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Early morning at Manaia Harbour (Coromandel)

Nga Waihotanga Iho – the Estuary Monitoring Toolkit for Iwi

Estuaries are the meeting place of land and sea; they integrate and accumulate the effects of activities on the land. Environmental changes that occur in estuaries due to land-based activities include increased water turbidity and sedimentation, loss of species, mangrove spread, algal blooms and contaminated kaimoana. Many of these environmental changes may occur gradually – over years or even decades – and may not be recognised at an early stage.

These environmental changes can have significant impacts on Maori, who value estuaries for a number of reasons: as spiritual places, including their healing/meditative properties; as a source of identity and cultural history; as a context for learning and customs; for recreation and as a food basket. Estuaries provide kaimoana as nourishment not just for the local community but also for neighbouring inland communities.

Traditionally, tangata whenua have informally accumulated information about environmental change in their estuaries to monitor resources, such as kaimoana, and to make decisions about conservation measures, such as rahui. However, when it comes to decision making within the

framework of environmental legislation (such as the Resource Management Act) science-based tools are often needed to complement the traditional knowledge and kaitiakitanga responsibilities that tangata whenua have practised for centuries.

In this context, Nga Waihotanga Iho (translation: what is left behind, lift up), the estuary monitoring toolkit for iwi, has been developed to provide tangata whenua with tools to measure environmental changes in their estuaries. While Nga Waihotanga Iho is based on sound science principles, it is also underpinned by tangata whenua values. The toolkit is comprised of a series of modules: habitat mapping; sediments; water and sediment quality; plants; fish; shellfish and coastal management. A unique feature of the toolkit is that the manual will be available in both Te Reo and English. In this article, we talk about the objectives of Nga Waihotanga Iho and provide a brief overview of the toolkit development process.

Objectives

The key objectives of Nga Waihotanga Iho are to:

- empower tangata whenua in the resource management decision-making process;



Manaia mangroves.

- provide easy-to-use, inexpensive and robust tools for tangata whenua and community groups to monitor environmental changes in their estuaries;
- provide an educational resource for high-school students to use in their science studies.

The project has unfolded in three phases: (1) detailed consultation with two hapu groups on the east and west coasts of the North Island; (2) toolkit development; and (3) field trials.

Phase 1 Consultation

For the toolkit to be effective and relevant to Maori, it must address those changes in the estuary/harbour environment that affect activities and goals of value to the tangata whenua. Such values may be economic (e.g., tourism, commercial fisheries), social (e.g., health and safety, recreation), cultural (e.g., collection of kaimoana, retention of matauranga Maori, mana, wairua, taonga species, kaitiakitanga) or specifically environmental (e.g., indigenous biodiversity, clean water, fresh air). Thus, the first phase of the project aimed to identify and prioritise tangata whenua values. To achieve this, we worked with Ngati Hikairo at Kawhia (West Coast) and Ngati Whanaunga and Ngati Pakenga at Manaia (Coromandel). Information on values and observations of environmental changes in these two estuaries was collected through detailed interviews, hui and a survey questionnaire that was widely distributed within each hapu. NIWA scientists and hapu members also took part in field trips to discuss the environmental changes that they have observed at Kawhia and Manaia over the last 50 years or so. A common theme for both hapu was that activities occurring on the land have affected estuaries and their resources. Estuaries are valued by tangata whenua:

- as a source of identity;

- to support mana and wairua of the iwi;
- for learning and custom, traditional knowledge;
- as Turangawaewae – a source of health;
- as a place of beauty and spirituality, connection with Tangaroa;
- as a source of kaimoana to share with guests and for special occasions;
- for recreation with hapu and whanau;
- for commercial value and employment.

These values have been compromised to some extent by environmental changes in the estuaries and their catchments. Observations of changes include:

- decline in the number and size of fish and shellfish;
- introduced plants and animals displacing native species and/or modifying the environment;
- increased sedimentation;
- deposition of more muddy sediments;
- decline in water quality, for example reduced water clarity, contamination of water and kaimoana due to runoff of human and animal waste;
- greater competition with visitors for kaimoana and other resources.

Based on consultation with our hapu partners, the NIWA team were then able to design, develop and test the toolkit so that it targets those environmental changes that impact on the most important and representative of these values.

Phase 2 Developing the Toolkit

In the second phase of the project we identified and developed easy-to-use but robust tools for



Measuring mangroves.

Nga Waihotanga Iho. A number of different monitoring tools were considered, trialled, and some were discarded in the process. The final set of tools is grouped into general themes that relate to physical, chemical and biological aspects of estuaries. The toolkit manual, which provides a general resource as well as a step-by-step description of methods, is arranged into several modules that focus on different aspects of monitoring estuaries.

- About this toolkit: a general introduction to the toolkit, what's an estuary, why monitoring, the estuary life cycle, human impacts, developing your estuary Monitoring Action Plan (MAP), some practical matters, health and safety.
- Habitat mapping: tools to map estuarine environments, their plant and animal communities and how these habitats change over time.
- Sediments: tools to describe sediment types, measure sedimentation rates and estuary morphology.
- Water and sediment quality: tools to measure the quality of estuarine waters and sediments and how these change over time. This module includes a tool to measure concentrations of E.coli and total faecal coliforms in water samples. This tool has specifically been developed by NIWA to measure faecal contamination of freshwater and estuarine waters and includes an incubator for the Petrifilm plates on which samples are incubated. The concentrations of these pathogens can then be related to water quality guidelines (e.g., drinking water, contact recreation, shellfish).
- Plants: tools for describing plant species and communities, vegetation cover, and the changes that occur in plant communities over time.
- Tidal flat ecology: tools to monitor changes in

size (i.e., area) and density of shellfish beds, shellfish size and the community composition.

- Fish: tools to measure the size and abundance of fish species and to monitor recreational and customary fisheries in an estuary.
- Coastal management: a guide to legislation relating to the management of the coastal environment and its resources, including estuaries. This module also outlines the roles and responsibilities of central and local government agencies and includes information about planning documents, such as regional policy statements, regional plans and district plans. It also reviews the resource consent process and includes information about how tangata whenua can become involved in the decision-making process. This module has been written by planning and science staff of Environment Waikato specifically for the toolkit.

Each module has been designed so that they can be used 'stand alone' or together, depending on the range of environmental issues to be considered.

Phase 3 Field trials

In February 2009, the project advanced to its next phase: field trials. NIWA scientists from the Hamilton, Auckland and Wellington campuses converged on Manaia estuary and spent four days working with participants from Ngati Whanaunga, Ngati Pukenga and the Coromandel Area School. The intention of the trials was to evaluate how easily the tools can be used and to identify how the tools could be improved. The field trial at Manaia was hugely successful with participants providing valuable feedback on all aspects of the toolkit. As a final step, the participants will use the toolkit independently over the next several months. Their feedback will be incorporated before Nga Waihotanga Iho is finalised and the manual translated into Te Reo. It is intended that similar field tests will be carried out at Kawhia with Ngati Hikairo in the near future.

Acknowledgements

Nga Waihotanga Iho has been developed as part of NIWA's FRST-funded Effects-based Protection and Management of Aquatic Ecosystems programme (contract C01X030), with additional Capability Funding for the development of the bacterial water-quality tool and field trials at Manaia. We are grateful to Environment Waikato for their support and involvement in the development of Nga Waihotanga Iho. NIWA Scientists involved in the project: Michael Ahrens (water quality), Rupert Craggs (plants), Carolyn Lundquist (habitat mapping and benthic ecology), Fleur Matheson (plants), Mark Morrison (fish), Rebecca Stott (water quality) and Andrew Swales (project co-ordinator, sediments).

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Photo credits: Alastair Jamieson (Wild Earth Media).



Measuring water quality.



Resource Management Act Reforms Underway

Coastal News



The Resource Management (Simplify and Streamline) Amendment Bill 2009 (Bill) has been introduced to Parliament, following its own streamlined development process. The Bill will now undergo Select Committee review. The deadline for submissions to the Select Committee was 3 April 2009.

The Bill is phase one of a two phase reform of the Resource Management Act 1991 (RMA). Phase one of the reforms aims to streamline consenting for major projects and speed up the processing of resource consents generally. It also seeks to change how councils set their planning rules and how they change existing plans.

The Bill as drafted has some significant changes that will impact those undertaking development in the coastal marine area.

Major projects

The reforms will allow fast-tracking of resource consent applications for major infrastructure projects. They create an option for resource consent applications to be considered by a new Environmental Protection Authority (EPA). An applicant will be able to lodge a matter with the proposed EPA if the applicant considers that the matter "is, or is part of, a proposal of national significance."

A "matter" includes an application for a resource consent, a notice of requirement for a designation, a notice of requirement for a heritage protection order and a request for a private plan change. The Minister of Conservation alone will be responsible for dealing with matters relating wholly to the coastal marine area. Previously the Minister for the Environment also had a role in considering those matters.

The EPA can recommend that the relevant Minister call in the matter or direct that the matter be referred to the relevant local authority. If a matter is called in, the Minister will direct that the matter be referred either to a Board of Inquiry or straight to the Environment Court.

The Bill also contains the ability for resource consent applicants to by-pass a local authority hearing by requesting direct referral to the Environment Court. The relevant council must approve the referral. The aim is to reduce time and costs for all involved where matters will inevitably be appealed.

Consent for restricted coastal activities

The Bill proposes to remove the requirement for the Minister of Conservation to give consent for restricted coastal activities. As proposed, the

regional council would make the decision. However, the regional council must delegate its powers to hear and decide the application for a restricted coastal activity to one or more employees or commissioners, appointed by the local authority. The delegates must include one person nominated by the Minister of Conservation.

The Council must serve a notice of that decision on the Minister of Conservation. The Minister of Conservation will be able to appeal the regional council's decision in whole or in part.

Significantly, in respect of coastal permits for restricted coastal activities the Minister of Conservation will be added as a person who can oppose the whole or part of any decision of a consent authority, or an application for a coastal permit, change of permit conditions or review of permit conditions.

These changes, plus those flagged in phase two of the reforms suggest that the role of the Minister of Conservation and processing of restricted coastal consents may be in flux for some time to come.

Improving council planning processes

The Bill strengthens the role that national policy statements and national environmental standards have in directing regional and district planning. Coastal planning is likely to benefit from greater direction and clarity from these central government instruments.

Rights to appeal to the Environment Court against a council decision on a plan change will be limited to questions of law. However, an applicant will be able to apply to the Environment Court on a case-by-case basis to request that the Court hear other matters. The ability to challenge an entire plan change will also be restricted.

The requirement for territorial authorities to review their policy statements and plans not later than 10 years after the plan became operative is removed under the Bill. It is replaced with a mandatory requirement for territorial authorities to commence a full review of its district plan if its plan no longer assists the authority to carry out its functions. The Minister may direct a territorial authority to review all or part of its district plan.

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The requirement for regional councils to review policy statements and plans remain. The Minister for the Environment may also direct a regional council to review all or part of its regional plan. In respect of regional coastal plans, the Minister of Conservation can direct the regional council to undertake a review.

Improving resource consent processing

The Bill proposes a number of new categories for assessing notification. Applications will be fully notified if the proposed activity would generate adverse effects beyond the “immediate environment”. Limited notification will be restricted to directly affected persons who have not provided written approval for the application. Notification will be prohibited for all applications generating minor adverse effects on the environment.

Councils will also be able to make specific rules in their plans about if or when notification will occur. Such rules will be able to override the notification regime in the RMA itself.

Other changes designed to speed up consent processing include limiting the ability for local

authorities to “stop the processing clock” when requests are made for further information from applicants.

Future Steps in the Reform Process

The Select Committee is to report back to parliament in June. The Bill will then undergo further parliamentary debate.

The Government’s aspiration is for the Bill to be passed into law by September 2009. In the meantime, the Government will be making preparations for phase two of the reforms.

Phase two of the reforms relate to aquaculture, freshwater management, urban design, infrastructure development and the Public Works Act. Phase two will also further cover the establishment of the Environmental Protection Agency. Persons interested or affected by part two proposals should consider now what reforms they would like made to these areas.

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Coastal



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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)

Past, present and Future – Predicted Evolution of Coastal Wetlands on the West Coast of New Zealand

Coastal News



This article details the work of Claire L. Kain, one of the two 2008 recipients NZCS Masters research scholarships.

The wetland systems associated with rivermouth lagoons are amongst the most dynamic of coastal environments, actively responding to changes in climate, sea level, tectonic and anthropogenic drivers. This is particularly true of coastal wetlands on the West Coast of New Zealand's South Island. In this setting a high-energy coastal-marine boundary combines with extreme weather patterns and the high-sediment yields delivered from nearby mountains to produce continual and often rapid changes in receiving wetland systems (Neale et al., 2007). As such, it is important to understand the functioning and evolution of the local coastal environment in order to effectively manage these systems, particularly as concerns of climate change and sea level rise grow.

Compared to other regions around New Zealand, little research has been undertaken on the South Island's West Coast. One consequence is that the coastal history and processes of the region are not currently documented or understood to the level required for making detailed coastal management decisions and plans (Goff et al., 2003; Kain, 2008). The purpose of this research is to investigate two representative coastal systems in the West Coast region, with the aim of documenting their evolution over the Holocene and relating this to their present-day topography and dynamics. This information will then be used to predict their future under changing climate, development and management scenarios. In addition to adding to the West Coast knowledge base, it is important that the scientific and management models presented in this research offer insights that may be applied or explored within similar systems elsewhere in New Zealand and globally.

Coastal wetlands and lagoons are considered to be transient features on a geological timescale, forming and evolving over relatively short time periods (Carter and Woodroffe, 1994; Kjerfve, 1994). Lagoons form as a result of the infilling of coastal depressions, reentrants or river mouths which become separated from the sea by a barrier and can be classified according to their degree of water exchange with the marine environment (Kjerfve, 1994). While occurring on wave-dominated coasts, the rivermouth-wetland lagoon systems researched here have relatively modest inputs of seawater and are predominantly fed by fluvial freshwater inputs.

The two coastal systems were chosen for this study based on their Westland location, high conservation values and comparatively-low levels

of anthropogenic modification and constraint. Totara Lagoon is an extensive, predominantly-freshwater lagoon, stretching 10 km north from the Totara River mouth (Figure 1). Shearer Swamp is a wetland complex bounded by, and draining through, a network of creeks on the northern side of Bold Head (Figure 2). This swamp is linked to Waikoriri Lagoon, a small hapua-type waterbody situated at the southern end of Shearer Swamp. This lagoon forms a channel behind the foreshore where the swamp's creeks discharge into the high-energy marine environment (Hart and Single, 2004). The presence and extent of Waikoriri Lagoon is highly variable and the position of the opening can change rapidly in response to storm events, water and sediment inputs and human forcing. Currently there is no waterbody evident as the barrier breached at the stream mouth during a storm in late 2008, draining the lagoon feature and high-wetland water levels of the previous five years.

As a consequence of the dynamic nature of these



Figure 1: Totara Lagoon - the present-day northern extent, approximately 10 km from the rivermouth (Dec. 2008)



Figure 2: The northern end of Shearer Swamp (Dec. 2008)

systems, a multidisciplinary approach will be used to investigate their evolution, structure and processes. The use of differing and complementary techniques allows a more robust and coherent set of results from which to construct the past and predict the future evolution of such systems (Goff et al., 2001). Assessing the current state of the systems involves the use of aerial photograph analysis of historical shoreline change, topographic surveying using Geographic Navigational Satellite Systems (GNSS), and water property and level records to investigate the hydrology. Analysis of sediment core stratigraphies, sediment textures and microfossils will be used to determine the Holocene evolution of each site while radiocarbon dating will allow this to be anchored to a timescale (Glew et al., 2001). These results will then be synthesized in the form of a model of the processes and associated responses operating over a range of time scales in the two wetland-lagoon systems under study. These models will then be used to evaluate different scenarios for the systems' responses under future-predicted environmental and anthropogenic conditions.

To date detailed topographic surveys have been conducted on representative sections of each field site and both short-term and long-term hydrological measurements made at each field site (Figures 3 and 4). This work was undertaken between September and December 2008, with the next fieldtrip scheduled for early March 2009 to take sediment cores for the reconstruction of Holocene evolutionary history. The collective set of results will be incorporated into a morphodynamic model towards the end of 2009. Although the project is still in its early stages, the potential for useful results and scientific implications is apparent. The study aims to enhance the local coastal research base and provide useful information to inform council authorities in making management decisions on the West Coast, a region that has an exciting and dynamic but, sadly, understudied coastline.

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Figure 3: GNSS surveying of the southern, rivermouth, end of Totara Lagoon (Dec. 2008)

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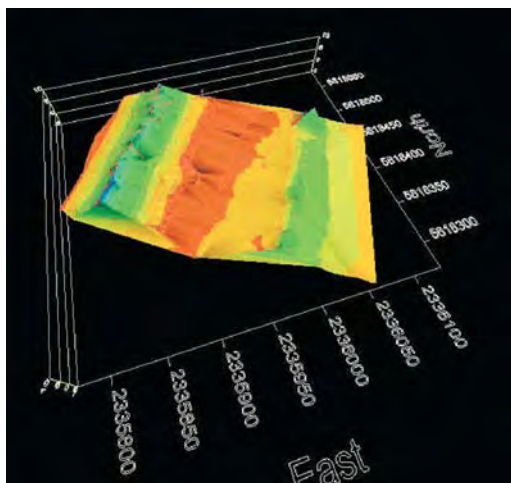


Figure 4: Preliminary topographic model of a section of Totara Lagoon from the results of the GNSS survey. Green and blue colours indicate the dune ridges on either side of the channel, which is shown in red and dark yellow in the centre. The red and yellow areas to the left of the picture represent the beach while those to the right show the landward-sloping surface of the second dune ridge.



Advanced Numerical Modelling of Moored Vessel Motions



Until recently the motion of moored vessels was a technically challenging and computationally intensive task to assess using numerical modelling techniques. In studies where vessel motions are induced by complex non-uniform flow-fields, such as wave-agitation in a harbour basin, or where motions are caused by vessels passing in close proximity in confined channels, the most common option was to carry out expensive and time consuming physical model tests. Recent advances in numerical modelling, however, have now made it possible to carry out these types of studies efficiently using numerical modelling tools to provide a cost effective and less time consuming alternative to conducting physical model tests. The current numerical modelling tools have been shown to accurately reproduce observed vessel motions.

During recent years, long period moored vessels motion induced by nearby passing vessels, has been of growing concern to harbour masters and port officials around the world. The phenomenon becomes particularly problematic for large vessels moving in constrained areas such as rivers and narrow estuaries, which can induce a surge motion in nearby moored vessels of several metres causing hazardous conditions at the berth. Growing ship sizes and increased port traffic calls for regulations dictating minimum vessel passing distances and speed limits, as well as optimization of the mooring system of the affected vessels in order to increase operational time.

The Port of Brisbane Corporation needed to investigate the potential for building berthing

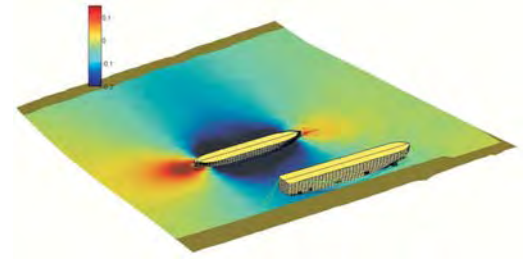


Figure 1: The WAMSIM model shows the effect of the waves from a passing ship on a moored vessel.

facilities for car carriers at the Port West Estate on the Quarantine Flats reach of the Brisbane River. As part of the planning studies, DHI Water & Environment was commissioned to investigate moored vessel movements at the conceptual berths as a result of passing vessels in the navigation channel and to recommend measures to reduce the risks of adverse motions and allow for safe mooring.

DHI had undertaken previous studies of moored vessel motions at the Port of Brisbane that identified displacement waves generated by passing vessels as the cause of the observed severe motions. Subsequently, an extensive physical modelling study was conducted to assess the factors causing the motions and to define mitigation measures to reduce the motions. Building upon the results of the previous studies, the current study was able to use numerical modelling techniques in place of physical modelling to simulate moored vessel motions at

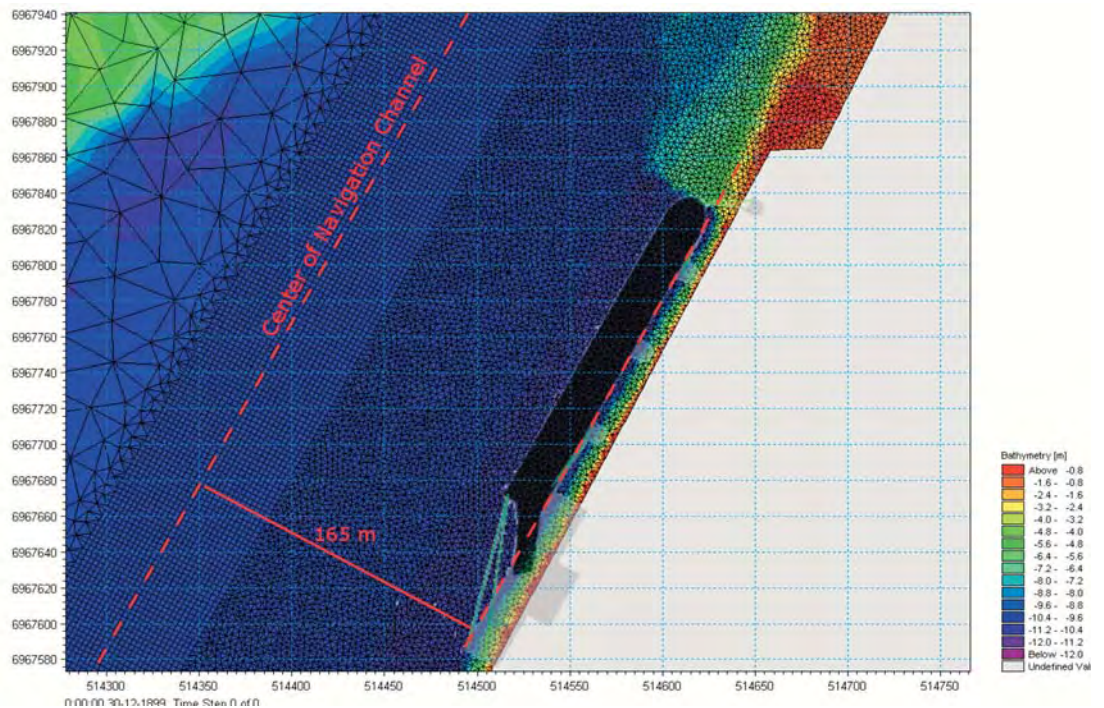


Figure 2: Utilizing an unstructured mesh to provide the spatial representation of the domain allows for an efficient resolution of the governing hydrodynamic processes.

the proposed car carrier berths for a range of wharf designs and operational conditions.

A numerical model was set up consisting of a coupling of the hydrodynamic model, MIKE21 HD FM, and the vessel response model, WAMSIM. The MIKE 21 HD FM model was used to model the displacement wave produced by the moving vessel and calculate the resulting hydrodynamic flow field around the moored vessel. From the modelled hydrodynamic flow field, the WAMSIM model simulated the motions of the moored vessel for all six degrees of freedom. The numerical models were successfully calibrated against the results of physical model testing and field measurements of moored vessel motions from the previous vessel motion studies at the Port of Brisbane. A very good match was obtained between the numerical model predictions and the data from the previous studies and it was concluded the models could be used to simulate moored vessel motions at the proposed car carrier berths with a high level of confidence.

Following calibration and validation, the models were used to simulate a range of scenarios, including options for the mooring arrangement, distance between the moored and passing vessels, passing vessel speed, mooring line types and pre-tensions and winds applied to the moored vessel. Criteria for assessment of the predicted motions were identified from published values for roll-on/roll-off vessels and used in the assessment of the model results. The assessment of the results identified key features of the wharf design that should be implemented and defined operational

constraints to minimize the risk of adverse motions and allow for safe operation of the berths.

Overall, it was concluded that with the appropriate operational and design constraints there was a low risk of adverse vessel motions at the proposed car carrier berths as a result of displacement waves generated by passing vessels under normal operating conditions. In the event of an out of control vessel along the edge of the channel the modelling predicted that, whilst vessel motions are severe, the vessel will remain at the berth and there is a low risk of damage to the vessel.

The response from the Port of Brisbane Corporation about their experience with choosing numerical modelling to carry out their vessel motion study was overwhelmingly positive:

“The results were faster, more accurate and allowed us to test more scenarios than physical modelling would allow. The project allowed the Corporation to critically assess a key strategic direction for the port”. (Robert Hancock, Manager Infrastructure Planning and Sustainable Engineering, Port of Brisbane).

The success of the Port of Brisbane project demonstrates a promising future for the application of numerical modelling in studies of moored vessel motions. These tools provide accurate and cost effective answers for decision-makers and allow for a dynamic and flexible project execution.

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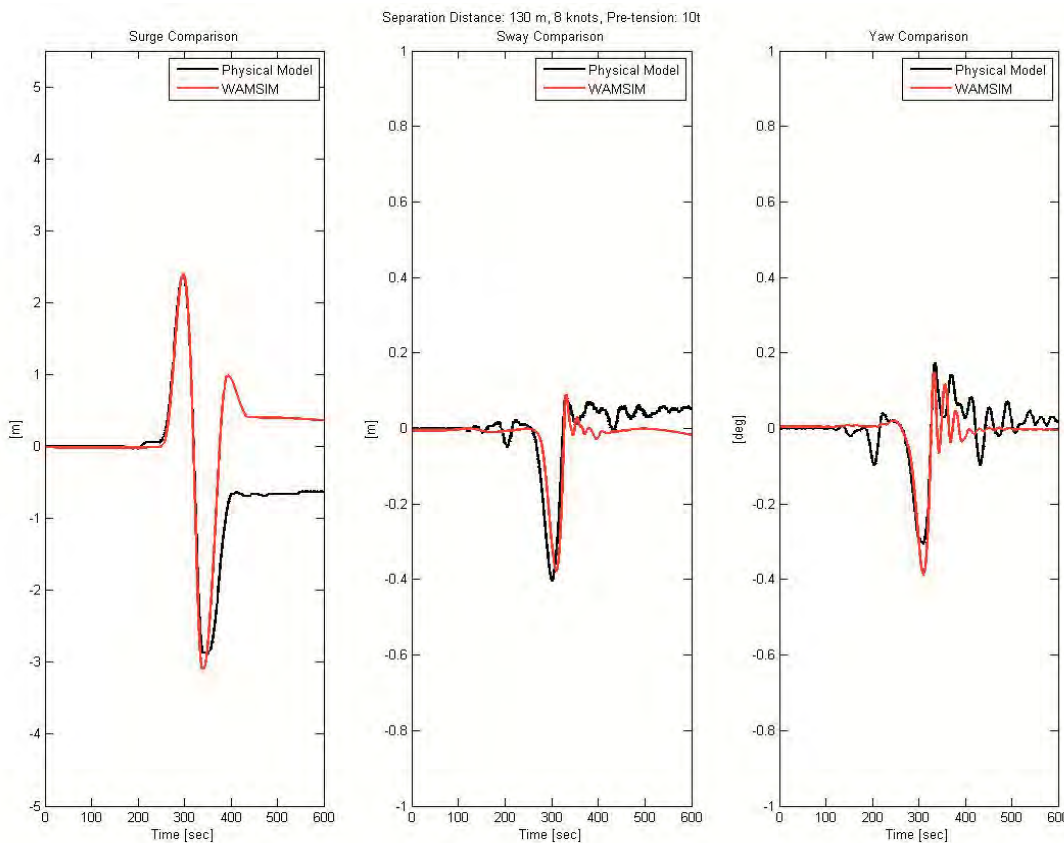


Figure 3: Comparison of surge, sway and yaw motion between the numerical model and the physical model for a passing speed of 8 knots at a separation distance of 130 m and a moored vessel line pre-tension of 10 t.

News From the Regions

Coastal News



Canterbury Regional News

Justin Cope, Canterbury Regional Coordinator

Harbours and Estuaries Under Scrutiny

Environment Canterbury has undertaken or are currently undertaking a variety of sediment and bathymetric surveys of some of Canterbury's major harbours and estuaries. Brooklands Lagoon (a tidal estuary 20km north of central Christchurch) bed levels have recently been surveyed for the first time in 30 years. Results have shown that although continuing to silt up, sedimentation rates have not accelerated over the past 30 years as some in the community have perceived. A recent survey of sediment quality, also in Brooklands Lagoon has indicated that copper, lead and zinc levels are well below guideline concentrations.

A bathymetry, sedimentation and ecological community study of the upper Lyttelton Harbour was completed in 2008 and following the success of this investigation a similar baseline sedimentation and bathymetry mapping exercise is in the process of being undertaken in Akaroa Harbour on Banks Peninsula. The Lyttelton and Akaroa work was carried out by the University of Canterbury.

The Avon Heathcote Estuary/Ihutai is also about to be subject to a similar sedimentation study in a collaborative project between the Avon Heathcote Estuary/Ihutai Trust, the Christchurch City Council, Environment Canterbury and the University of Canterbury.

Contaminant Study Underway

As part of an Integrated Catchment Management programme Environment Canterbury has engaged NIWA in a two year study using satellite imagery to examine the circulation and dispersion of freshwater-borne contaminants from the major rivers and coastal lakes (Ellesmere/Waihora and Forsyth/Waiwera) of the Canterbury Bight. The study will also look at the potential effects of these contaminants on the coastal waters of the Bight and the southern bays of Banks Peninsula. This work should be completed at the end of June 2009.

Ramsar Status for Estuary

The Avon Heathcote Estuary/Ihutai Trust is currently embarking on the process of applying for Ramsar status for the estuary.

Bay of Plenty Regional News

Reuben Fraser, Bay of Plenty Regional Coordinator

Removal of Mangroves

Mangroves continue to be a focus of coastal works for care groups around Tauranga Harbour. Environment Bay of Plenty's Land Management section have applied to mechanically remove mangroves from areas which are currently

consented to be managed by the various care groups around the harbour. This is a restricted coastal activity due to the area of foreshore to potentially be disturbed so will go through a public notification process. It will be interesting to see how much interest there is in this activity, I imagine there could be quite a bit! The intent is to cut down on the amount of work that the care groups put into removing mangroves to allow them to concentrate on a more holistic catchment wide approach to improving the health of their parts of the harbour.

Managing Tauranga Harbour

Ngai Te Rangi, Ngati Ranginui and Ngati Pukenga Iwi groups have collaborated to produce a pan-tribal Iwi Management Plan for Tauranga Harbour called Te Awanui which has been officially lodged with Environment Bay of Plenty. The intent of the document is to provide guidance for management and planning decisions relating to Tauranga Harbour for tangata whenua and local authorities.

Rapid Coastal Inventory Completed

Environment Bay of Plenty Coastcare Coordinator Pim de Monchy has completed a Rapid Coastal Inventory which was a project set up to ascertain how much of our BOP coastline has spinifex and pingao. The results for this show that approximately 43% of the region's sandy coastline is currently under active or advanced management by Coast Care.

Spinifex is established over 64% of the length of the sandy coastline and pingao over 12%. Average dune height through the region was 3.2m, but ranging from just over 1m at Whangaparaoa, Waiotahi and Pikowai through to just under 6m at Tirohanga, Pukehina and Omanu. The study showed that 17.68km of the sandy coast (excluding Matakana Island) could be replanted immediately without any mechanical intervention (where spinifex and pingao are absent). Interestingly, 58% of the area suitable for immediate foredune planting lies between Maketu and Kohi Point, so Coast Care is likely to have a large presence there for the next year or two.

Opotiki Marine Farm

Consent has been granted for the development in two stages of a 3800-hectare marine farm (initially primarily focussed on mussels but may end up being more varied) located 8.5km off the Opotiki coastline.

Environment Bay of Plenty's science section is applying for consent for instrument deployments in the Bay – one of these is intended to monitor the growth of shellfish and the amount of nutrients available to shellfish to provide some baseline data prior to the aquaculture development taking place. Also related to this is another application to significantly develop the Opotiki harbour

entrance including a pair of training walls proposed to extend into the ocean.

Coastal Structures

Tauranga City Council have applied for resource consent to authorise the continued occupation of space in the coastal marine area by 260 existing structures in various areas around Tauranga Harbour. The proposal also includes the removal of 33 structures and the reconstruction/upgrade of 63 structures over the next 10-20 years, including associated disturbance of the foreshore/seabed. The structures include coastal protection structures (seawalls and groynes) and public access structures (jetties, ramps, steps and boardwalks). The application does not seek to authorise all non-consented structures around Tauranga Harbour, only those which have been identified as providing a community benefit such as protecting public areas or providing public access to the harbour.

Pipeline Walkway

The southern pipeline decision, which included a reclaimed walkway between Memorial Park and downtown Tauranga, was notified 5 weeks ago and all consents were granted although Tauranga City Council has opted not to pay for the walkway now.

New Marina

Environment Bay of Plenty has received an application to construct and operate a marina near the mouth of the Wairoa River. An earlier earthworks consent for the site (to make 4 building platforms from onsite earth) was declined because the proposed large-scale earthworks (particularly a proposed 5.5 hectare borrow pit which could have been later developed into a marina) would have a significant adverse effect on the relationship of Maori (Pirakau Hapu) with their ancestral land and a site of significance. An application for a plan change has also been made to Western Bay of Plenty District Council associated with this development and the intent is to run a joint process.

Sediment in Tauranga Harbour

NIWA are undertaking an integrated catchment sediment transport model for the southern part of Tauranga Harbour. This should allow Environment Bay of Plenty to model the impacts of variations in sediment input around the harbour and therefore prioritise works in different catchments.

Shipwreck Off Moutohora

More than 120 boats, three aeroplanes, two jet skis and a penguin were there to watch the sinking of the Seafire on the 19th of October approximately 740 metres (0.4 Nautical miles) from Moutohora (Whale Island). The former trawler was scuttled off Whale Island to form an artificial reef for recreational diving and apparently it all went swimmingly.

Nelson-Tasman Regional News

Eric Verstappen, Nelson-Tasman Regional Coordinator

Marahau Replenishment

At the southern gateway to the Abel Tasman National Park nestles the coastal community of Marahau. It too has an east-facing shoreline, now largely rock protected due to the proximity of the coast to the access road to the Park. A number of commercial water taxi and kayak hire companies access the ATNP from the Marahau boat ramp. Their schedules require them to cross almost 1km of intertidal area at low tide to access water. Well over 100 commercial operator tractor-trailer movements occur within a defined corridor from the boat ramp to the waters edge during high season.

Excessive speed through shallow water areas invariably creates holes that become larger and deeper over time, potentially compromising adjacent eelgrass and cockle bed communities. In an attempt to manage this issue in a simple way, Tasman District Council has embarked on a one year trial with the commercial companies during 2009, to manage damage within the transport corridor.

This involves a combination of sand replenishment of the scour holes, together with rigorous self and Council monitoring of vehicle speed through water. Up to 1000 cubic metres of sand is skimmed by excavator from clean, highly mobile sandbar complexes nearby to the corridor and placed by dump truck in low-lying damaged areas of the 20m wide corridor. Care is taken to preserve estuary drainage paths, but control of speed through the water will be the key to the success of the trial. So far so good!



Traffic corridor in use



Marahau foreshore post-replenishment

**Coastal
News**





Kaiteriteri Beach Replenishment

The Kaiteriteri Recreation and Reserve Board have long held a resource consent from Council to periodically uplift up to 5000 cubic metres of sand, generally from the Kaiteriteri ebb tide delta at the southern end of the beach, and respread it along the Kaiteriteri beach front. This modest work takes place before Christmas every year or two, so that the campers have something to sit on and the wee kids don't have to clamber up and down a steep beach escarpment up to 1m high, formed after (you guessed it) unseasonal easterly storms. La Nina has a lot to answer for on this coastline!



Kaiteriteri Beach, 9 December 2008.

Northland Regional News

Ben Lee and Andre Labonte, Northland Regional Coordinators

Bay of Islands Coastal Survey Project

The first phase of the Bay of Islands Coastal Survey Project is complete. The project is part of the Oceans 20/20 programme. The first phase was the mapping of 3,230 square kilometres of coastline between North Cape and Mimiwhangata between 50 and 200 metres water depth, and all of the Bay of Islands. Phase 2, which is anticipated to start later this year, is the mapping of biodiversity. It will include habitat mapping, biological surveys, and sediment and water quality analysis. See the LINZ website for further information.

Plan Change for Aquaculture

Negotiations with the appeal parties continue on Plan Change 4 (Aquaculture) to the Regional Coastal Plan for Northland. The plan change seeks to improve the management of aquaculture by better management of existing aquaculture and stronger direction on the places where new aquaculture may and may not be appropriate.

Oyster Contamination Examination

In mid March NRC in conjunction with local oyster farmers and the Northland District Health Board carried out dye testing in the Waikare Inlet, Bay of Islands. The work is part of a project to have the Waikare Inlet reclassified to allow commercially grown oysters to be harvested directly from marine farms in the lower and middle part of the inlet. Oysters have not been able to be harvested for sale directly from those parts of the inlet since 2001 after a harmful water-borne virus contaminated them. Investigations

suggested there were a number of possible sources for the virus, including leaking septic tanks, sewage discharges from boats, the Kawakawa sewage treatment plant, or a combination of these. Since then a number of parties have been working to address these issues and due to improvements are now working to have the inlet reclassified as safe for direct harvest.

Mooring Management Plans

The Northland Regional Council, in conjunction with relevant agencies, local communities and mooring holders is in the process of developing "Mooring Management Plans". In a nutshell, Mooring Management Plans are individual mooring area plans 'tailor-made' to deal with the specific issues. Mooring Management Plans will guide the use and development of mooring areas, with a particular focus on ensuring that adequate shore-based facilities and services are available and that water space is used efficiently (e.g. limiting vessel size and use of more intensive mooring systems). Draft plans have been developed for five out of the 13 high priority areas.

Vehicles on Beaches

Different approaches have been adopted by the Whangarei, Kaipara and Far North District Councils to tackle the issues surrounding vehicles on beaches within the Northland region.

The Whangarei District Council (WDC) is making significant progress towards a comprehensive management regime for vehicles on beaches. In addition to the 30kph speed restrictions set prior to Christmas for the major beaches with vehicular access, WDC staff are working on a proposed bylaw under the Local Government Act (LGA). It is understood that this bylaw will aim to identify pedestrian safe zones (no vehicles) and address other safe and responsible driver behavioural issues.

In contrast, Kaipara District Council (KDC) has chosen not to extend its district boundary and manage the issue itself, but instead rely on the Minister of Conservation (MOC) to set speed restriction bylaws for the district's beaches. Far North District Council (FNDC) has not identified nor progressed an approach to improve the management of the issues associated with vehicles on its beaches.

Northland Regional Council (NRC) is seeking delegated authority from the Minister of Conservation to become the road controlling authority, as an interim solution for the Kaipara and Far North districts and will set speed restriction bylaws on beaches within these districts. NRC is awaiting a response from MP John Carter to a letter seeking his support and assistance for this approach.

In addition, Safe Beach Driving Information Days have been held at high priority beaches throughout Northland. These events have been jointly staffed by Northland Regional Council (NRC), Department of Conservation (DOC),

District Councils and the Police, with assistance from local volunteers. The main focus of these events is to raise public awareness of safe and responsible driver behaviour and included beach patrols in agency vehicles distributing beach driving leaflets, tide tables and answering queries.

Tidal Power Generators for Kaipara

The Crest Energy Limited proposal to place up to 200 tidal current power generating devices in the entrance to the Kaipara Harbour is before the Environment Court with a hearing likely to commence mid-2009.

Changes in RMA Welcomed

The review of the RMA is a welcomed move. Two recent examples of coastal resource consents in Northland show the need to stream-line the consent process.

In Mangawhai, a volunteer group took on the task of obtaining a resource consent for a swimming pontoon to be placed in the harbour. The swimming pontoon idea had resulted from the local primary school winning a national contest in problem solving (International runners-up). The RC application was made to place the pontoon in the only safe, protected and readily accessible location in the harbour. That application drew in excess of 60 submissions in objection, the main objection summed up as NIMBY. The process cost the volunteer group in excess of \$10,000 just to obtain consent. It is interesting to consider prior to the RMA how this project would have likely proceeded.

A coastal land owner who had been through the RMA process (public notification, pre-hearing consultation, hearing and Environment Court mediation) to obtain a resource consent for a boardwalk landward of the CMA (required by the local council to facilitate public access), had his construction efforts stopped when one vindictive local objected to the presence of a tractor on the shoreline. In this same harbour, on a daily basis, individuals launch and retrieve vessels using tractors on the beach. And, as per the above information regarding "Vehicles on the Beach", it is recognised that other vehicles, as well as tractors, are regularly using the CMA. This land owner, however, was required to obtain another resource consent for a minor coastal activity which delayed construction for over a month and added \$684 to the cost of his project. There appears to be

something that needs fixing when the RMA becomes so obstructive and costly in relation to such minor activities.

Hawke's Bay Regional News

Neil Daykin, Hawke's Bay Regional Coordinator

Coastal Erosion: Update

Following on from the last Coastal News, we have had only one swell event (11-20th January). Although swell sizes were not huge (max wave height 5m, max significant wave height 2.81m), king tides and a swell that hung around for a week caused minor damage to Clifton Motor Camp that required more permanent sites to be cleared. The event produced epic blue sky surf all week but also blocked a number of river mouths that then required mechanical opening.



Clifton Motor Camp following a week of small and consistent swell

Dredging of the Ahuriri Inner Harbour

Napier City Council are undertaking maintenance and capital dredging of the Ahuriri Inner Harbour area including the channel using two diggers secured to a flat deck barge, with the dredge material placed in bottom opening barges which are then towed out to sea for disposal of the silt.

HB Volunteer Coastguard

It's been a summer of boating mayhem for HBVCG and for coastguards nationally. Although, fortunately, we haven't had any fatalities this summer, there have been plenty of close calls. We have had the usual run of broken down boats but also a sinking yacht that we had to get our pump onboard to save it from Davey Jones' locker, and two vessels that ran aground, one a steel hulled yacht and the other a large 60ft motor cruiser.

Student Conference Award

This year the NZCS Student Conference Award includes free registration, dinner ticket, and \$500 towards expenses for one to two students to attend the 2009 Coasts and Ports/NZCS Annual Conference to present an oral or poster paper. The conference will be held in Wellington, 16-18 September. The 2009 theme – In a Dynamic Environment – encapsulates the evolution of the physical environment

through climate variability and change as well as changes to industry, policy and social expectations.

Visit www.coastalsociety.org.nz/index for further details and an application form. To apply, email a completed copy of the application form and your abstract to hannah.hopkins@ew.govt.nz. Applications close on 30th June 2009 at 5pm.



Word from the Chair

Coastal News



By the time you read this, registrations will have opened for the 2009 Australasian Coasts and Ports Conference being held in Wellington at Te Papa from 14-18 September 2009. The conference organising committee is expecting over 100 papers to be submitted around the theme of 'Coasts and Ports in a Dynamic Environment'. The biennial conference is hosted by New Zealand only every six years and attracts delegates from throughout the Pacific. The main keynote speakers have been confirmed. They include the chief executive of the Port of New Orleans, Estonia's man of the year in 2004, and last year's Australian Civil Engineer of the Year. If you want to know who they are visit the conference website at www.coastsandports2009.com.

I would strongly encourage you to register for the conference as soon as possible as it is highly likely that the conference will be over subscribed due to Te Papa having a the maximum venue capacity of 320 delegates. As at the beginning of March over 170 people have already registered an interest in attending the conference, and in 2003 in Auckland we had over 340 registered delegates.

I am pleased to advise that this year the NZCS Executive Committee is offering up to three \$1000 student travel scholarships to tertiary students studying in the coastal field to attend the 2009 Coasts & Ports conference in Wellington. The award includes free student conference registration of \$500 and \$500 towards travel and accommodation costs to attend the conference. Applicants have until the end of May to apply for the student travel award, with details and application forms contained on the NZCS website.

As a member of the New Zealand Coastal Society you are part of a group of like minded professionals, whether you are an engineer, planner, scientist or some other form of practitioner. The NZCS is a Technical Interest Group of the Institute of Professional Engineers of New Zealand, and as such is bound by the rules of that parent body. All members should be advised that in 2008 an amendment was made to Rule 27 of IPENZ which governs membership. As a result NZCS members may now only refer to themselves in formal situations, such as at the Environment Court, as an Affiliate Member of the New Zealand Coastal Society. Members can not refer to themselves as being either a member or an affiliate member of IPENZ itself. This matter was discussed at the recent NZCS AGM in New Plymouth and while those attending saw the decision of IPENZ as rather extreme, the Society and its members are bound by that decision. Please be assured that the NZCS Executive Committee made known verbally and in writing to IPENZ its dissatisfaction with this arrangement when it was originally proposed. The issue is with members of Technical Interest Groups and Special Interest Groups stating they are full members of IPENZ when they are not. It is important to note that the review of Rule 27 was not brought about by the actions of any member of the NZCS.

I note that the Board of Inquiry decisions on the

revised New Zealand Coastal Policy Statement are due to be reported to the Minister of Conservation by 31 March 2009. The Minister will then decide whether to accept the Board's decisions and proceed to gazette the NZCPS through government proceedings. It will be interesting to see whether the protection of surf breaks and Maui dolphins are retained, and what implications the new NZCPS will have on central and local government coastal planning.

This edition of *Coastal News* sees a report on the work that Claire Kain is doing. Claire was one of our two 2008 student research scholarship winners, along with Jeremy Barker, and is studying at the University of Canterbury. It is extremely rewarding to see the Society being able to assist with funding coastal research in New Zealand. If you are a student commencing study this year towards your Masters or PhD in a coastal related field you may wish to apply for the 2009 research scholarship of up to \$5,000. Details are on the NZCS website under the student pages or for further information you can contact Deirdre Hart (NZCS Student Coordinator) deirdre.hart@canterbury.ac.nz. Applications for 2009 will close in late July.

In the June edition of *Coastal News* we will be asking for your views on the Society and the services provided to our members. In terms of following up on last year's feedback for a more improved website, the current revamp the NZCS website is nearing completion. Our website is an important tool to communicate with both our members and the wider coastal community and the Executive Committee is committed to making sure we have an informative and up to date website. Our website is being redesigned by staff at the University of Canterbury.

The NZCS Executive Committee wants to make best use of the NZCS Email Digest. If you know of any coastal related course, workshop or employment opportunities that members may be interested in please contact Hannah Hopkins (NZCS Administrator) hannah.hopkins@ew.govt.nz. The Digest provides updates on up and coming conferences, events and employment opportunities in the coastal field, and is available for all members to disseminate information.

The Society is on the look out for a new editor of *Coastal News*. After 6 plus years as editor, Alex Eagles is stepping down from this role at the end of the year due to family commitments with the demands of two small children. I want to thank Alex for ensuring *Coastal News* is produced to such a high professional standard three times a year. The Society is currently seeking expressions of interest from a suitably qualified person who may be interested in this paid position, and who has editing or journalist experience with a passion for New Zealand's coast.

David Phizacklea
Chair, New Zealand Coastal Society
david.phizacklea@envbop.govt.nz

Applying Coastal Hazard Setbacks and Spatial Accuracy

A coastal erosion hazard zone (CEHZ) is primarily used to provide guidance for safe and sustainable development. However, there are some issues when assessing proposed developments due to the spatial accuracy of electronic datasets commonly used in planning documents. This article highlights these issues and provides a solution when things go wrong.

Under Section 30 of the Resource Management Act (RMA), regional councils are required to control the use of land for the purposes of avoidance or mitigation of natural hazards while territorial authorities are required to control any actual or potential effects of the use, development or protection of land (Section 31, RMA). These functions are often implemented with the assistance of coastal erosion hazard zones (CEHZ).

Once assessed, CEHZ's are commonly represented in planning documents as a reference to some sort of coastal hazard setback. The setback is usually represented as lines or zones overlaid on aerial photographs and a cadastre (property boundaries). Policy and rules within the plan are then formed around the setback. Some plans have one or more CEHZ's representing the hazard risk over different time periods (i.e. current, 50 years or 100 years).

The mapping of CEHZ's in planning documents is normally undertaken using a GIS (Geographical

Information System) using available, up to date, electronic datasets. A significant issue is the relative accuracy when overlaying various spatial datasets.

In some cases the absolute (i.e. real world) accuracy of the cadastre (especially in rural areas) can be out by as much as 30 m. The accuracy of georeferenced aerial photographs may also be as inaccurate since the cadastre is commonly used to position the aerial photograph. While 30 m accuracy may be an extreme case, even with the latest technology, accuracy of the cadastre and aerial photo may vary between 0.5 m to 10 m.

Therefore, mapped CEHZ's in planning documents may not accurately represent the position of the CEHZ's relative to property boundaries and dwellings. Maps showing the CEHZ's with aerial / cadastre information should have caveats outlining the map accuracy to provide better guidance to the public. The only way to accurately assess if a property is within a CEHZ is to have the CEHZ surveyed by a registered surveyor.

As an example, Figure 1 shows what can happen when the spatial difference in the electronic cadastral and actual surveyed property boundaries is not adequately dealt with. In this case at Patua North on Northland's east coast,

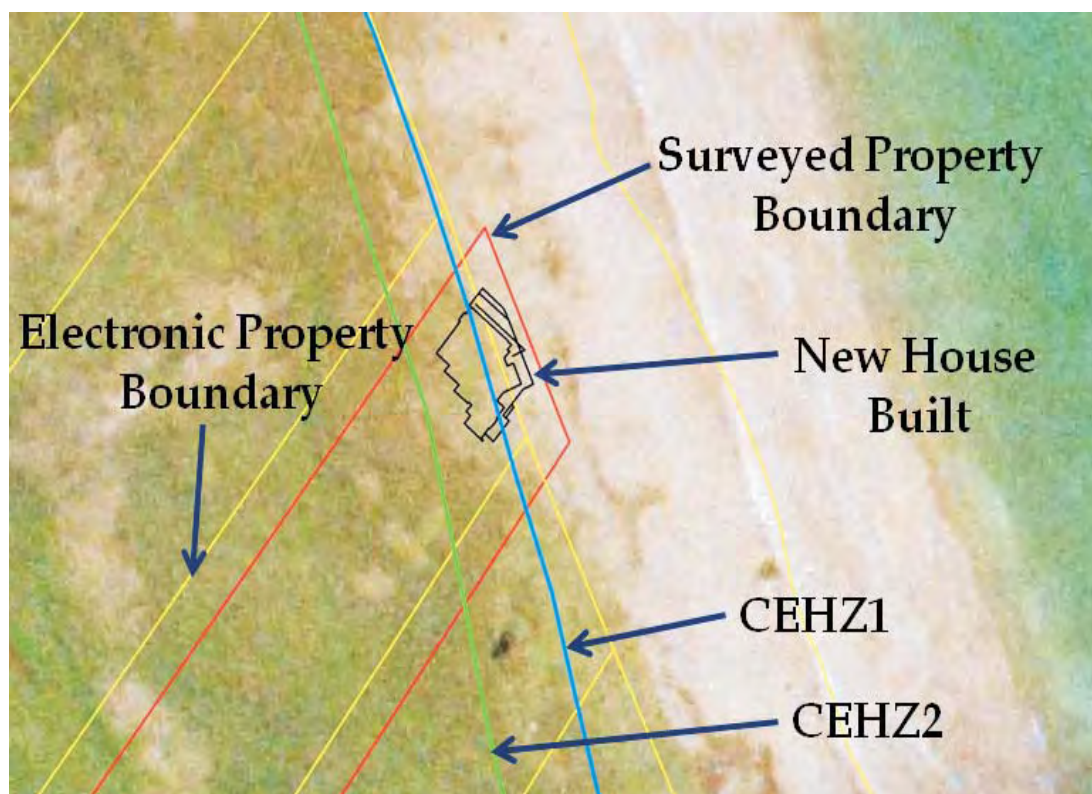


Figure 1: Relative difference between electronic cadastre (yellow line), surveyed (red line) property boundary, CEHZ1 (50 year erosion risk) and actual placement of house. CEHZ2 represents 100 year erosion risk.



the house plans were based on the electronic (virtual) property boundary, which showed the CEHZ's relative to this boundary. In the virtual world the dwelling was landward of the CEHZ1 (50 year erosion risk) line and complied with council regulations.

However, the house was constructed relative to the surveyed (real world) property boundaries. This resulted in the house being built approximately 10 m further seaward than indicated on the house plans. Therefore, the property is now seaward of the CEHZ1 line and contrary to council regulations.

This posed a problem for Whangarei District Council and Northland Regional Council. What to do with a house that had gained consent, but built in the wrong place?

Although the Pataua North dwelling is within the CEHZ1 zone and is at some risk of coastal erosion,

there may be no immediate risk of erosion for some time. Therefore, a practical solution to the problem was to leave the dwelling as it is, but have pre-determined mitigation which takes effect when a trigger point is reached.

A trigger point is an assessed distance seaward of a property that indicates the property is an imminent risk of a hazard. Once the trigger point has been reached, pre-approved mitigation is undertaken. In the Pataua North example, should the toe of dune (which is measured regularly) reach 41.5 m (trigger point) from the dwelling, the dwelling is to be removed /relocated.

This solution provided a compromise between the owner and WDC, where the owner can still enjoy the use of his house, while the council still achieves the objectives of the RMA.

*Rick Liefting, Tonkin & Taylor
Heather McNeal, Whangarei District Council*

Coastal News Editor Vacancy

The opportunity exists for an enthusiastic individual to take over the role of Editor for the New Zealand Coastal Society publication, *Coastal News*. *Coastal News* is published in February, June and November of each year. It is distributed to members of the New Zealand Coastal Society and attendees of the annual conference.

The individual we seek should have the following attributes:

- demonstrated skills in editing and proof reading;
- highly organised and pro-active;
- broadband internet access;
- an interest in the coast; and

- good communication skills.

The responsibilities of the *Coastal News* Editor position include regular liaison with the New Zealand Coastal Society committee, sourcing articles from authors, reviewing and editing articles and working closely with the graphics designer on the layout of the publication. It is a paid position that is expected to take approximately 70 hours per month.

Applications that outline your relevant experience and skills can be e-mailed or posted to the Coastal News Coordinator, Cushla Loomb (e-mail cushla.loombe@beca.com, PO Box 448, Hamilton. Applications close 29th May 2009.

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.

North Island

Northland	Ben Lee André Labonté	benl@nrc.govt.nz labonte@xtra.co.nz
Auckland	Hugh Leersnyder	hugh.leersnyder@beca.com
Waikato	Amy Robinson	amy.robinson@Beca.com
Bay of Plenty	Reuben Fraser	reuben.fraser@envbop.govt.nz
Hawkes Bay	Neil Daykin	daykin@hbrc.govt.nz
Taranaki	Kate Giles	kate.giles@trc.govt.nz
Manawatu/Wanganui	Johanna Rosier	d.j.rosier@massey.ac.nz
Wellington	Iain Dawe	iain.dawe@gw.govt.nz

South Island

Upper South Island	Eric Verstappen	eric.verstappen@tdc.govt.nz
Canterbury	Justin Cope	justin.cope@ecan.govt.nz
Otago	Mike Hilton TBC	mjh@geography.otago.ac.nz
Southland	Ken Murray	kmurray@doc.govt.nz



Marine Mammal Sanctuaries

Four new marine mammal sanctuaries were established in September 2008. These are in areas where the nationally critically endangered Maui's dolphins and the nationally endangered Hector's dolphins are found - West Coast of the North Island, Clifford and Cloudy Bay in Marlborough, Porpoise Bay / Fortrose on the Catlins Coast, and Te Waewae Bay on the South Coast. An enlargement was also made to the existing Banks Peninsula Marine Mammal Sanctuary.

The sanctuaries are part of implementing the Hector's and Maui's dolphin threat management plan, jointly developed by the Department of Conservation and the Ministry of Fisheries. The sanctuaries also complement fisheries measures announced by the Minister of Fisheries. You can find further information about the fisheries measures at www.fish.govt.nz.

To increase the protection of these endangered dolphins, mining and acoustic seismic surveying restrictions apply in the sanctuaries. All methods

Figure 1: Hector's dolphin leaping, Porpoise Bay, Catlins Coast Marine Mammal Sanctuary, Southland, 2004 (Photographer: Erin Green)

of fishing are allowed within the sanctuaries, other than those prohibited under fisheries legislation.

Marine mammal sanctuaries can be established throughout New Zealand fisheries waters to create a permanent refuge for marine mammals. Such sanctuaries may prohibit activities known to harm particular marine mammal species, such as dolphins, whales, seals and sea lions. For example, a marine mammal sanctuary may not exclude all fishing activities, but may restrict what fishing methods may be used. Under the Marine Mammals Protection Act 1978, the Department of Conservation is responsible for administering and managing marine mammal sanctuaries. For more information, go to www.doc.govt.nz.

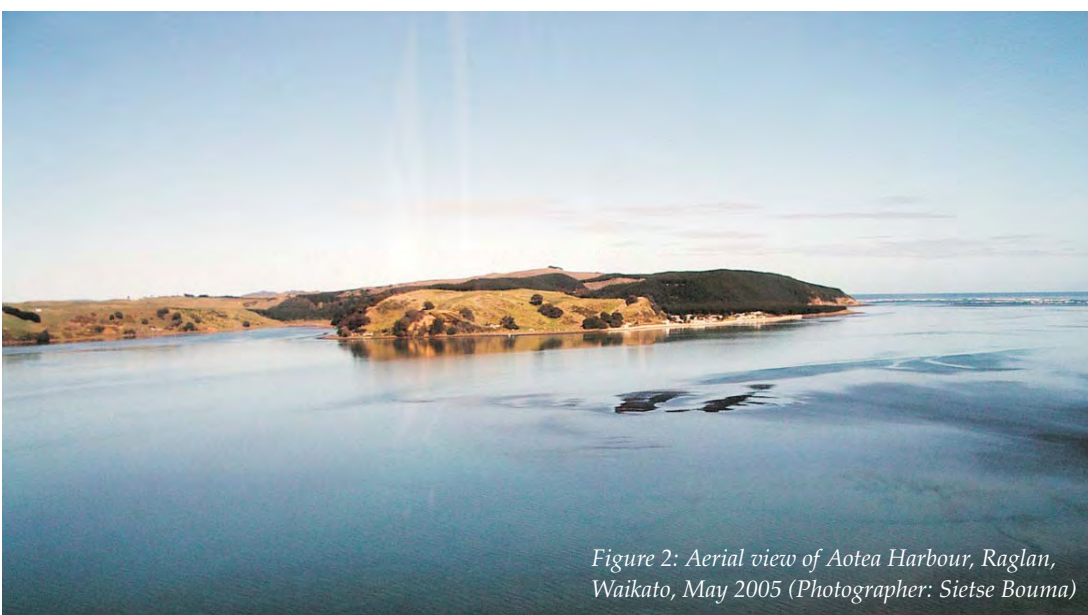


Figure 2: Aerial view of Aotea Harbour, Raglan, Waikato, May 2005 (Photographer: Sietse Bouma)

Aquaculture – Why all the Fuss?



Nothing seems to have caused as much fuss in marine planning as aquaculture over the last decade. Following the moratorium of 2002, the reforms of 2004 and Aquaculture Legislation Amendment Bill 2008, we will soon be adding Aquaculture Legislation Amendment Bill No 2, closely followed by a review of the existing law and potentially a whole new set of reforms.

Rather than discuss such dry and technical stuff, I wanted to step back and get a feel for the bigger global context of aquaculture and figure out why it causes so much excitement.

It turns out that there is a worldwide imperative to expand aquaculture, driven by a combination of growing population, increasing demand for healthy seafood and a global food shortfall. This has created a number of commercial opportunities that private enterprise is keen to make the most of.

In New Zealand the industry is dominated by mussels which are now our largest seafood export, earning \$204 million last year, well ahead of the next biggest earner, hoki, at \$151 million. However our annual production of 33,300 tonnes of mussels is very small fry compared to global aquaculture production which was estimated at 66,700,000 tonnes in 2007 by the United Nations Food and Agriculture Organisation (FAO).

Husbandry of aquatic organisms, both freshwater and marine, has a long history but modern commercial aquaculture really began in the mid-twentieth century. It has grown rapidly from less than a million tonnes in the early 1950s and now produces about half the fish consumed by people. The average global growth rate of aquaculture has been 8.8% from 1950 to 2004 but growth has been fastest from 1990 with production tripling since then.

Asia easily dominates world production with China alone accounting for 70% of world production and the rest of Asia making up a further 22% by volume. Production is roughly half freshwater aquaculture and half marine farming; half fish and a quarter each of shellfish and seaweeds.

Asian aquaculture is primarily freshwater fish (carp and related species), coastal shrimp farms

and some marine fish farming. European and Canadian aquaculture is dominated by atlantic salmon farming while catfish are the main product in the United States. Latin and Central America is rapidly expanding its salmon farming and has consistently experienced very fast rates of growth. Other significant aquaculture species are oysters, seaweeds, mullet and tilapia.

Carp accounts for two-thirds of global fish aquaculture at 18 million tonnes worth US\$16 billion. Salmon by comparison, is eighth by volume at around 2 million tonnes but third by value at over US\$6 billion. New Zealand's king salmon production amounts to 7,700 tonnes, worth over NZ\$80 million.

In a country where we have food coming out our ears, we often fail to grasp the global imperative to increase food production. The FAO, established in 1945, has the primary objective of achieving global food security and in 1996 they set a target of halving the number of chronically hungry people by 2015. In 2007, in the face of increasing food prices, they estimated that 923 million people were undernourished, an increase of 100 million since 2001. To put that another way, at least one out of every 7 people does not have enough to eat on an ongoing basis, and its getting worse.

The FAO has predicted that an additional 40 million tonnes of aquaculture production will be required by 2030 just to maintain current per capita consumption of seafood. Due to the state of the world's fisheries, the FAO has concluded that all of this will have to come from aquaculture.

But the demand for seafood is increasing, especially in developed countries as the health benefits become more widely known. The average global per capita consumption of seafood has risen from 9 kilograms per annum in 1961 to just over 16 kilograms in 2003. A significant part of this is due to China where per capita consumption is now over 25 kilograms per annum. Taking out the influence of China, per capita consumption in the rest of the world was static during the 1990s and the FAO links this to wild fisheries becoming fully or over exploited. Per capita consumption began growing again from 2000 as the rate of expansion of aquaculture was able to exceed population growth.



New Zealand is and always will be a very small player in global aquaculture. In common with many of our primary production systems, it succeeds best when it has a niche market and point of difference to enhance its market value. The green-lipped mussel, now trademarked as the Greenshell, is unique to New Zealand, and the king salmon, while an introduced species, is not farmed in similar quantities elsewhere.

Our green, clean image is a major selling point for aquaculture produce, irrespective of the reality. Compared to most developed nations, and many developing ones, our coastal water quality is very high. A major selling point of our farmed shellfish is that it is safe to eat raw.

In an infamous incident at Eden Park more than 300 people came down with food poisoning after eating raw oysters. The caterer had run out of NZ oysters and served up Korean ones, not realising that they could not be eaten raw. The damage done to NZ's image and the industry should not be under-estimated. Clevedon Coast Oysters, who supplied Eden Park, received urgent calls from several overseas importers demanding assurance that their product was safe.

The safety of aquaculture produce cannot be taken for granted and requires constant vigilance on the part of farmers. Good water quality is not universal in NZ, as shown by problems with sewage contamination of some Northland oyster farms

in Waikare Inlet at the Bay of Islands.

Throughout the country, every time it rains, shellfish farmers must stop harvesting until the faecal contamination from agricultural runoff has passed through the system and the shellfish have been able to flush themselves with clean water. In some cases farmers transfer oysters from dirtier water to clean water, allowing them to naturally flush out contaminants, a process referred to as depuration.

Globally the growth in aquaculture is inevitable and there are huge opportunities for NZ businesses to capitalise on this. With our natural advantages, NZ can carve itself a niche at the higher value end of the market. The potential economic benefits to NZ of a growing aquaculture industry are substantial but the bottom line must remain preserving the high environmental quality that makes NZ special.

Experience here and overseas has highlighted the environmental effects. Farm management has improved but the potential for adverse effects remains. Stay tuned for the next instalment in which I will try to get to the bottom of one of the trickier issues: the sustainability of feeding farmed fish on fishmeal made from wild caught fish...

*Graeme Silver, Senior Coastal Policy Advisor
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- 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 – March, June and November.
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For more information on corporate memberships please contact:

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