host more regional events which local members can attend. The NZCS Committee is committed to providing support to the Regional Coordinators to help them promote the activities of the Society in the regions, through

running local workshops and seminars on current coastal issues. This is not an easy area to gain traction in and requires commitment from our Regional Coordinators.

I would like to thank Hannah Hopkins, our part-time paid Administrator who has been invaluable to the Society over the past two years. Hannah ensures the smooth running of our operations, including providing a point of contact for new and existing members, sending out the NZCS Email Digest and assisting the NZCS Committee. I would also like to thank Alex Eagles who continues to remain as our *Coastal News* editor. Alex does a great job in writing, collating and organising our three editions of *Coastal News* each year, and ensures each edition is of high quality, reflecting the professional standards to which the Society operates. All members are encouraged to contribute to *Coastal News*, either through their local regional coordinator or by sending articles to Alex direct.

Lastly, I would like to acknowledge the significant commitment that the NZCS Executive Committee and other members of the NZCS give voluntarily to ensuring the success and continued existence of the Society.

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## NZCS Management Committee

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For any enquiries regarding Coastal News articles or advertising please contact  
NZCS Editor Alex Eagles ([penguins@clear.net.nz](mailto:penguins@clear.net.nz)).

### Seeking Contributions to *Coastal News*

Your contributions to *Coastal News* are welcome. These contributions are important to keep NZCS members informed about coastal issues in New Zealand and around the world. Contributions may be in the form of advertisements, notification about conferences or workshops, short news items, or longer articles of 400-800 words plus photos or diagrams.

For further information or to submit an idea please contact Alex Eagles, Editor *Coastal News*, on [penguins@clear.net.nz](mailto:penguins@clear.net.nz).

# Regional Coordinator Profile

*Neil Daykin, NZCS Hawke's Bay Regional Coordinator*



Neil is currently a Design Engineer with Hawke's Bay Regional Council. Prior to this his career has included clinical drug trial and waste/storm water engineering consultancy jobs in the UK. He moved over to NZ from Devon in November

2003, arriving the day England won the Rugby World Cup. After initially working in Auckland with an engineering consultancy, Neil moved to the sunny Hawke's Bay and joined the Regional Council. A BSc Hons in Earth Science from Aberystwyth University and an MSc in Applied Marine Science from Plymouth University (specialising in coastal process, management & engineering) make up Neil's academic background. He recently qualified as a member

of the Chartered Institute of Water & Environmental Managers.

His position at Council involves dealing with a diverse range of projects and council activities that include flood risk assessment, flood modelling, flood and river control works and of course being one of the coastal specialists on coastal processes, management & engineering. Neil is currently working on ongoing projects such as development of multi-user pathways along Council owned stopbanks, constructed wetlands and drain/stream development and enhancement. Neil also provides advice to the Council's consent and compliance sections over a wide range of issues especially coastal ones.

When not found at his desk, Neil can be found assessing the local coastal process from his surfboard, providing council and the Civil Defence Emergency Group with real time feed back on coastal hazards.

To contact Neil you can e-mail him at [daykin@hbrc.govt.nz](mailto:daykin@hbrc.govt.nz).

## 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 incorporates over 300 members. Members include representatives from a wide range of coastal science, engineering and planning disciplines, and are employed in the engineering industry, local, regional and central government, research centres and universities.

Applications for membership should be sent to NZCS Administrator  
Hannah Hopkins (e-mail: [hannah.hopkins@ew.govt.nz](mailto:hannah.hopkins@ew.govt.nz))

## NZCS Regional Coordinators

Every region in the country 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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# News From the Regions

## Hawke's Bay Regional News

Neil Daykin, Hawke's Bay Regional Coordinator

### Coastal And Estuarine Ecology And Water Quality

Hawke's Bay Regional Council has continued its coastal State of the Environment monitoring. Over the last 3 years this programme has been expanded from basic microbiological water quality monitoring, to include annual monitoring of estuaries, hard and soft-shore ecosystems and coastal waters.

The main finds of these programmes include:

- That nutrient levels in nearshore coastal waters are not as high as was indicated by a pilot study run in 2005;
- That levels of contaminants in estuarine sediments are generally well below levels of concern, although some point source discharge contamination has been identified;
- That background levels of trace metals in coastal sediments are generally low; and
- That the fauna associated with Hawke's Bay estuaries and sandy beach ecosystems are typical of North Island east coast estuaries and medium to highly exposed beach systems respectively.

This work has provided core information to support decision-making in the resource consent and planning processes.

In addition to state of the environment monitoring, Hawke's Bay Regional Council also investigates areas where further research or the development of monitoring programmes may be required to provide for effective management. Recently this has included investigations into the level, extent and bioavailability of common antifouling compounds in and around Napier's Inner Harbour, as well as participating in a national study looking at levels of antifouling compounds in coastal waters.

Council also undertakes work reporting on the levels of bacteria in waterways for contact recreation and shellfish gathering, including a 3-year investigation into the role of sediment resuspension in elevating bacterial levels in overlying water bodies.

### Coastal Plan Hearings

As 2008 kicks off, Hawke's Bay Regional Council's (HBRC) hearings on the Proposed Regional Coastal Environment Plan are nearing completion. A week in February will wrap up the public hearing phase, then the Hearings Panel will make its deliberations and refer its final recommendations to Council, which in turn, should be set to issue its decisions mid 2008. (Thanks to 2005 RMA amendments, Council's decisions must be issued by September 2008).

## Bund Building

Waimarama is one of Hawke's Bay most popular beaches and like many sandy beaches it has periods of erosion and accretion. In the 1990s a clay and earth bund was constructed to protect the township from storms and high seas.

Unfortunately the bund itself was prone to erosion. The steep and solid surface did little to dissipate wave energy and may have actually exacerbated sand loss during storm events. When the sea breached a section of the bund last year, the District and Regional Councils were forced to consider different options.

Instead of rebuilding the bund it was agreed to take advantage of a period of high sand deposition and create a pseudo-natural dune. HDC undertook the earthworks to reshape the bund, covering it with beach sand and fencing it off.

The Waimarama Development and Protection Society (WDPS) community group were then left to concentrate on planting out the new "dune" with spinifex and other native dune species. So far, 2500 spinifex seedlings have been planted. After only 6 months the plants have shown incredible growth and already appear to be trapping good quantities of sand. HBRC provided a Regional Landcare grant to help fund the works.

As a result of the WDPS work, they recently won the group category of the Hawke's Bay Regional Environmental Awards. This follows 3 years of community led dune restoration efforts which are ongoing and is really starting to make a difference.

The local community and general public have been generally supportive, obeying the signs and keeping out of the fenced restoration areas.

## Dune Planting

HDC have also fenced off some existing spinifex at the Pouhokio Stream at Waimarama. Maintained by local resident Ron Flowers with the aid of CAN fertiliser, the plantings have responded to their daily attention by putting on prolific growth.

Ocean beach will have some spinifex and pingao planted this year whilst Waipatiki has had the back dunes fenced and planted and the beach has had a small number of spinifex put in the fore



Waimarama bund/dune planting

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*Waimarama bund/dune after*

dunes. Waipatiki has also had the bush walk track and the coastal walkway to Aropaoanui upgraded by the PD staff.

The HDC nursery has been growing the majority of the plants for the Region, sourcing the seed from local beaches. The emphasis is changing from solely planting spinifex to planting pingao and coprosma acerosa as well.

**Wastewater Treatment**

HBRC and Wairoa DC are dealing with a proposal to construct reticulated wastewater services for several coastal settlements near Mahia. After analysis of various treatment and disposal options, land is proposed to be designated for the WDC works, while HBRC deal with the associated discharge permits. The project has already received approval for a subsidy from the government.

**Coastal Rezoning**

Hastings DC has recently publicly notified a plan change request to rezone approximately 950ha of rural land at Ocean Beach for a mix of residential and commercial developments with some areas set aside for reserves. As proposed, the rezoning would allow for clustered dwellings as well as continuation of surrounding farming activities. A large number of submissions are expected, particularly from interests keen on preserving this idyllic stretch of coast from further development.

**Where River Meets Sea**

A large number of the rivers in the Hawke’s Bay region enter the sea through beach systems. During large swell events, the waves can close off the river mouths, even during floods. To alleviate backing up of river water and resulting flooding when closure occurs, HBRC mechanically opens the river mouths.

In the six months to December 2007, there have been 13 mechanical openings across seven rivers. Table 1 shows the total number of river openings covering 16 rivers over the last eight and a half years.

**New Playground**

HDC have built a new playground at the Waimarama domain which has become very

Period	Total No. of Mechanical River Openings
July 99 – June 00	71
July 00 – June 01	53
July 01 – June 02	63
July 02 – June 03	60
July 03 – June 04	33
July 04 – June 05	53
July 05 – June 06	42
July 06 – June 07	65
July 07 – Dec 07	13

*Table 1: Total No. of Mechanical River Openings*

popular with teenagers!! Recycling bins have also been installed at Waimarama, Ocean and Waipatiki beaches to reduce the amount of glass on the beaches, hopefully!

**Auckland Regional News**

*Hugh Leersnyder, Auckland Regional Coordinator*

**Mangroves in the Spotlight**

A change to the Auckland Regional Plan: Coastal on the approach to managing the spread of mangroves was notified in October 2007. The proposed change aims to recognise the important role mangroves play in the marine ecosystem while addressing issues around the impact of the spread of mangroves into other habitats such as inter-tidal areas for wading birds and the effects on peoples' access, navigation and recreational use of the coast.

**Redeveloping Auckland's Waterfront**

Plans for the redevelopment of the western end of Auckland's waterfront took a leap forward with the notification of plan changes to the Regional Coastal Plan and the adjoining Auckland City District Plan. The area, known as Wynyard Quarter, is proposed to be re-developed from an area of industrial and commercial uses associated with marine activities and the bulk storage of liquid chemicals to a more "people oriented" area with public open space, residential, recreational and commercial activities. The proposal retains opportunities for some of the traditional maritime activities in ship repair and fishing fleet berths.

**Coastal Occupation Charge Put On Hold**

Regional Councils are required to notify a decision on whether or not to introduce a regime of Coastal Occupation Charges. While the ARC supports the principle of a coastal occupation charging regime for the coastal marine area it has resolved, at this time, to not introduce a regime. To this end a plan change to the Auckland Regional Plan: Coastal was notified in 2007.

## Wellington Region

*Iain Dawe, Wellington Regional Coordinator*

### Regional Policy Statement

Greater Wellington Regional Council is progressing through its second generation Regional Policy Statement and is set to release a draft for public consultation in March. The coastal environment section has focused on three issues of regional significance: natural character, coastal water quality and ecosystems, and coastal processes. A list of significant sites in the coastal environment has been completely revised and mapped. Sites have been assessed on the basis of their regional significance for landscape, ecological, geological and historic heritage values.

### Wellington Harbour Seafloor Mapping Project

A large scale mapping project using multi-beam side scan sonar is underway in Wellington Harbour. The project is being run by NIWA, in conjunction with DoC and Greater Wellington. The programme will involve a complete survey of the harbour to a resolution of less than one metre. This will provide detailed information on the bathymetry, sediments and ecology of the seafloor. The data will be invaluable for examining coastal issues, such as sediment transport and erosion, storm surge and tsunamis.

### Marine Education Centre

The Marine Education Centre appeal has been upheld in a controversial 2-1 split decision, quashing plans for a multi-million dollar aquarium complex at Te Raekaihau Point, on the Wellington south coast. The development was initially approved by the Environment Court in early 2007, but was appealed by group of local residents on the basis that it would destroy the natural character of a wild section of coast. The presiding judge disagreed, but was outvoted by the other two commissioners making up the three person judging panel. The other main issue on appeal was the risk from natural hazards, in particular tsunami and flooding from storm surge. In the final decision, it was felt that the hazard risk could be reasonably be mitigated, but that the natural character would be irreversibly spoilt. After considering whether or not to call it a day, the Marine Conservation Trust has decided to lodge an appeal, but it remains to be seen whether this will be followed through. The court case cost the Trust \$160,000, leaving them in debt to the tune of \$80,000.

### Tide Power Generation

A consent application has been received for a tidal energy turbine/generator in Cook Strait. The application was lodged by Neptune Energy, a Christchurch based marine energy technology company. The proposal is to anchor the turbine to the seafloor in around 50 m of water in the Karori Rip, an infamous section of water off the south Wellington coast that experiences tide flows in excess of 7 knots. The aim is to harness some

of the energy in the enormous volumes of water that flow through the area every day. The project has the twin aims of testing both the technology and feasibility of generating power from the tidal streams in Cook Strait.

### New Marine Reserve

Work on creating a new marine reserve on the Wellington South Coast is nearing completion. It will cover an area of 8.4 km<sup>2</sup> from the mean high water springs to a distance of just under 2 km offshore. This is the first marine reserve in Wellington located near a major urban area. However, this has meant that a few issues needed to be worked through because there are activities, such as some discharges, that would not otherwise be allowed into a marine reserve. An Order in Council is presently being drawn up as part of the formal gazettal process to address these issues, prior to the official opening in the next few months.

### Coastal Strategies and Plans

The Kapiti Coast District Council has recently released its coastal strategy. The aim of the strategy is to ensure the sustainable development, use and management of the coastal environment. The Council sought and received wide ranging public comment on the strategy in order to get community ownership of the plan.

The success of coastal strategies around the region has spurred the Hutt City Council to begin one of its own. A series of public meetings were held in December to get the ball rolling and get a feel for the issues that are important to the community.

Porirua City Council have sought submissions from the public on their draft Titahi Bay beach reserves management plan with a hearing due in March. Controversy has surrounded the use of vehicles on the beach and ways to manage the periodic erosion of the dunes from storm wave activity. A review of the Wellington regional coastal plan has just kicked off, beginning with an effectiveness report of how the plan has performed over the 7 years that it has been in operation.

### Waikato Regional News

*Jenni Paul, Waikato Regional Coordinator*

#### Maui's Dolphin

Environment Waikato is giving \$33,000 to the Waikato Royal Forest and Bird Society to help save the critically endangered Maui's dolphin.

Maui's dolphins are considered the world's rarest marine dolphins and are found only around the west coast of New Zealand's North Island. It is estimated there are only 110 left and of these the population may include only 60 mature animals and only 25 breeding females. Research in 2005 showed the highest densities are between Manukau Harbour and Port Waikato. However, efforts to save the dolphin are complicated by a lack of data and little or no monitoring has been done in Raglan, Kawhia and Aotea harbours.

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Environment Waikato's grant will help to fund research into whether or not the dolphins visit these areas. Acoustic pods will be placed around the harbours to record dolphin activity by researchers based at Otago University in conjunction with the Department of Conservation (DOC). The research will be peer reviewed to ensure that it accurately tests for the presence or absence of dolphins.

Information gathered during this research will help DOC and the Ministry of Fisheries develop appropriate management options for the dolphin. It will also be useful in future when Environment Waikato makes resource management decisions for these areas.

For more information please contact Kevin Collins (Kevin.Collins@ew.govt.nz).

### **Shore Futures**

The Waikato, Otorohanga and Waitomo district councils, Environment Waikato and the Department of Conservation have been working together on a joint planning project for the Kawhia and Aotea Harbour catchments termed "Shore Futures". The project team are also working with tangata whenua and other interest groups and agencies such as Federated Farmers, the Ministry of Fisheries and the Historic Places Trust. A report summarising the results of the consultation undertaken is now available online: [www.ew.govt.nz/projects/shorefutures/documents/finalconsultationreport.pdf](http://www.ew.govt.nz/projects/shorefutures/documents/finalconsultationreport.pdf).

For more information please check the Shore Futures webpage ([www.ew.govt.nz/shorefutures](http://www.ew.govt.nz/shorefutures)) or contact Jenni Paul (Jenni.Paul@ew.govt.nz), Reg Proffit (reg@otodc.govt.nz), John Moran (johnm@waitomo.govt.nz), Allan Turner (allan.turner@waidc.govt.nz) or Vicki Carruthers (vcarruthers@doc.govt.nz).

### **Aquaculture**

Aquaculture planning continues to be a busy area of work at Environment Waikato. We are still waiting on an Order in Council to declare the Wilson Bay Marine Farming Zone an interim AMA. At that time we will be applying to the Ministry of Fisheries for an undue adverse effects test and identifying 20% of the Area B part of the Zone for allocation to the Maori Trustee. That allocation will amount to 104 hectares of water space.

The Marine Farming Variation, notified in 1999, became operative in part at the start of 2007 but a single Environment Court appeal remains

unresolved and this prevents the remainder of the Variation from becoming operative.

Looking forward we are preparing to identify Aquaculture Exclusion Areas and inviting private plan changes for new AMAs. The first stage of this project will be a joint process with Auckland Regional Council.

In addition to this we are scoping out a potential plan change to allow trials of new types of aquaculture, such as Kingfish farming, within existing AMAs in the Region. Initial consultation is underway and a number of technical reports have been commissioned to investigate the impacts of fish farming.

For further information contact Graeme Silver (Graeme.Silver@ew.govt.nz).

### **Occupation Charges**

Because of the deadline in section 401A of the RMA Environment Waikato has prepared a coastal occupation charges plan change to state that no charges will be levied at this time. This is due to the fact that section 401A prevents regional councils notifying any changes to their regional coastal plans if they have not notified a coastal occupation charges plan change, and the provisions of section 64A contain too many flaws to implement. Limited consultation has been undertaken. A notification date has not been decided as it is dependent on other planning work.

For further information contact Graeme Silver (Graeme.Silver@ew.govt.nz).

### **Waikato Coastal Database**

Environment Waikato and the Department of Conservation have worked together to create the "Waikato Coastal Database", which is now freely available at [www.waikatocoastaldatabase.org.nz](http://www.waikatocoastaldatabase.org.nz).

This site describes nearly 300 datasets that contain information relevant to coastal management in the Waikato Region. The database does not contain raw data, but provides sets of metadata sheets describing information about research projects and other sources of information. Metadata includes a description of the purpose and a brief summary of the dataset, the organisation or person who carried out the research, the date when the research was carried out, specific reports and related information, availability of the information and contact details to source the information. Database searches can be made based on location, keywords, organisations or themes. There is also a searchable bibliography containing approximately 1100 references to coastal reports and scientific papers.

Ongoing improvements and updates are underway to improve the usefulness of the site and ensure it remains current and as complete as possible. If you have any comments or questions about the database, please contact Vernon Pickett at Environment Waikato (vernon.pickett@ew.govt.nz).

# Biodiversity Assessment to Guide Marine Conservation

New Zealand's marine environment is a hotspot of global biodiversity, with an estimated 65,000 marine species, 44% of which are found only in New Zealand waters (MacDiarmid 2007). The New Zealand government is striving to protect our diverse waters, and legislation has been

drafted to robustly define the process for which a network of marine protected areas will be determined. Marine protected areas, including no-take marine reserves, act to protect our coasts and oceans from fishing and destructive uses. International guidelines suggest that a functioning network of marine protected areas should be based on comprehensiveness (the full range of marine ecosystems across the marine environment that are sampled), adequacy (the level of protection required to ensure viability and integrity of populations, species and communities), and representativeness (the degree to which diversity within each marine ecosystem is protected and therefore represented in the network).

One major challenge to designing marine protected area networks is assessing biodiversity across the entire New Zealand EEZ. We have an extensive coastline and EEZ, ranging from sub-tropical to sub-Antarctic waters. In some places, particularly in well populated coastal areas or near university marine stations, biodiversity information exists to assist in decision-making about designating marine protected areas. We also have some very good datasets describing the distributions of fish species in offshore waters. However, other coastal and offshore areas are either more remote or have not been surveyed due to lack of resources. This lack of information on biodiversity in much of NZ's EEZ doesn't mean that we lack information to make conservation decisions, only that we must make use of other techniques to inform policy.

## Environment-based models

One new technique is using environmental variables to develop predictions about where we

should expect to find various species and habitats. NIWA has been a leader in developing classification systems for marine environments based on environmental variables. The 'Marine Environment Classification' (MEC) is one such classification for the NZ EEZ that splits our coasts

and oceans into different classes based on environmental variables including tidal currents, sea surface temperature, depth, and other variables that correspond to factors that influence biotic distributions (Snelder et al. 2006). The MEC correlates well with biological datasets such as demersal (bottom-dwelling) fish and chlorophyll-a (representing phytoplankton) (see Figure 1).

More recently, strongly 'tuned' classifications have been produced based on detailed knowledge of the drivers of particular groups of species, e.g., demersal fish — current work is

exploring the development of a parallel classification tuned to benthic invertebrates.

## Predicting species distributions

Another approach that allows us to make maximum use of patchy biological data is to use statistical procedures that allow us to develop detailed predictions of individual species occurrence and patterns of abundance across extensive areas. For example, NIWA researchers have used a Ministry of Fisheries dataset of demersal fish trawls covering depths that are subject to trawl fisheries (200 m to 1950 m), in combination with environmental variables, to predict catch per unit effort for 122 bottom dwelling fish species across 1.59 million grid cells, each of 1 km<sup>2</sup> (Leathwick et al. 2006). What is important to note here is that actual data on fish biodiversity were only available for 21,000 of the total cells – less than 2% of the total area. Yet, understanding how the environmental variables correlated with the available information describing fish abundance allowed us to generate

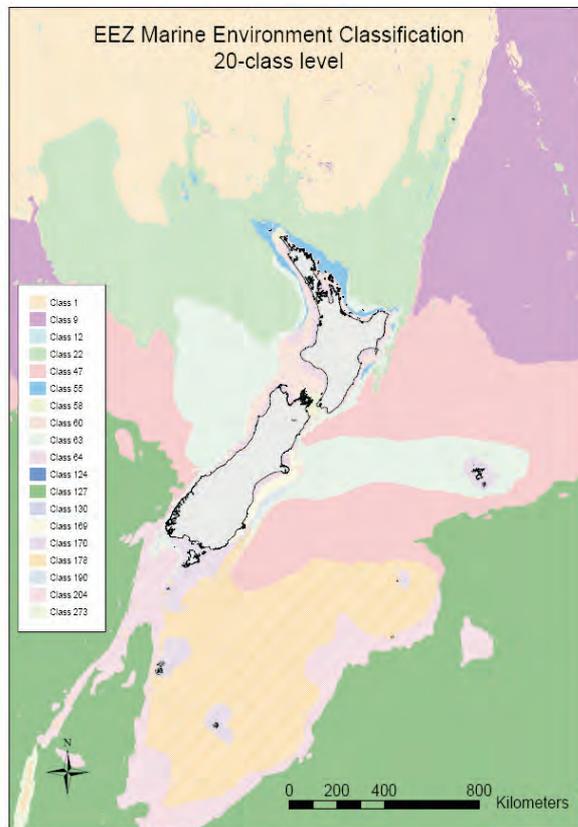


Figure 1: Example of 20 class Marine Environment Classification

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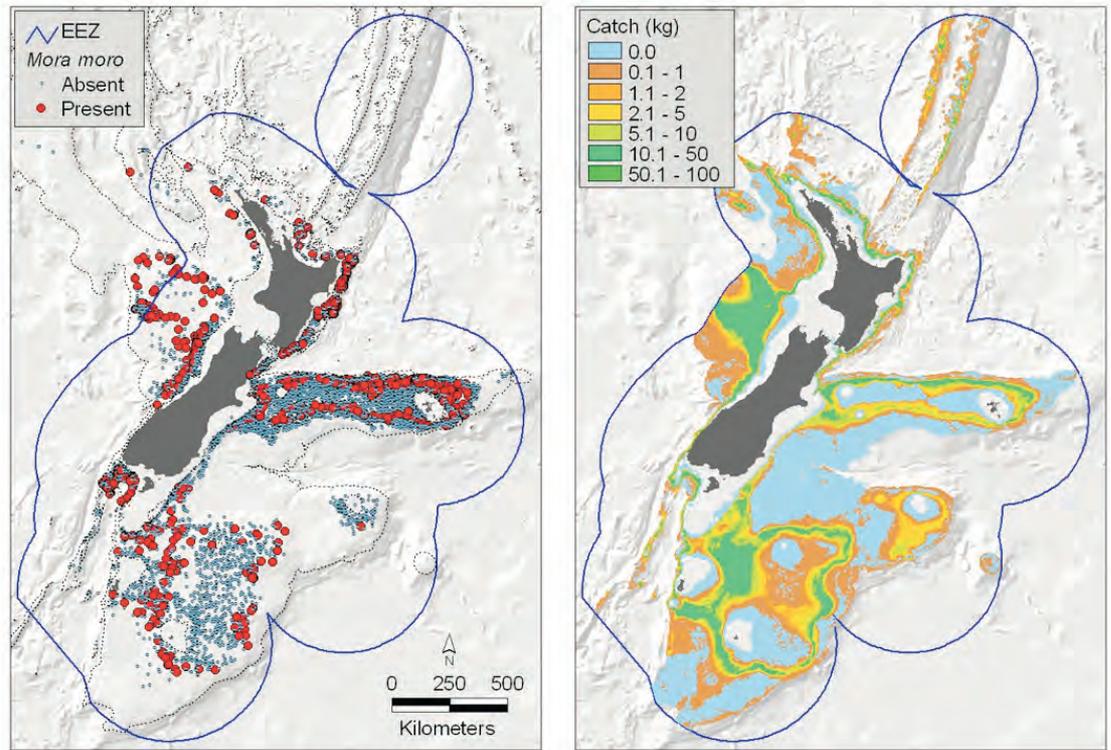


Figure 2. Example of predicted presence/absence and catch across trawlable cells in the NZ EEZ

accurate predictions of fish abundance across the remaining cells. These predictions have been validated with independent fish datasets, and show the value of using advances in statistical techniques to help us estimate biodiversity in places that logistics and resources have not yet allowed us to sample (see Figure 2).

### Determining biodiversity

Once species distributions have been estimated, many tools have been developed to prioritise areas based on biodiversity. Two common tools are MARXAN and ZONATION, each with different assumptions and methods that result in optimal marine protected area designs.

NIWA has ranked trawlable areas in the NZ EEZ based on their value for biodiversity of demersal fishes. Different model options allow different weighting schemes for each cell based on the proportion of each species' range that it protects, what proportion of endemic species are predicted to be present in the cell, and the relative cost to

fishers in terms of reductions in catch if an area is protected from fishing (see Figure 3).

Much of the value of these decision-making tools is that you can weigh the biodiversity benefits that might be gained from protecting a particular area versus the costs imposed on fishers or other users of the marine environment. In addition, ranking of the value of the cells for biodiversity allows for flexibility in choosing between equivalent cells, thus allowing for choices that

can satisfy biodiversity needs as well as minimise economic costs to users of the marine environment.

NIWA is currently completing a comparative analysis of both packages to give decision-makers guidelines on which software works best for their needs based on data availability, the size of the area to be modelled, and how societal or economic values are to be included.

### Conclusion

We have identified how advances in the development of robust environment-based spatial classifications of marine biological and environmental resources

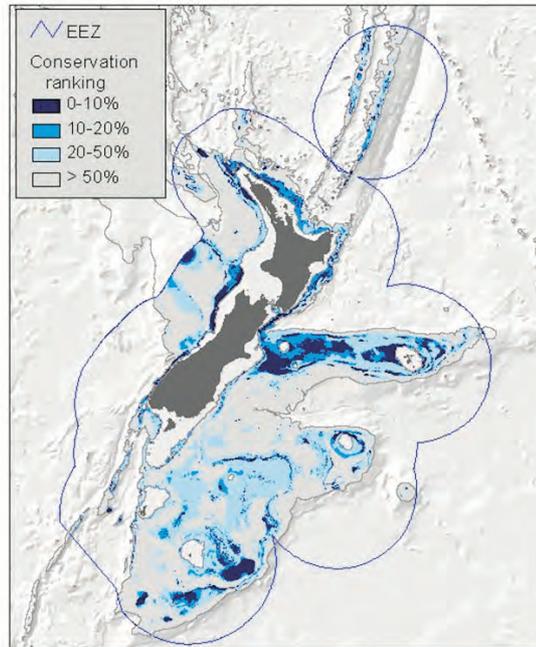


Figure 3: Ranking of cells using ZONATION based on demersal fish biodiversity predictions, without including species weighting or costs. Cells are ranked in order of decreasing priority, such that top priority cells have Conservation Ranking of 0-10%.

can enable the identification, prioritisation and management of marine ecosystems.

While it is unlikely that we will be able to survey every kilometre of coastline and ocean environment in the NZ EEZ, these new statistical techniques can give us robust estimates of biodiversity across large areas and also assist in the decision-making processes.

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## Conferences and Workshops

### Solutions to Coastal Disasters 2008 Conference

April 13-16, 2008, Oahu, Hawaii

The Coasts, Oceans, Ports and Rivers Institute (COPRI) of the American Society of Civil Engineers (ASCE) conference program will explore coastal disasters such as the Indian Ocean Tsunami and Hurricane Katrina and solutions that can be applied to the array of potential future disasters facing the coast.

Topics will include: community hazard response and planning, sea level rise, Pacific Ocean storm events and surf forecasting/storm evacuation, changes in extreme wave climate, coastal structures & levee vulnerability, coastal hazard mitigation – sea grant, tsunami, planning & preparedness, tsunami numerical modeling, using historic tsunami deposits to assess tsunami risk, FEMA flood mapping tools, hurricanes and storm surge, cyclone and inundation monitoring, coastal inundation and flooding tools, marine facilities, shoreline retreat, non-structural shoreline management, beach nourishment, shoreline erosion and coastal structures and coastal hazard mitigation.

### IOC/WESTPAC Symposium on Natural Hazards and Changing Marine Environment in the Western Pacific

May 21-25, 2008, Kota Kinabalu, Sabah, Malaysia

Topics at the symposium will include:

- Effects of climate change on the Western Pacific;
- Coastal and offshore processes in the Western Pacific and their measurement;
- Marine environmental forecast and data management; and
- Marine ecosystem health.

For further details visit the website [www.ums.edu.my/conferences/iocwestpac](http://www.ums.edu.my/conferences/iocwestpac).

### ICCE 2008

August 31 - September 5, 2008, Hamburg, Germany

The Coastal Engineering Research Council (CERC) of the American Society Of Civil Engineers (ASCE), the German Society for Port Engineering, the German Coastal Engineering Research Council and various other German coastal engineering institutes invite you to attend the 31st International Conference on Coastal Engineering.

For further information visit:  
[icce2008.hamburg.baw.de](http://icce2008.hamburg.baw.de).

### 2008 ICCE International Symposium on 'Sediment dynamics in changing environments'

December 1-5, 2008, University of Canterbury, Christchurch, New Zealand.

The International Commission on Continental Erosion (ICCE) conference is this year being organised by NIWA, Landcare Research and the University of Canterbury.

The field trips will visit the gravel bed rivers of the Canterbury Plains, which act as a conveyor belt transporting sediment out of the uplifting Southern Alps into the Pacific Ocean, and the Canterbury coastline to observe the intense coastal erosion and transport happening in that area.

The Scientific Programme will be organised around four themes:

- Scaling issues in sedimentary systems - point to continents.
- Dating and source tracing technologies.
- Global change and erosion.
- Linking erosion with environmental and societal impacts: sediment production, river regulations, depositional environments, hazards and risks, management and policy.

For more information visit [www.civil.canterbury.ac.nz/icce2008](http://www.civil.canterbury.ac.nz/icce2008).

# New Zealand Coastal Society Conference – Pushing the Boundaries

Aptly named “Pushing the Boundaries”, the New Zealand Coastal Society annual conference held in Tauranga 21 – 23 November 2007 provided an ideal forum for a broad range of practitioners interested in coastal issues to share their experiences, increase their knowledge and understanding and catch up with mates beside the sea!

The conference was opened by the Mayor of Tauranga City, Stuart Crosby, who highlighted the value the Tauranga community place on their coastal environment in the face of significant urban growth pressure. Tauranga is one of the fastest growing cities in the country. There’s a lot going on with redevelopment of the waterfront, construction of the duplicate harbour bridge, artificial surf reefs at the Mount and communities taking an active interest in their beaches and estuaries.

A diverse range of topics was discussed in the conference papers and associated field trips including planning for growth in coastal communities, coastal hazard management, climate change, marine ecology (that thorny issue of managing the expansion of mangroves in urban estuaries!), coastal processes and innovative engineering solutions to coastal issues.

The Port of Tauranga shares the Tauranga Harbour with many users. Keynote speaker Mark Cairns (CEO of Port of Tauranga) described the challenges facing one of the country’s largest and fastest growing ports and provided his insight into the future of port operations in New Zealand. Improving efficiencies through a consolidation of New Zealand’s ports to maintain an internationally competitive position was an important message in Mark’s presentation.

A contrasting keynote presentation was given by John Forbes, Mayor of the Opotiki District Council. Outlining the social and economic challenges facing his community, John described the vision his Council has for turning the tide. This hinges on improving employment opportunities and economic growth founded on a 4,000 ha off-shore aquaculture venture in the Eastern Bay of Plenty. This really is pushing the boundaries, with new technologies in a growing industry.

Providing the necessary infrastructure to support the industry and working through the myriad of resource management issues will require considerable perseverance, resilience and innovation.

The direction of use and development of New Zealand’s coast will be shaped to a significant degree by the pending release of the review of the New Zealand Coastal Policy Statement. A presentation to the conference given on behalf of

the Minister of Conservation, the Honourable Steve Chadwick, foreshadowed some of the direction proposed. The release of this important policy document is awaited with interest.



## NZCS Conference 2008

The next NZCS conference will be held in New Plymouth in November.

For further information contact Kate Giles  
[kate.giles@trc.govt.nz](mailto:kate.giles@trc.govt.nz)

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# Fish Farming Lessons From Australia

*As a coastal planner who spends a lot of time thinking about aquaculture, I often hear how well the Aussies do it. So when there was an opportunity to visit South Australia I leapt at the chance to see it for myself and talk to the officials who regulate it. So in May 2007 I found myself in South Australia visiting tuna, kingfish and mullet farms, and meeting the executive director of PIRSA: Aquaculture and some of his staff. This is what I found out...*

## Aquaculture in South Australia

Aquaculture in South Australia is a major industry employing 1900 people and generating another 1500 flow-on jobs. Farmed species are tuna, kingfish, mullet, abalone, oysters and mussels. In 2004/05 it earned a total revenue of A\$518.2 million. For comparison New Zealand's aquaculture industry earns a bit over \$300 million.

The industry is concentrated around the fishing harbour of Port Lincoln (pop. 15,000) on the Spencer Gulf, some 250km distant (as the kookaburra flies) from Adelaide (pop. 1.1 million). Over the last decade Port Lincoln has undergone a major economic transformation on the back of the aquaculture industry, largely as a result of the development of tuna farming. Once known as the suicide capital of Australia it now claims to have highest number of millionaires per capita.

Currently Southern Bluefin Tuna cannot be produced in a hatchery so they are caught in the Southern Ocean under an international quota system, placed in 40 metre diameter pens and towed slowly back to the Gulf. Along the way divers check the nets for damage and gently encourage any sharks that have got in to depart the way they came. A risky job but the sharks are usually well-fed at this point.

The tuna are fed whole fish (usually mullet) for about 6 months then individually harvested at around 35kg each, air freighted to Japan and auctioned at the fish markets. A single fish can go for upwards of \$2000.

## Planning and regulation of the industry

Aquaculture is managed by the Primary Industries and Resources Department of the State Government (PIRSA). Policy and zoning for

aquaculture occurs through a combination of legislation, regulations and management plans. The Aquaculture Act 2001 has the objective of "promoting ecologically sustainable development of marine and inland aquaculture", "maximising benefits to the community from the State's aquaculture resources", and "ensuring efficient and effective regulation of the aquaculture industry".

The Aquaculture division of PIRSA has the responsibility of ensuring the sustainable development of the industry, and the department as a whole has a target of trebling the value of South Australia's primary industry export income to A\$25 billion by 2013 (exports were A\$9 billion in 2006). PIRSA: Aquaculture has a staff of 15 led by an executive director with decision making powers delegated from the Minister of Fisheries and a budget of A\$2.2 million.

Management plans are developed in consultation with stakeholders, the public and other government departments but no appeals are possible. The plans set policies, create zones, and set limits on the amount of space that can be occupied and the tonnage of fish or shellfish that can be farmed within the zone. These plans typically take nine to twelve months to prepare and are frequently reviewed. A management plan for the Port Lincoln area gazetted in 2003 was reviewed and replaced in 2007.

## Permits and the approval process

The permitting process in South Australia is, if anything, longer and more involved than that under the RMA. A farmer must obtain a lease, a licence and a development approval before they can put a line or cage in the water, and the process involves multiple agencies of the state government – PIRSA, Aquaculture Tenure Allocation Board, Department of Environment and Heritage, Development Assessment Commission and the Environmental Protection Authority to name the major ones. However, obtaining all three is expected to take just six to nine months.

There are two main reasons for the speed with which all this paperwork can be processed: one

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is the resourcing that is put into the process, but the main one is the lack of opportunities for public participation and appeals. The only point at which third-party appeals are possible is at the development approval stage, and only if that is publicly notified. As most applications are within aquaculture zones, they are not normally notified.

However this is coupled with more draconian powers on the part of the state government officials. An adaptive management system is applied under an environmentally sustainable development framework. Officials of PIRSA:Aquaculture are of the view that this requires a responsive and fast regulatory environment to be effective. This is possible in SA because changes to the conditions of a licence can be made simply by a phone call. Failure to comply can result in fines of up to \$35,000 and the licence can be cancelled.

Monitoring of fish farms appears to be limited to surveys of benthic impacts on the boundary of the lease area. These are surveyed annually and compared to control sites at least 1 km from the farm.

### Leases vs licences and occupation of space

Officials at PIRSA:Aquaculture are adamant that the separation of leases and licences is essential. The lease provides the right to occupy the space and the licence the right to use the space for aquaculture. The licence can be revoked easily but the farmer will retain the lease and can re-apply for a licence. This is intended to give the farmers greater security of tenure while allowing stricter controls over the activity.

This is similar to the separation of a RMA section 12(2) consent for occupation of public space, and section 12(1) and 12(3) consents for structures and activities. However, under the RMA the criteria for decision making are essentially the same and are limited to sustainable management issues.

In South Australia decisions on the lease are made by the Aquaculture Tenure Allocation Board. The Board considers a range of criteria including, but not limited to, the nature of the proposal, economic benefit to the state, technical and business



capability, and environmental management capability. There is no equivalent under the RMA and I believe this is a flaw in our coastal management system – no one can properly wear the hat of the landowner in the RMA decision making process.

### Lessons for NZ

Examining the South Australian system for managing aquaculture has been a useful exercise and several points can be taken from it. However, the fundamental differences in the governmental and legislative frameworks prevents any simple translation of their system into ours.

The South Australian state government has set itself a goal of boosting primary industry exports and aquaculture is expected to contribute to that. The system in place has been successful in supporting rapid growth and it is clear that this success is dependent on a much higher level of resourcing than is possible at a regional level in New Zealand, and at the cost of greatly reduced public participation compared to the RMA. It may possibly be at some cost to the environment but that could not be determined (or ruled out) during the study tour.

The Aussies are to be applauded for achieving significant growth in their aquaculture industry but I doubt that NZ would be willing to accept the system they have used.

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