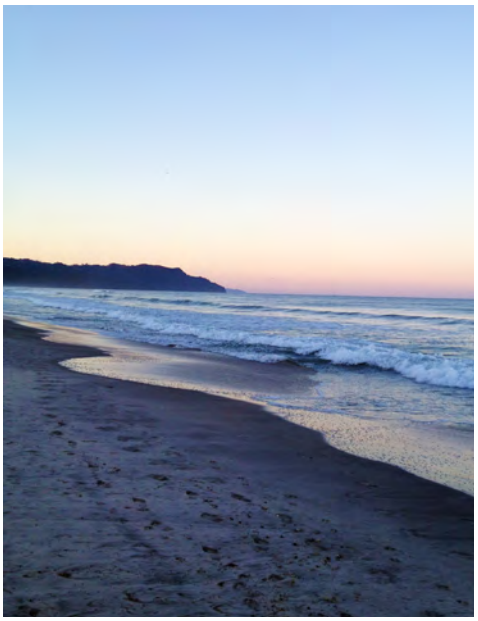
Bay of Plenty
REGIONAL COUNCIL



Coastal State of the Environment Report

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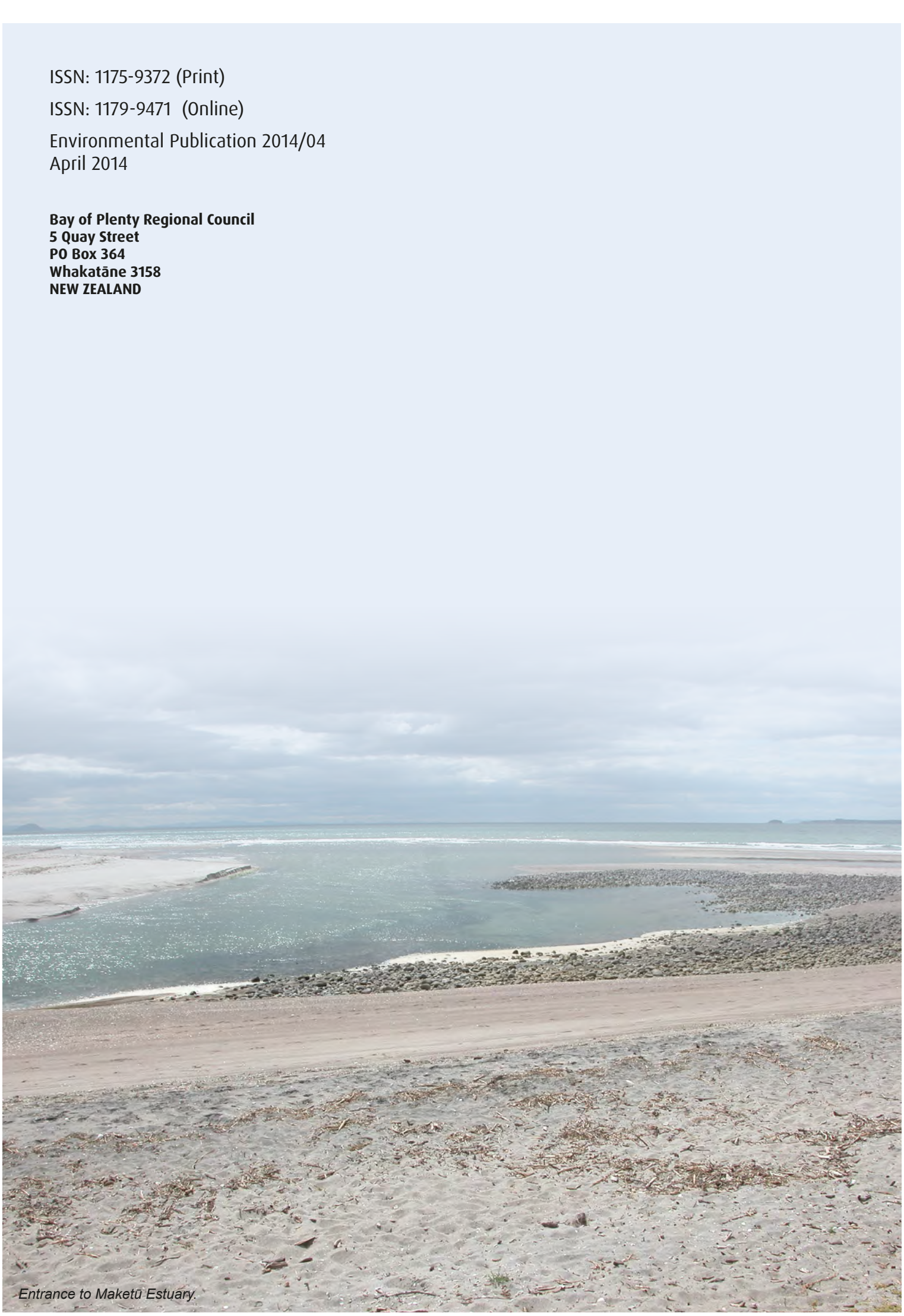


Entrance to Maketū Estuary.

Contents

Coastal State of the Environment Report

Coastal focus

This report is a summary of the state of the coastal environment in the Bay of Plenty region. The report focuses on the coastal marine area, which starts at the high tide mark and extends 12 nautical miles off the coast. The report also looks at land dominated by the coast, such as sand dunes and coastal wetlands, which is an important part of our coastal environment.

Our coastline

The Bay of Plenty coastline extends east from Orokawa Bay (east of Waihī) toward East Cape ending near Lottin Point. Along the coast there are two large harbours Tauranga and Ōhiwa, a number of estuaries and eight large rivers.

Nearly all of the coastal marine area in our region is common marine and coastal area. This means it is not owned by any individual or organisation.

Bay of Plenty coastline and coastal waters

Managing our coastal environment

Bay of Plenty Regional Council sets rules, policies and objectives for the coastal marine area in the Regional Coastal Environment Plan (the Plan). This Plan controls activities such as construction of sea walls, dredging and discharges to the coastal environment.

The Plan also has objectives and policies that apply to land in our coastal environment.

The following local and central government organisations also play an important role in managing our coastal environment.

Department of Conservation (DoC)

- Focus on protecting New Zealand's natural and historic heritage – including marine mammal protection.
- Advocate for conservation in planning and resource consent processes.

In our region, DoC:

- Manages two marine reserves – Tūhua Island and Te Paepae o Aotea (Volkner Rocks).
- Manages 72 other reserves in the coastal environment for historic heritage, scenic, recreation or conservation purposes.

Department of Internal Affairs

- The Department of Internal Affairs, on behalf of the Minister of Local Government, acts as the territorial authority for offshore islands that are not included in the boundaries of a city or district council. Offshore islands in our region include Mōtītī Island, Tūhua Island (Mayor Island) and Whakaari (White Island).

Maritime New Zealand

- Implement maritime rules for the safety of ships and people and marine protection rules that prevent the disposal of waste and marine pollution from ships.
- Responsible for navigation and safety outside harbour limits.
- Co-ordinate oil spill response planning.

Ministry of Primary Industries

- Fisheries management – including commercial, recreational and customary fishing.
- Biosecurity lead agency – impose biosecurity controls on vessels entering New Zealand – including discharge of ballast water and biofouling.
- Assess effects of aquaculture on fishing.

District Councils

- Provision and management of local infrastructure and services, such as stormwater networks, public wharves, jetties, erosion protection works and recreational facilities.
- Management of land use and associated impacts through District and City Plans.
- Bylaws for intertidal areas – control of litter, dog control, use of vehicles and horses on beaches.
- Manage land-based coastal reserves.

Department of Conservation
Te Papa Atawhai

The Department of Internal Affairs
Te Tari Taiwhenua

MARITIME NEW ZEALAND

Ministry for Primary Industries
Manatū Ahu Matua

Bay of Plenty Regional Council

WHAKATĀNE District Council

Opotiki District Council
Strong Community Strong Future

Tauranga City

Western Bay of Plenty District Council

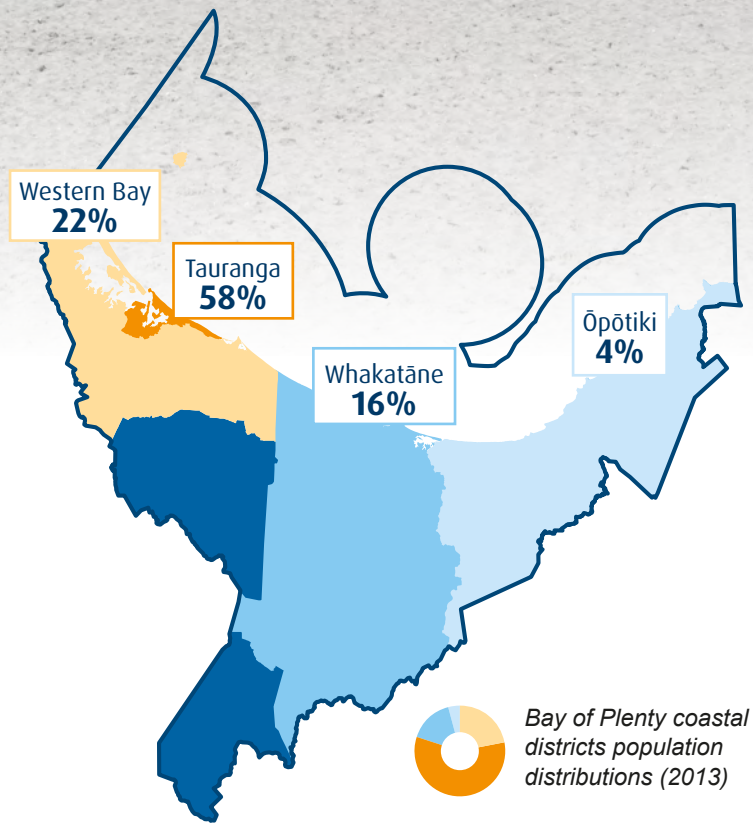
Our region, people and heritage

Mount Manganui Beach, Moturiki Island (Leisure Island) in background

Our region

The Bay of Plenty region has:

- New Zealand's fifth largest population 275,000 permanent residents.
- The second highest growth rate in New Zealand – it is expected to grow by over 50,000 people by 2030 – mostly in the western bay and Tauranga.
- A high proportion of Māori residents.
- A high proportion of retired citizens.
- A lower proportion of youth and working age population compared to the national average.



Bay of Plenty coastal districts population distributions (2013)

Our natural heritage

The Bay of Plenty is a hotspot for marine biodiversity in New Zealand and has a wide range of habitats including estuaries, brackish water lagoons, open sandy beaches, offshore islands and an active volcano.

Offshore islands, such as Astrolabe Reef (Otaiti), White Island (Whakaari) and Mayor Island (Tūhua) are exposed to both warm and cold ocean currents. Their unique location and volcanic origin supports a rich marine biodiversity. The warm currents attract subtropical marine species, such as the long-finned boarfish and the occasional turtle.

Estuaries in the Bay of Plenty such as Tauranga Harbour (one of New Zealand's largest estuaries) are important productive ecosystems. Habitats in and around our estuaries include freshwater wetlands, saltmarsh, mangroves, seagrass, sand and mud flats, rocky reefs and tidal channels.

Sand dunes line the coast from Waihi Beach to Opape, broken occasionally by river and harbour mouths, volcanic landforms and rocky headlands. East of Opape, the landscape changes to steep and rugged rocky headlands and long gravel beaches. Marine terraces are found east of Raukokore.

Bay of Plenty Regional Council is required under the Resource Management Act to provide protection to natural heritage values in the coastal marine area. Mapping and assessments of biodiversity sites in the coastal environment has recently been updated. The overall natural character of our coastal environment has also been assessed and mapped. This work has been undertaken to assist implementation of the New Zealand Coastal Policy Statement 2010 – a national policy document that applies to the coastal environment.

Outstanding areas of natural character are largely limited to offshore islands, with the exception of Ōhiwa Harbour. Areas of high and very high natural character are found along the coast, including Tauranga Harbour.

Over 240 high value biodiversity sites have been identified in our coastal environment. Protection of these sites from incremental and cumulative effects is an on-going challenge.

In many instances community based groups are leading restoration and protection of sites, with support from the regional, district and city councils.

Outstanding natural features and landscapes in the coastal environment were originally identified in 1993. These sites were reassessed in 2006 – all sites still qualified as 'outstanding' and in several cases boundaries were expanded to encompass regenerating indigenous vegetation. Three new sites were also identified.

Moturiki Island - part of an outstanding natural feature and landscape

Iwi dynamics and the coastal environment

The Bay of Plenty is a culturally rich and dynamic region. Māori make up nearly a third of the overall population and have substantial land holdings. This region is home to around 35 iwi and multiple hapū entities. Tangata whenua have strong kinship ties through traditional waka affiliations which connect iwi geographically across the region, from the hinterlands to the coast. Although linked closely through whakapapa (geneology), tangata whenua retain autonomy in managing their affairs.

Many Māori view the environment holistically and find it difficult to separate the land from the sea, or the physical from the spiritual. This is one of the reasons why the coast is viewed as a collective taonga (treasure), a space to be shared.

The practice of kaitiakitanga – the guardianship over natural resources by tangata whenua – is important to Māori. Māori have inherent responsibilities to ensure that resources are sustainably managed for the benefit of present and future generations. Water is significantly important. The mauri (life force) of water is the lifeblood of the people.

The changing Treaty landscape

Te Tiriti O Waitangi (The Treaty of Waitangi) is recognised as the founding document of New Zealand and represents the foundation of the relationship between the Crown and Māori.

The Treaty landscape in the Bay of Plenty is rich and dynamic, with significant progress in Treaty negotiations and settlements in the last decade. There have been eight comprehensive Treaty settlements in the region, with several more in the pipeline. The new era of Treaty settlement is seeing iwi wanting to be involved as equal partners in the management of significant natural resources.

Sharing management of natural resources

Co-governance and co-management models are emerging. Through the Te Arawa Lakes settlement in 2005, co-governance of the Rotorua Lakes was established. More recently in 2012 a co-governance forum was set up for the Rangitāiki River. Soon there will be a co-governance entity for the Kaituna River (down to the Maketū estuary) and also Tauranga Harbour (Te Awanui) and its catchments, through settlement of the Tauranga Moana Iwi Collective.

There are also arrangements outside Treaty settlements. For example, Ōhiwa Harbour has a co-management scheme in place. Iwi and Regional Council along with other agencies work collaboratively to ensure the future well-being of this harbour.

Marine and Coastal Area (Takutai Moana) Act 2011

The Marine and Coastal Area (Takutai Moana) Act 2011 (the Act) recognises the mana tuku iho (inherited rights) of iwi, hapū and whānau in the coastal marine area. The Act enables groups to apply for legal recognition of their customary interests either as customary marine title or protected customary rights (such as collecting hangi stones, or launching waka). The granting of recognition under the Act places some additional resource consent, planning and monitoring obligations on the regional council.

There are currently four applications within the Bay of Plenty region for recognition under the Act (Nga Potiki, Te Whānau a Apanui, Te Whakatohea, and Ngati Rangitihi Raupatu Trust). If a determination is made in favour of applicants, they will play a substantial role in the management of the recognised area.

Customary marine title holders can give or decline permission to resource consent applicants and create a planning document that Regional Councils must recognise and consider when creating and reviewing regional documents. For holders of protected customary rights the use, activity or practice for which the right was granted can continue without resource consent.

Hapū/iwi resource management plans

Hapū/iwi resource management plans (HIRMPs) are an expression of kaitiakitanga and a useful tool that can help develop a relationship between Regional Council and hapū/iwi. HIRMPs are designed to proactively involve hapū/iwi in the planning and management of their rohe. These plans include resource management issues, policies and objectives, and may contain specific interests and background information about the iwi and/or hapū. We are required to take into account matters addressed in these plans.

The future of hapū/iwi management plans

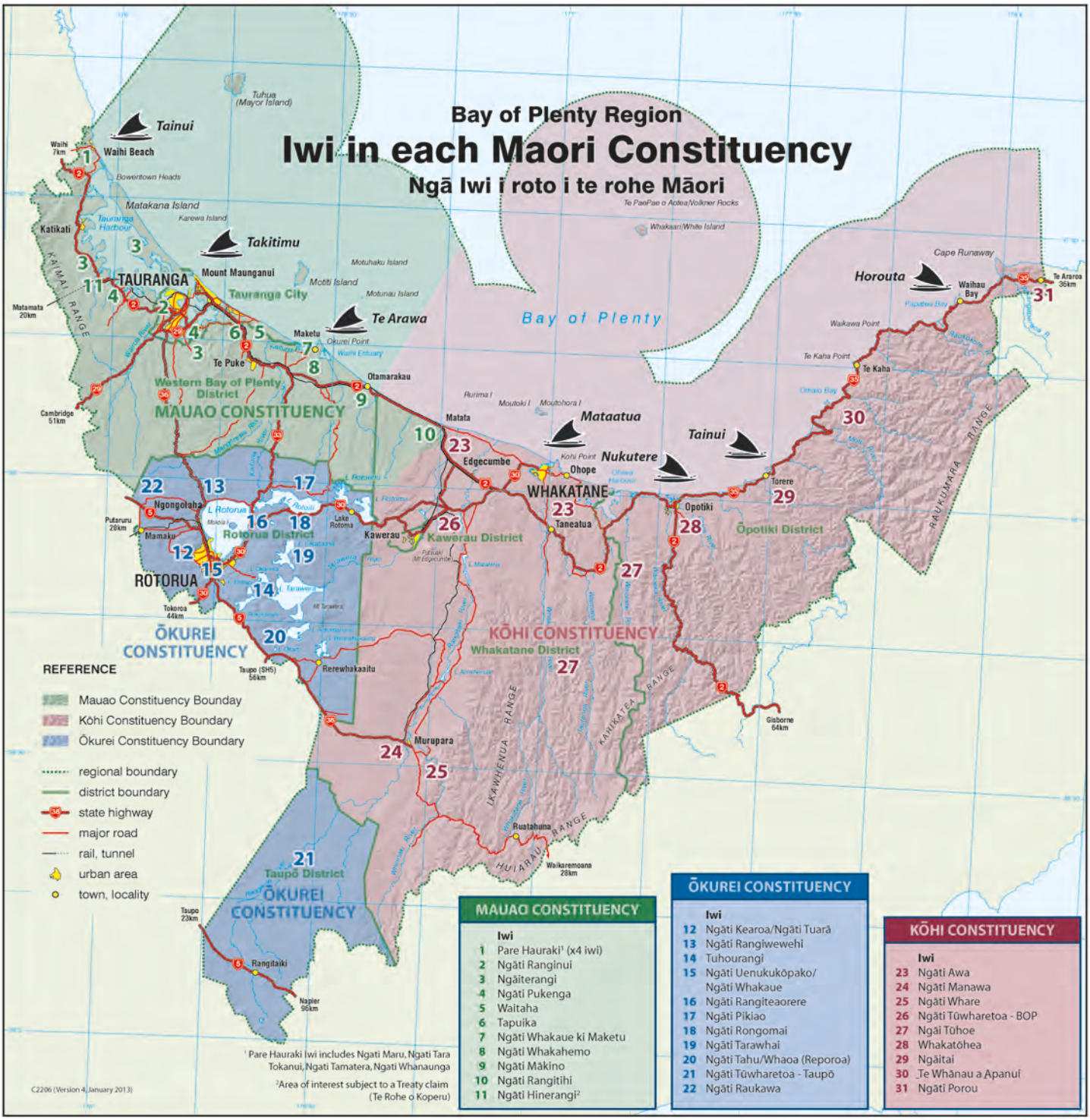
The Council will continue to work together with tangata whenua in the region, enhancing the coastal environment for the benefit of iwi, hapū and the wider community. The Bay of Plenty Regional Council provides funding to hapū/iwi in the region to develop and/or update and revise such documents. Information and criteria for funding applications can be found on the Bay of Plenty Regional Council website[1].

[1] www.boprc.govt.nz > Council > Kaupapa Maori > Hapu Iwi Resource Management Plans

Hapū/iwi issues of concern

Information in HIRMPs has been used by the council to identify significant environmental and resource management issues for Māori. The main issues relevant to the coastal environment are shown in the diagram.

Mataatua, Te Manuka Tutahi

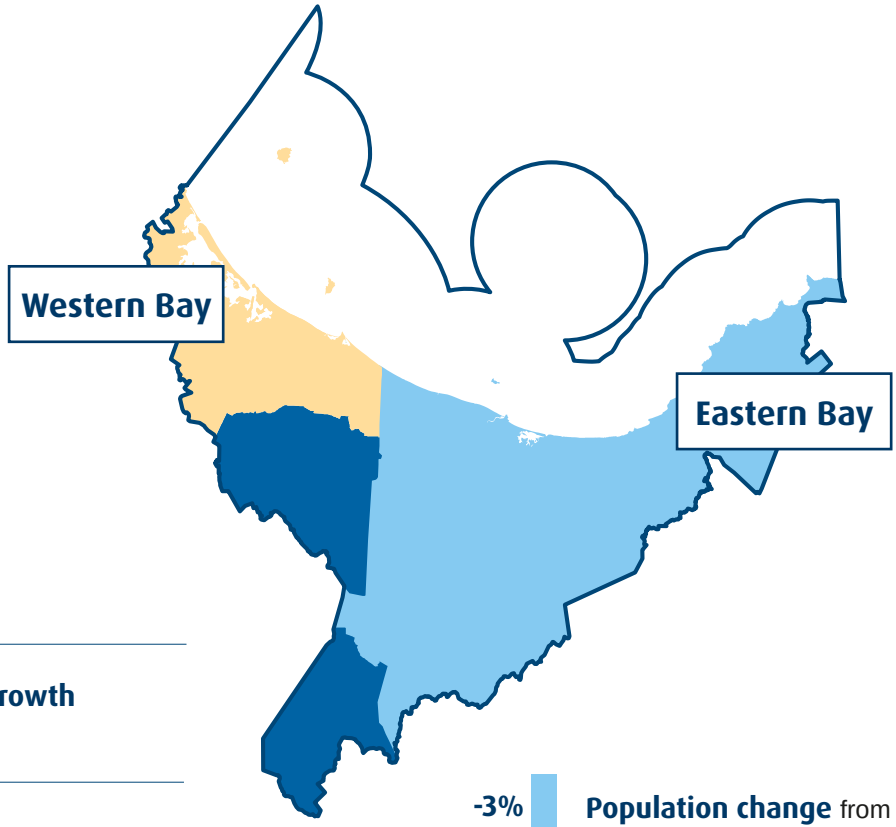


On the horizon

Tangata whenua bring enormous value to the culture and spirit of the Bay of Plenty region and with better resources hapū/iwi will continue to enhance the community. With many positive changes on the horizon the potential for hapū/iwi and community advancement is significant. By building strong and enduring relationships between Councils, hapū/iwi, the community and the environment the Bay of Plenty can continue to grow and thrive.

Pressures on the coastal environment

The coastal environment is also influenced by a wide range of human-influences.



Western Bay

8% **Population change** from 2006-2013

Rapid population growth expected in the west

Tauranga City is the region's business service and transport hub

Port of Tauranga – New Zealand's largest port

Key exports: kiwifruit

Most visited offshore islands: Tūhua (Mayor Island) and Mōtītī Island (more than 1000 boat trips per year)

Commercial shipping lanes from the North of Tūhua Island to Port of Tauranga

Eastern Bay

-3% **Population change** from 2006-2013

Largest approved marine farm in NZ is off Ōpōtiki

Majority of dairy farms in the Bay of Plenty are in the Eastern Bay

Key exports: logs, timber, milk, dairy products

Most visited offshore islands: Whakaari (White Island), Moutohorā (Whale Island) and Raurima Island (more than 2000 boat trips per year)

Commercial shipping lanes from the East Cape to Port of Tauranga

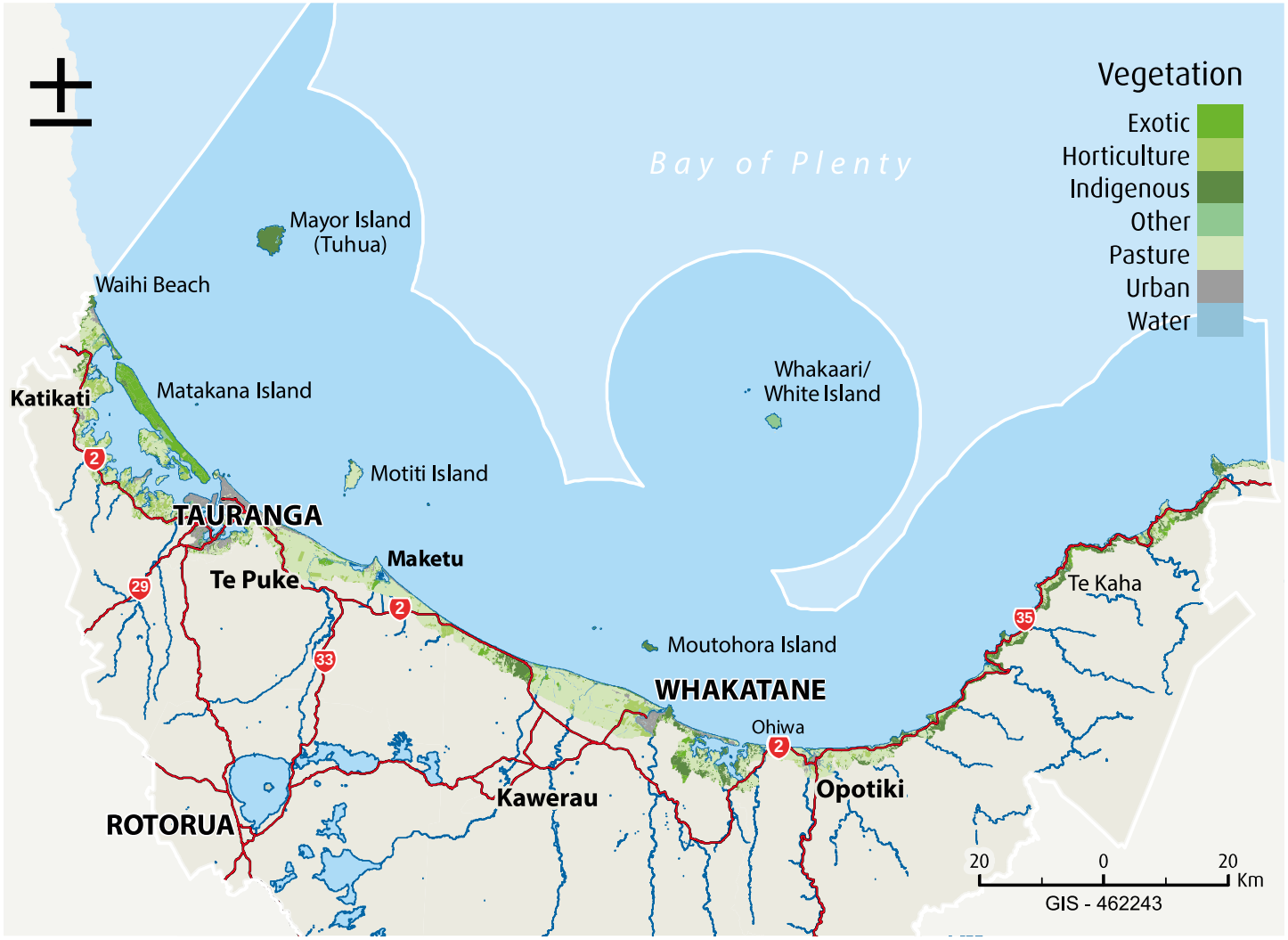
Land use and coastal water quality

Land use and land-based activities can affect the quality of our coastal environment. For example, changing land use can increase the supply of nutrients to rivers and streams that discharge to the coast, and vegetation removal can increase erosion and the transport of sediment into our harbours and estuaries.

Pasture is the dominant land use along the coast with horticulture a distant second. The large area of intensive land use heavily influences the condition of both the soils and the environment. Overall, the health of our region's soils is fair but there are concerns about the increasing levels of nutrients found in agricultural and horticultural soils. Nutrient levels must be managed carefully as increased nutrient leaching allows for subsequent enrichment of waterways (eutrophication). Eventually nutrients often accumulate in coastal areas (estuaries and harbours).

Exotic forestry is common throughout the region with indigenous forest cover reduced in much of the eastern Bay of Plenty. The higher presence of exotic forest cover is a result of a large forestry industry in the Bay of Plenty and land clearance for agricultural and horticultural purposes.

The Regional Council works with landowners and the community to help maintain healthy soil, water and biodiversity. For example, a series of self-assessment toolkits have been produced for landowners in the Tauranga Harbour area. The toolkits cover erosion proofing, pollution proofing, weather proofing, pest proofing and soil health.



Land use in the coastal environment

Coastal water quality

Swimming water quality

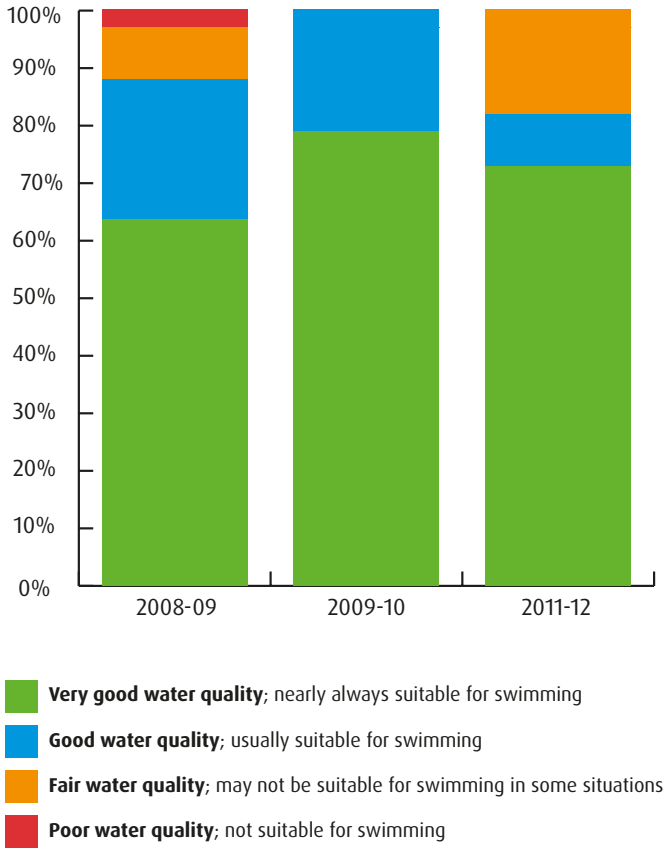
The Bay of Plenty Regional Council monitors water quality at popular recreational sites and shellfish beds. Monitoring occurs from October to March each year. Results help identify the risk to public health from faecal contamination at these sites.

Results

Open coastal water in the Bay of Plenty is consistently good quality for swimming. In 2011/2012, only four sites exceeded the alert mode.

Estuaries have poorer water quality. For example, last year 50 percent of estuarine sites were graded 'fair' quality and 13 of 18 sites exceeded the orange/alert mode. Nine of these sites were around Tauranga Harbour; the others were at Little Waihī, Tarawera River Mouth, Whakatāne Heads and Waiotahi Beach Estuary. No sites reached the Red/Action mode.

Swimming water quality at coastal and estuarine sites



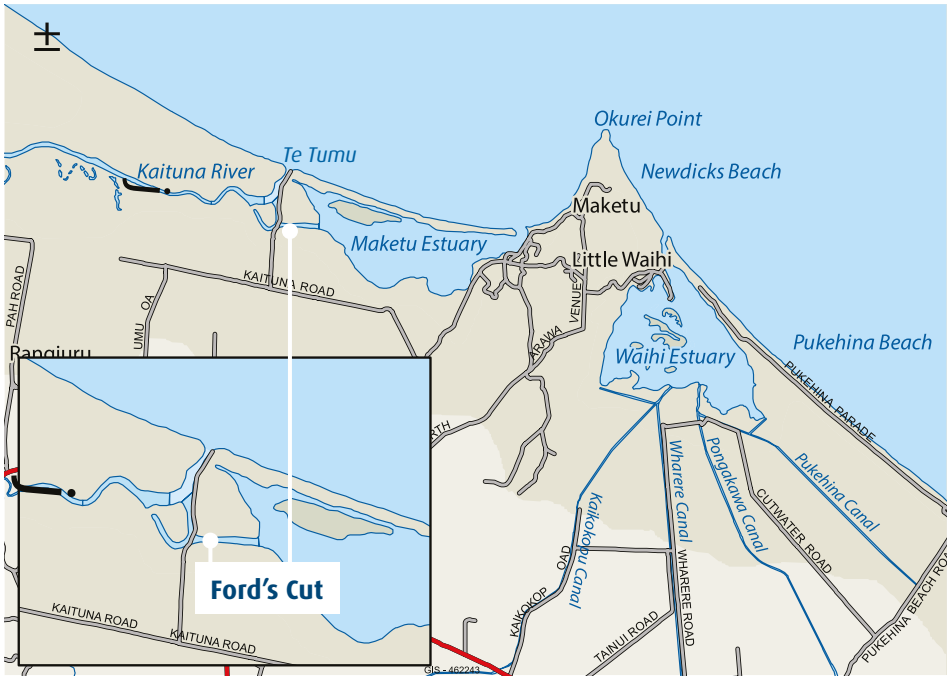
Estuarine sites tend to have higher faecal contamination levels due to the enclosed nature of estuaries and the influence of stream and rivers. This is because water in streams, rivers and stormwater can be contaminated by farm and urban run-off, which can contain faecal contaminants, hydrocarbons and heavy metals.

The weather can influence water quality, which is often worse after periods of prolonged rainfall. Swimming in rivers and estuaries should be avoided for 48 hours (two days) after heavy or prolonged rain.

Strategies are being implemented by the Bay of Plenty Regional Council and district councils to encourage appropriate land use and activities around our water resources, and restore degraded areas. One example is the Regional Sewer Overflow Working Group which was established in 2013, and includes the Regional Council, district and city councils and Toi Te Ora – Regional Public Health. The group is working collaboratively to promote best practice across the region in responding to and preventing overflows from the sewer network into the stormwater system, which discharges into our rivers and harbours.

Maketū and Little Waihī Case study

Maketū and Little Waihī Estuary are separated by Ōkurei Point. Maketū Estuary is the natural outlet of the Kaituna River. It covers approximately 2.3 square kilometres and consists of very dynamic and continuously shifting channels. Little Waihī Estuary covers around 2.4 square kilometres, which is almost completely exposed at low tide. The Pukehina sand spit encloses most of the estuary and freshwater is supplied by the Pongakawa Stream. Both estuaries have lost many of the original wetland plant communities around the edges due to land drainage, stop-banking and changes in currents and salinity. Both estuaries have also partially filled with sediment from both coastal and land-based sources.



Location of Ongatoro/Maketu and Little Waihi Estuaries

Community concerns

The Ongatoro/Maketū Estuary strategy was released in 2009. The strategy was prepared in response to longstanding iwi and community concerns about a general decline in water quality, mauri of the area and the infilling of the estuary. From the consultation process key community concerns were established:

- Inability to practice kaitiakitanga
- Water quality in the lower Kaituna
- Urban and industrial development
- Flood management
- Environmental health of the estuary
- Wetlands and aquatic habitats
- Recreation.

Royal Spoonbill feeding in Maketu Estuary

The ability to divert a greater volume of freshwater from the Kaituna River into the Maketū Estuary is being explored.

Local outcomes

In response to concerns raised by the community, management goals were established for the Ongatoro/ Maketū Estuary through the strategy.

A key focus is restricting stock access via fencing and riparian planting and ensuring dairy shed and other discharge compliance to protect and enhance water quality. Bacterial contamination in the river is improving but still relatively high, while nitrogen levels have doubled since 1975. Other goals in the strategy include diverting a greater volume of freshwater from the Kaituna River into Maketū Estuary, and attempting to create 100 hectares of new wetland.

Kaituna diversion

Before 1956 the Kaituna River passed through Ongatoro/ Maketū Estuary before exiting to the sea. During extreme flood events the river would break through the sandspit at Te Tumu, bypassing the Estuary for a period of time until the river mouth migrated east to Maketū. Ford's Cut was constructed in the 1920s to allow a portion of the river flow to enter the estuary. In 1956 the Kaituna River was completely diverted out to sea at Te Tumu as a response to flooding in the surrounding farmland. While this helped reduce the flood risk and improve land drainage, it had significant negative effects on the health of the estuary. These effects included a 95% loss in vegetated wetland area, over half the estuary filling with coastal sediment, and a consequent reduction in fish and shellfish populations. 5% of the river has been allowed to flow through Ford's Cut into the estuary since 1996. Through the strategy, Bay of Plenty Regional Council is currently planning to re-divert 20% of the Kaituna River into Maketū Estuary as well as re-creating at least 20 hectares of wetlands.

Sediments and macrofauna

Shallow inshore waters are highly productive. They are also susceptible to environmental degradation. Contaminants transported to the coast often accumulate in marine sediments. Many of the marine species found in the Bay of Plenty live in or on the sediments. Sediment characteristics, and the number and diversity of species living in the sediments are monitored annually at a number of coastal sites in the Bay of Plenty.

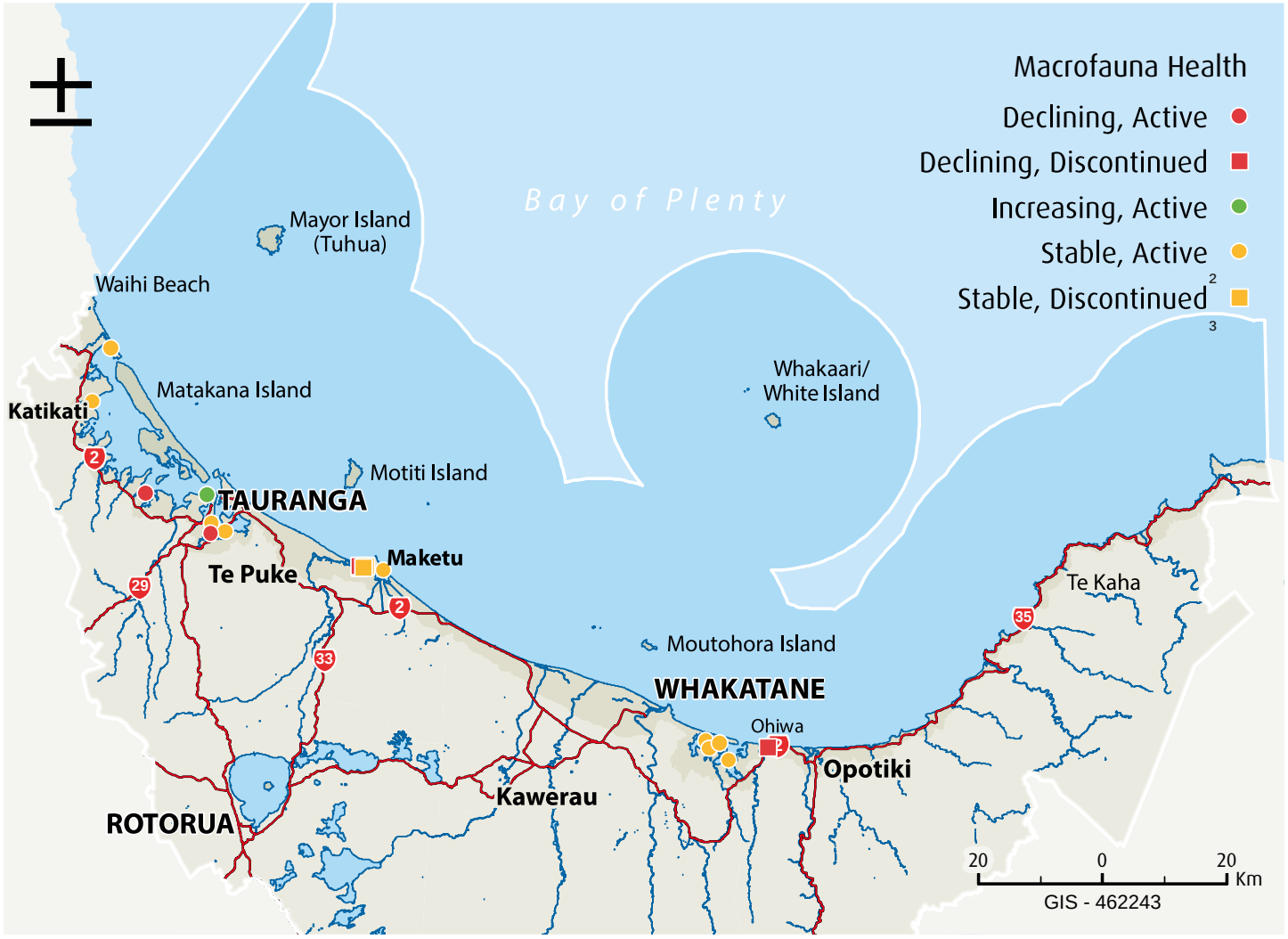
Sediment monitoring

We monitor sediments to identify, monitor and trace contaminants and their sources to prevent potential or further contamination. The Interim Sediment Quality Guidelines (ISQG), developed by the Canadian Ministry for the Environment, are used to assess the quality of sediment at each monitoring site. We also analyse the variations seen over time to identify potential causes of sudden increases. While a low level of accumulation may not be lethal to an organism, it may have flow on effects to organisms higher in the food chain.

Sediment health and trends

Similar to a trend shown in the Auckland region, sites next to urban or commercial development appear to have elevated levels of contaminants. However, with the exception of the Matahui site in Tauranga Harbour, none of the 38 sites sampled to date have exceeded the guidelines. The Matahui site consistently has a higher mercury level than surrounding catchments. The source has not yet been identified and research is on-going.

Sediment quality in Tauranga and Ōhiwa Harbour



Results of macrofauna monitoring along the Bay of Plenty coast

Macrofauna monitoring

Macrofauna are animals larger than 0.5 mm in size. A coastal and estuarine monitoring programme was established in 1990 to monitor macrofauna health at exposed and sheltered soft-shore sites. Animals found in these areas include shellfish, worms, crabs and isopods (such as sea-slaters).

Factors that can influence macrofauna distribution are also investigated, such as how muddy the sediment is and the effect of physical processes like wave action.

Monitoring at Maketū and Waiotahi Estuaries has been discontinued due to the dynamic behaviour of the estuaries. The constantly changing channel routes and highly mobile sediments make it difficult for macrofauna to survive. Potential new sites are being investigated.

Macrofauna health and influences

Overall, macrofauna health in the Bay of Plenty appears to be good. However, as monitoring has not yet occurred over a long period of time, it is difficult to determine a long term trend.

Seven sites are monitored in Tauranga Harbour. Four have stable, two have declining and one site shows increasing numbers of macrofauna; however this increase is thought to be due to the loss of seagrass cover and is not necessarily positive for the heath of the harbour. The two declining sites (Te Puna and Welcome Bay Estuaries) are both sheltered catchments that have experienced an increase in muddy sediments and a decrease in species richness. This decline may be related to changes in land use in the surrounding catchment releasing finer, muddier sediments to the harbour via runoff.

The macrofauna in the four sites monitored in Ōhiwa Harbour are all stable; however the mud proportion of sediments is increasing, which may lead to changes in macrofauna over time.

[2] Active - site still being monitored. [3] Discontinued - site no longer monitored.

Mangroves

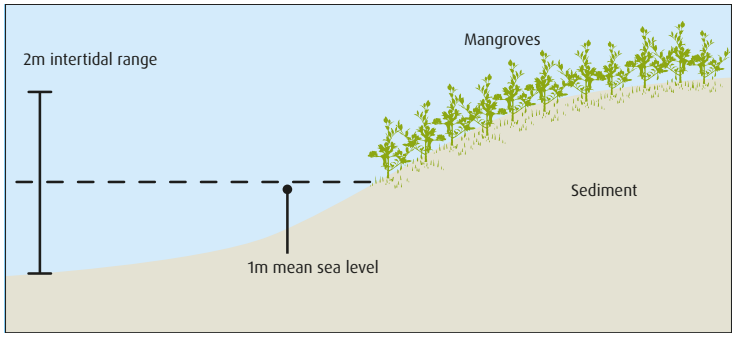
Mechanical mangrove removal at Waikareo Estuary

The New Zealand mangrove is an indigenous species naturally found in estuaries in northern New Zealand, but the rapid increase is a concern for some communities living around Tauranga and Ōhiwa Harbours.

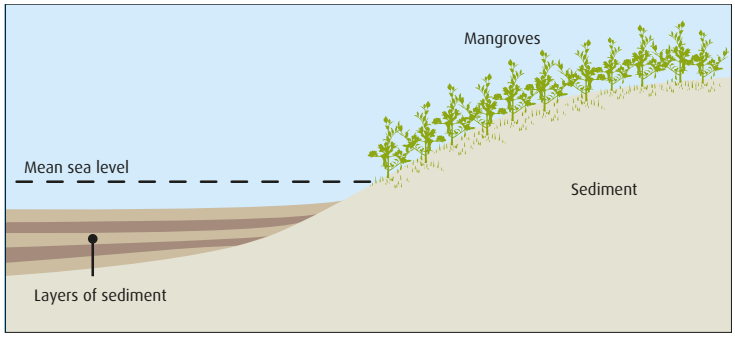
Mangrove cover in Tauranga and Ōhiwa Harbours has increased rapidly over the last fifty years. Mangrove spread is associated with increased sedimentation – particularly of fine (muddy) sediments. The increase of sediments in both harbours is a result of intensive land clearance and development. Sediment accumulation occurs faster in sheltered bays. In our harbours there is a greater extent of mangrove cover in areas where large-scale land clearance and development have occurred around sheltered harbour bays.

Climate change will also influence mangrove distribution if events like frost, which currently hinder mangrove growth and reproduction, decrease in frequency.

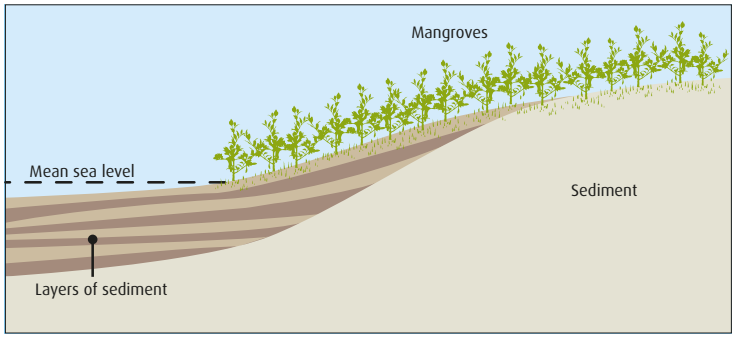
How does sedimentation increase mangrove cover?



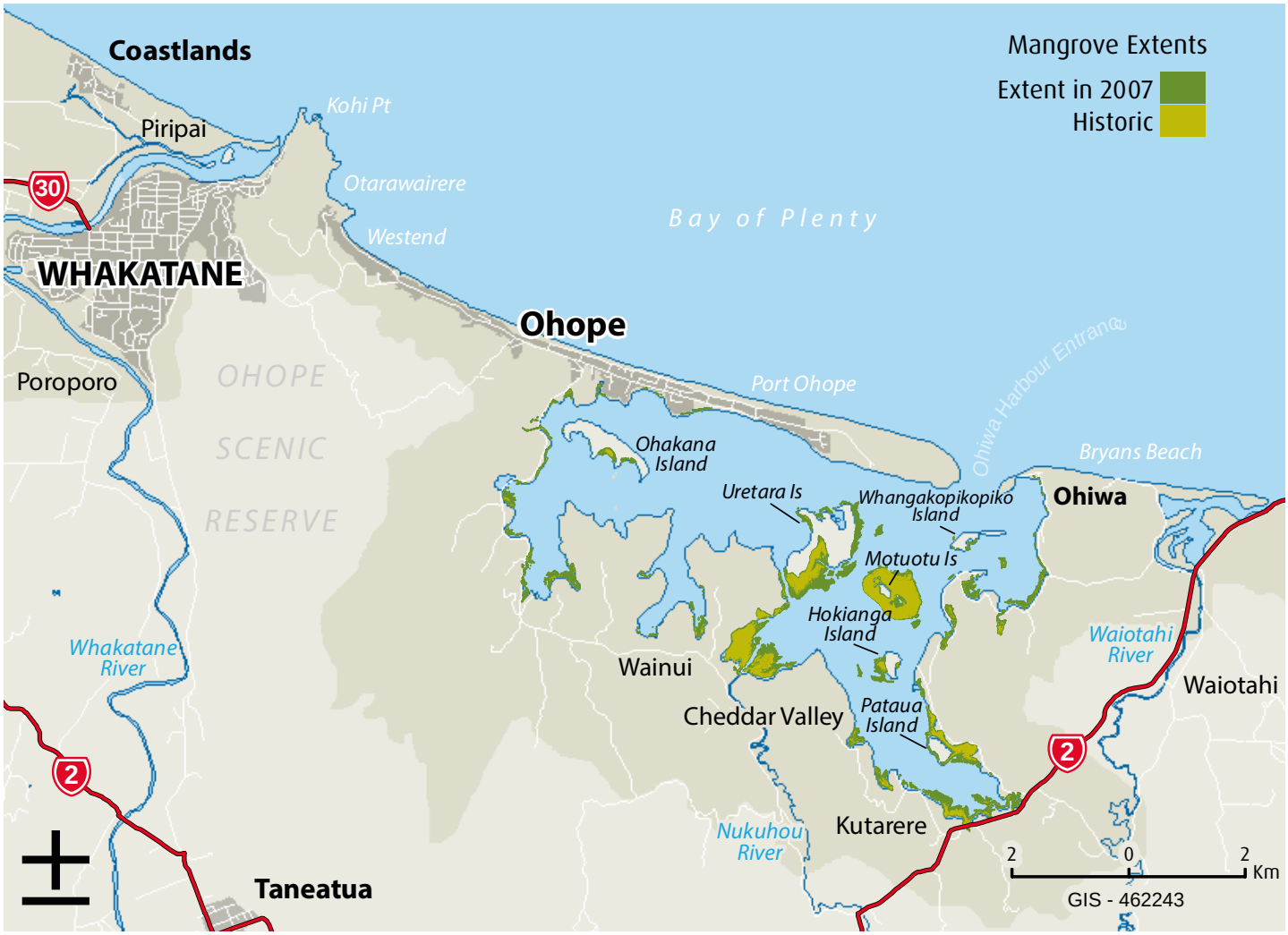
A: *Mangrove cover limited to the area above mean sea level*



B: *Increased sediment supply raises the bed level in sheltered areas of harbours and estuaries*



C: *Sedimentation and the raised seabed mean that mangroves can grow in a greater area than before*



Mangrove extents in Ohiwa Harbour

Ōhiwa Harbour

The local hapū – Upokorohe hold the Ōhiwa Harbour resource consent for management of mature mangroves and seedlings using low impact methods (hand held tools). Removal is targeted at outlying plants and seedlings, rather than large-scale removal, with the intention of limiting further spread around the harbour and to maintain a balance between mangroves, open sand and mud flats. Although the consent covers the entire harbour, there are many high value or biologically sensitive areas that are protected by legislation and have restrictions applied. Last summer (2013/2014) over five hectares of mangroves were removed.

As mangrove spread is largely a response to sedimentation, efforts are being made to reduce sediment entering the harbour by fencing land along streams and encouraging change in some land management practices.

Mangrove spread in Ōhiwa Harbour has occurred predominantly in the sheltered southern inlets where there is a high input of waterborne sediment that can settle undisturbed by currents and wave action.

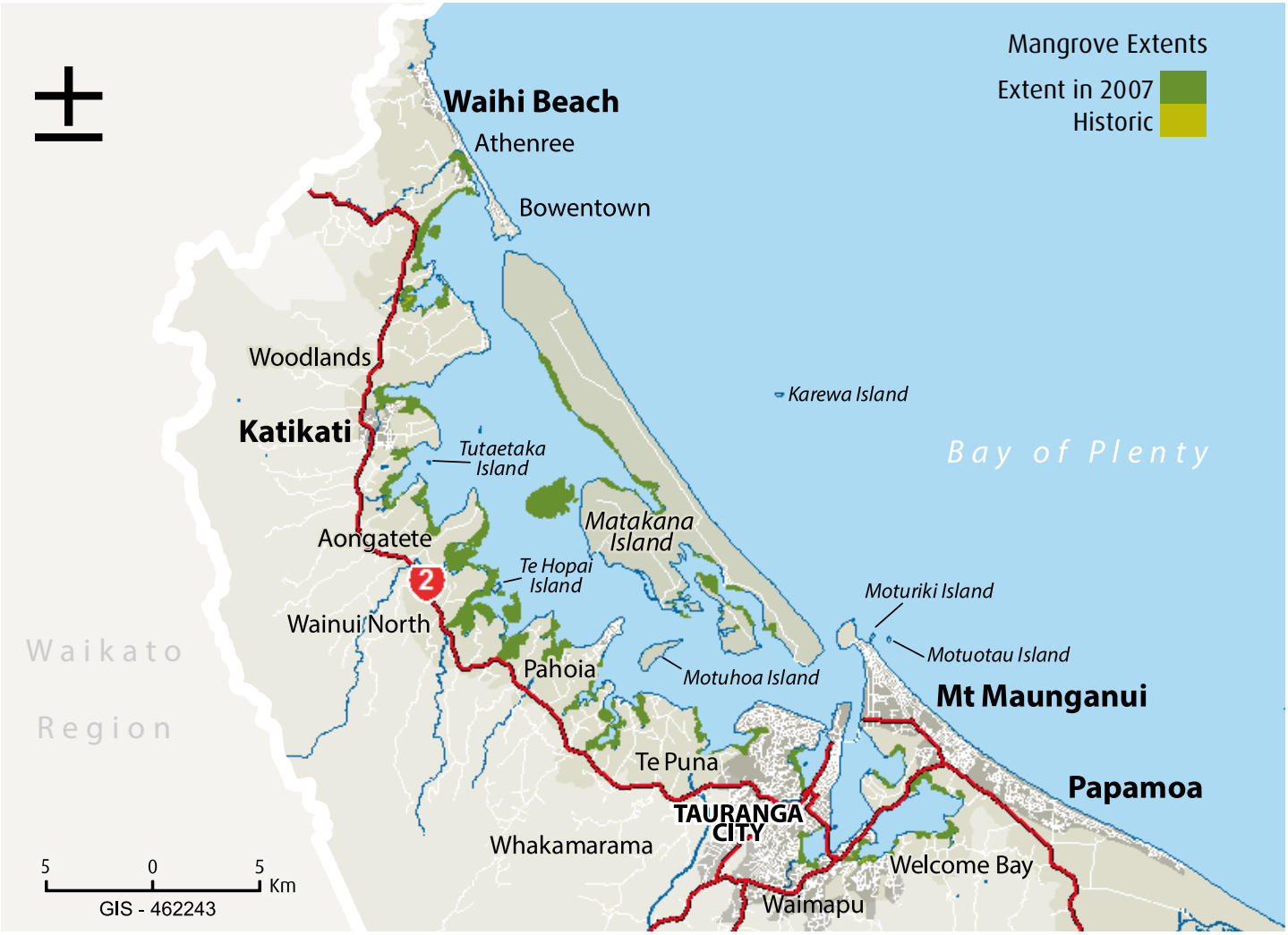
Tauranga Harbour

Ten estuary care groups currently operate in over 11 locations around Tauranga harbour. The focus of the Estuary Care programme is to achieve environmental enhancement of the estuaries. Each group holds its own consent for manual mangrove removal.

Consents were granted in 2009 enabling the use of mechanical removal to clear mangroves from specified areas around Tauranga Harbour. Approximately 110 hectares of mangroves were removed using the mechanical mulching method in 2010 and 2011. This dramatically reduced the time taken to remove mangroves.

The long-term effects and benefits of mechanical mangrove removal are still being monitored. Sediment levels in areas of mechanical mangrove clearance have shown a general decline in height and thickness of finer sediment (mud) since removal of mangroves. However sites with low erosion or continual high sedimentation have shown little decrease.

Mangroves provide benefits such as reducing erosion in some situations and creating habitat for wader birds in the absence or decline of the native saltmarsh. Banded rail are known to use the mangroves for shelter and presumably foraging for food in the absence of saltmarsh. Mangroves in other parts of the world increase species diversity in surrounding ecosystems by acting as a nursery for juvenile organisms. However, in New Zealand mangroves only act as a nursery for one or two fish species. Determining the overall contribution of productivity to the wider harbour ecosystem is still to be established in the Bay of Plenty. Therefore, mangrove removal needs to be carefully managed as part of a wider catchment management plan and in conjunction with the local community to ensure that positive outcomes are achieved.



Mangrove extents in Tauranga Harbour

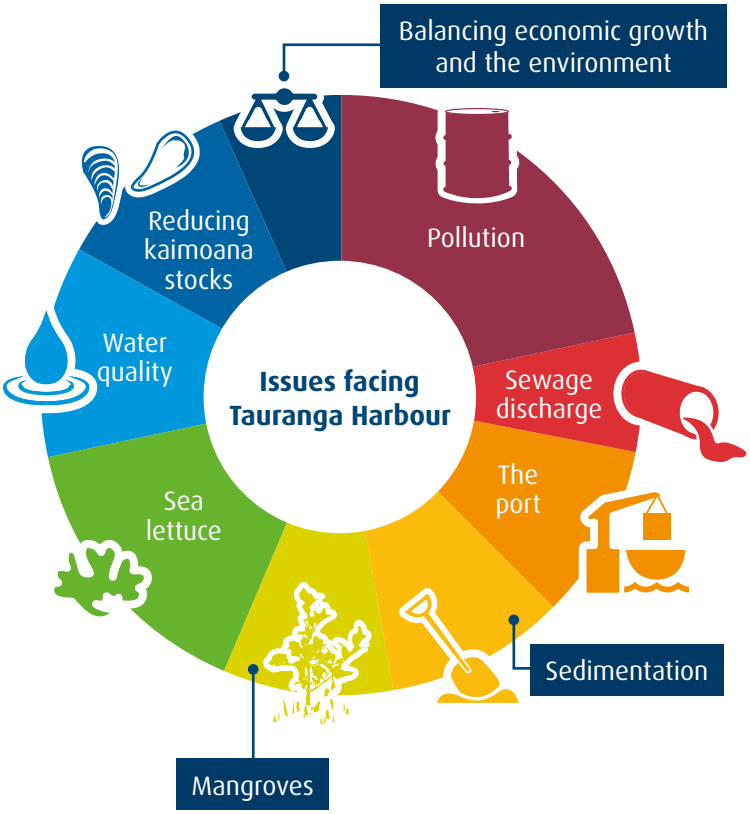
Tauranga Harbour

Tauranga Harbour is one of New Zealand's largest estuaries. The Harbour covers approximately 200 square kilometres and has a large catchment that is home to over 100,000 people. Around 60 percent of the Harbour is exposed at low tide; there is also a large tidal influence and two entrances, which contribute to diverse conditions. The entire harbour is an outstanding natural feature and landscape. The Harbour also has numerous ecologically and culturally significant locations and is of huge importance to many due to its ability to provide readily accessible kaimoana, recreational activities and space.

Management of Tauranga Harbour

The Tauranga Harbour Integrated Management Strategy identifies several challenges for the management of Tauranga Harbour. Balancing economic and population growth with environmental health and sustainability is important as greater use of the harbour brings conflicting use. A significant concern is the increasing use of the harbour by port vessels and recreational users. Putting plans in place to cooperatively manage these issues is vital to ensuring all parties are represented properly. Key users of the harbour are the Port of Tauranga, local hapū/iwi and recreational users.

Commonly used beaches in Tauranga Harbour generally have good water quality. However, there are occasionally localised areas of reduced water quality in the vicinity of urban development, particularly after periods of rainfall. Sediment contaminant monitoring shows that Tauranga Harbour is generally in good health except for localised 'hot-spots' around stormwater outfalls; however the macrofauna monitoring suggests that concentrated urban development is having a negative impact on some aspects of the harbour ecology (sea grass and filter-feeding shellfish species).



Public knowledge and perceptions

A recent survey of over 600 Bay of Plenty residents found that pollution of the harbour was of concern to just over a third of respondents (36 percent). Other common concerns were sea lettuce (34 percent), water quality (26 percent), sedimentation (22 percent), mangroves (21 percent) and activities at the port (21 percent).

Sea lettuce washed up on Omokoroa Beach

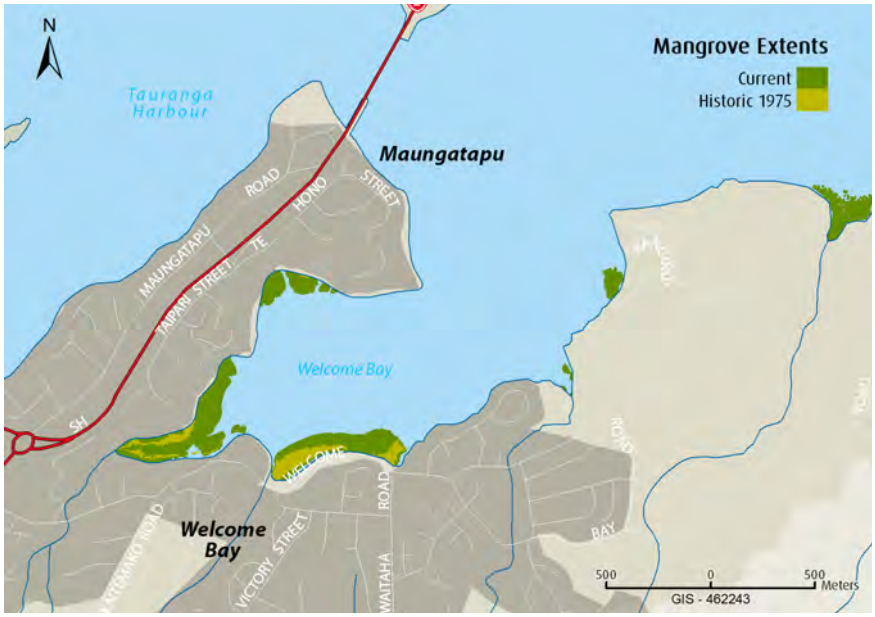
Sedimentation

Sedimentation has affected Tauranga Harbour. Infilling in and around the Port and navigation channels means that movement through many channels is now tidally dependent for larger vessels, or dependant on more frequent or more extensive dredging.

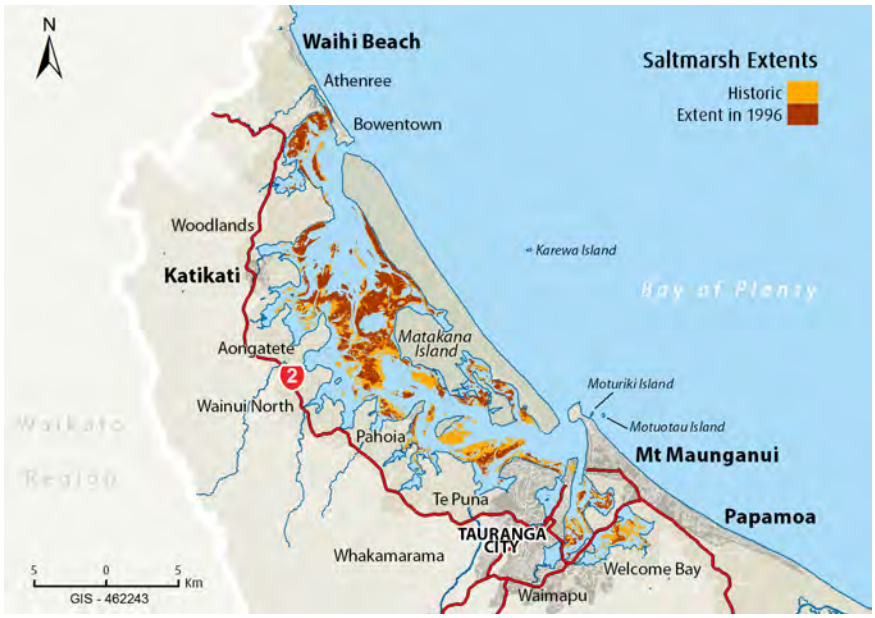
The second detrimental effect of sedimentation is the influence on the ecology and biological health of the harbour. This is of increasing concern from local Iwi. Sedimentation is at least partly responsible for the severe decline in seagrass (*Zostera*), declining shellfish beds and the spread of mangroves. Sedimentation could ultimately change the numbers and type of wildlife found in the Harbour.

Sea lettuce (*Ulva*) is a naturally occurring green algae that grows in large sheets and is often considered a nuisance. Research has shown that whilst freshwater inflow is linked with nutrient enrichment of the harbour waters and sea lettuce tissue it has little effect on the abundance of sea lettuce. Climatic analysis has shown that El Nino years, which produce westerly winds that drive coastal waters offshore and create upwelling of deep nutrient rich cooler water, have some influence on sea lettuce abundance. The lower peak summer water temperatures may allow continued growth of sea lettuce. As Ulva is a naturally occurring species, Bay of Plenty Regional Council has no statutory responsibility to control or remove the algae; however support is provided to local councils to manage the effects of sea-lettuce blooms on the basis of recreation and amenity values. Research is on-going to discover a sustainable use for sea lettuce washed up on shore.

Mangrove cover in Tuapiro Estuary: 1975 and current



Mangrove cover in Welcome Bay: 1975 and current



Seagrass extents in Tauranga Harbour: Historic and 1996

Beaches and dunelands

The Bay of Plenty region has approximately 688 km of coastline; 75 percent of our coast is soft sandy shore.

Open sandy beaches are extremely dynamic. Wind and wave action creates variation in beach morphology and short and long term trends are visible in beach profile, erosion and accretion patterns. Periods of erosion, accretion or dynamic equilibrium (stable state) often occur for periods of 10 years or more.

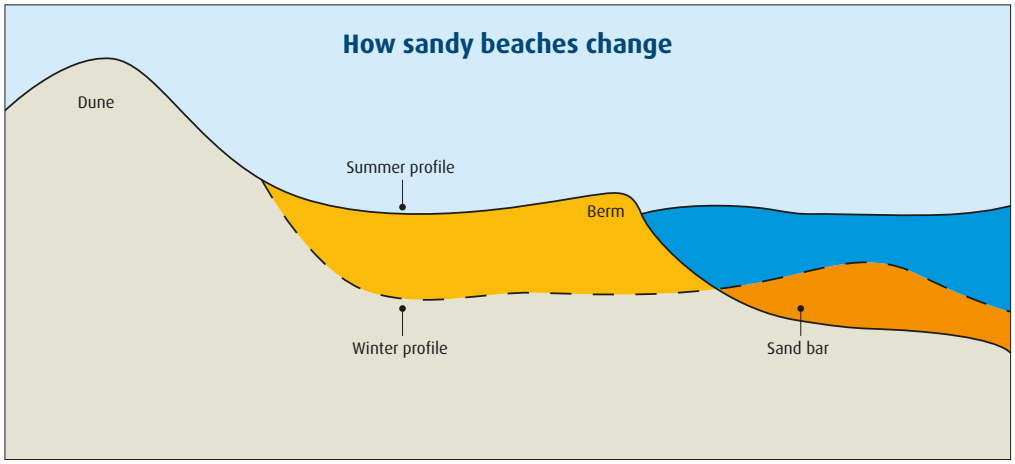


Diagram showing how beach profile changes between winter (lower beach and sand bar near to shore) and summer (higher beach and no sand-bar)

Coast Care planting at Pāpāmoa Dune

Monitoring

The coastal monitoring programme was established in 1990. Currently 53 sites are monitored each year - spanning 135 km of open coastline from Ōpape in the east to Waihī Beach. Each site is classified as being in a state of erosion, accretion or dynamic equilibrium (stable). Understanding the Bay of Plenty beach dynamics is essential for planning and resource management.

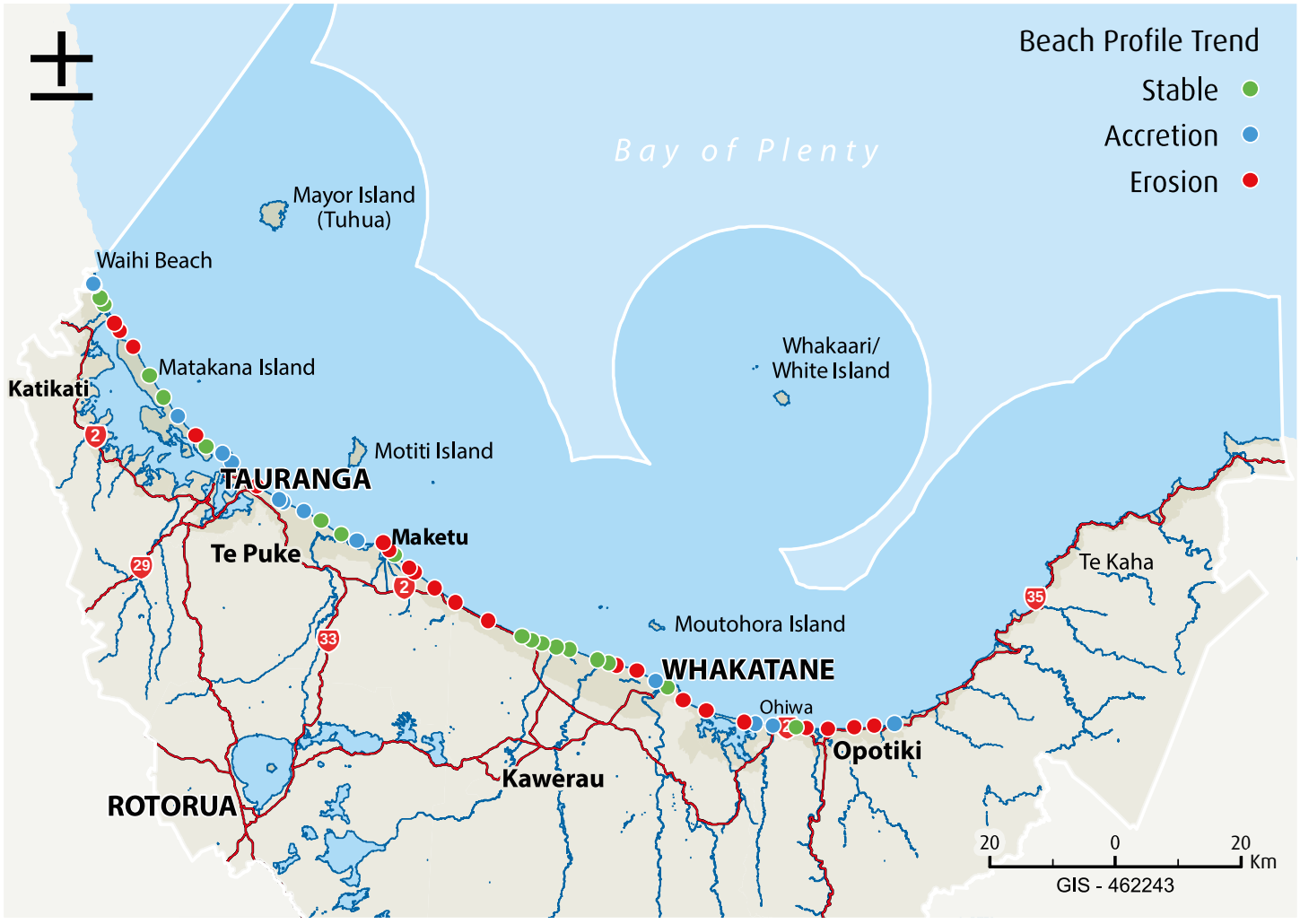
What is the state of our beaches?

During the last complete monitoring phase (2011), 21 beaches were eroding, 15 accreting and 17 stable. The number of sites in a state of erosion has reduced from 26 in 2007/08 and is encouraging for initiatives like the Coast Care Programme. However, other factors like the climate may also influence beach dynamics.

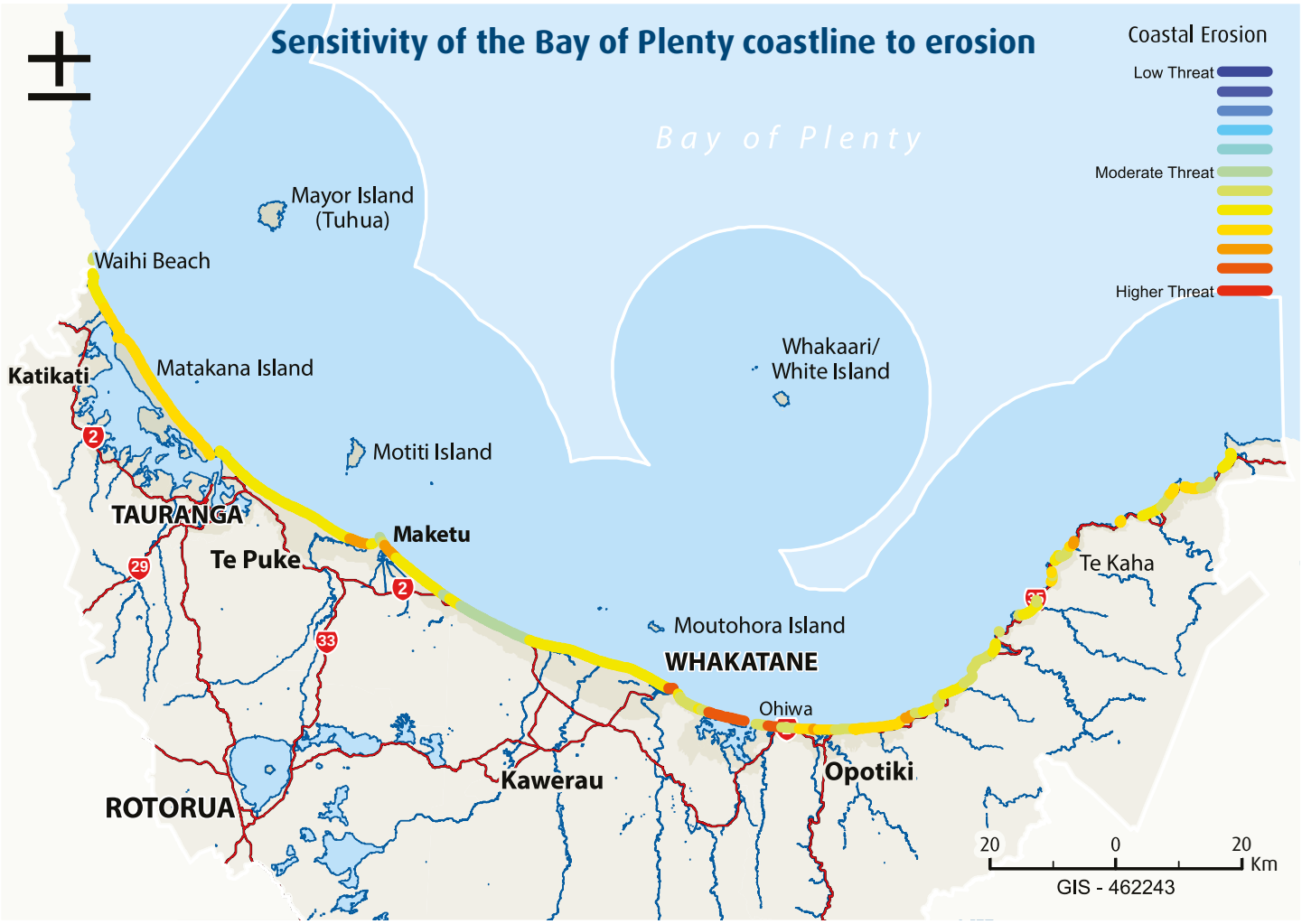
Pressures

Increased use and development of the coastal environment puts pressure on dune systems. Activities that have negative impacts on the dunes include:

- Informal access (walking on dunes, vehicles, sliding down dunes).
- Encroachment of private gardens into the dune – introducing exotic species that can out-compete native plant species that can stabilise the dunes.
- Urban development and associated impacts from coastal structures required for infrastructure (drainage, seawalls).
- Grazing by stock or rabbits.
- Coastal erosion removing habitat suitable for vegetation cover and reducing the barrier between the coast and human development.



State of sandy beaches along the Bay of Plenty coast 2011



Sensitivity of the Bay of Plenty coastline to erosion. Data provided courtesy of NIWA

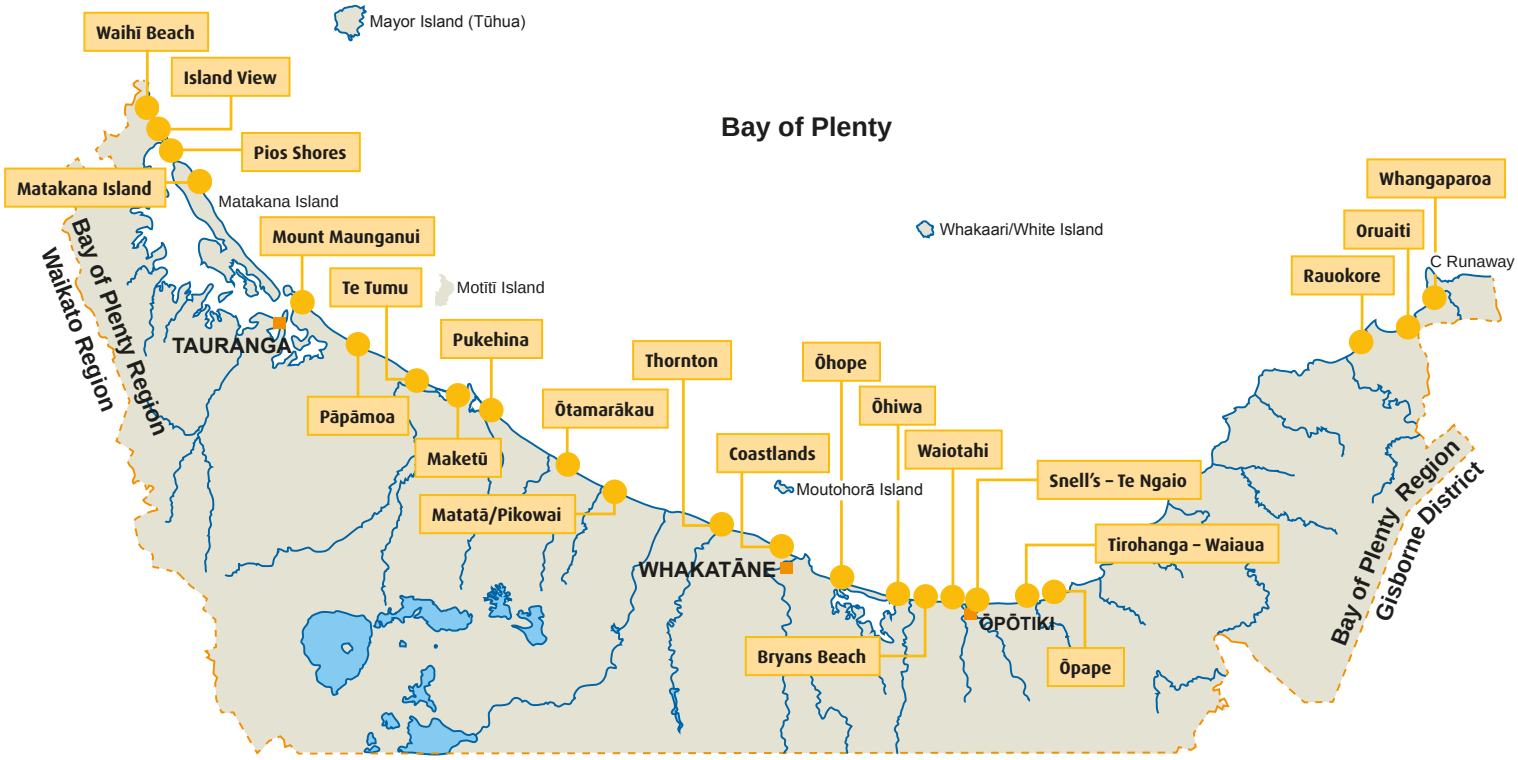
Coastal Erosion

The National Institute of Water and Atmospheric Research (NIWA) has developed a model that predicts the relative susceptibility of beaches to erosion. Areas more susceptible to erosion are found in low lying coastal areas that have sandy shores and modified sand-dunes. Sand-spits like the Ōhope Spit and Pukehina are two areas potentially susceptible to erosion.

Hikuwai Beach - well-used vehicle access track and eroded fore dune

Coast Care programme

Coast Care Groups in the Bay of Plenty



The Coast Care Programme is a multi-agency, community based programme focusing on restoration of the region's dunes. The agencies involved are the Bay of Plenty Regional Council, the Department of Conservation and the four coastal district councils. Since its establishment in 1994, the programme has expanded to cover around 156 km of the coastline. There are around 30 Coast Care groups in operation and over 1000 regular volunteers.

The programme has been highly successful. Native dune plants like Spinifex and Pingao now cover approximately 75 percent of the region's fore dunes. Impact on the dunes from vehicles and private garden encroachments has also reduced. Rabbit populations appear to be declining as pest management is proving effective. This has all been a result of increased public education and inclusion in management of the dunes - 58 percent of the region's sandy beaches now have some form of Coast Care involvement.

North end of Waihi Beach in 1996 - before Coast Care planting

North end of Waihi Beach in 2005 - after Coast Care planting

Climate change and coastal pressures

Climate change will influence our coastal environment.
Major changes expected include:

- More frequent droughts
- Increasing westerly winds
- More frequent extreme rainfall events
- Sea level rise.

Coastal inundation

Coastal inundation is the flooding of land along the coast from the sea.

Low lying coastal plains and features like the Rangitāiki plains and Matakana Island are at particular risk, as some areas are below sea level. Increased inundation also increases susceptibility to erosion and saltwater intrusion. Drainage systems have the potential to become unsustainable in low lying areas.

Tsunami

A tsunami is a series of surges created by the rapid displacement of a large volume of water.

There are three types of tsunami that pose a threat to coastal communities along the Bay of Plenty coastline:

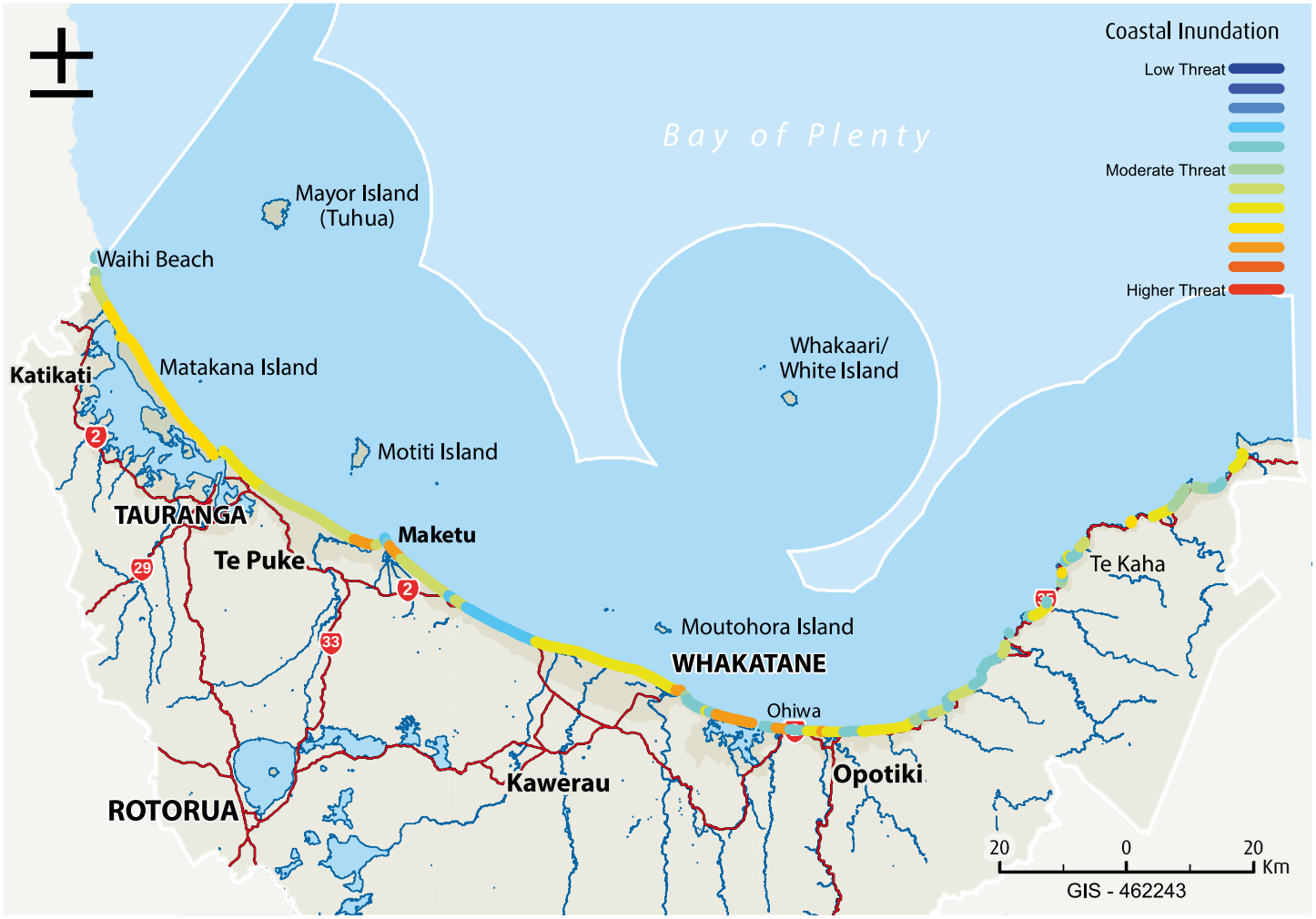
Local Source tsunami occur anywhere from one minute to one hour after an earthquake has occurred. They can be triggered by quakes in fault lines close to the shore, or from areas such as the southern part of the Kermadec Trench.

Regional Source — tsunami generated along the Kermadec/Tongan trench, which lies to the northeast of New Zealand. Regional source tsunami have a travel time of between one and three hours.

Distant Source - tsunami generated by earthquakes in other areas of the Pacific, such as Japan, South America or North America. Due to the distance that waves have to travel we have a much longer timeframe to respond.

Tsunami evacuation areas have been mapped by the Bay of Plenty Emergency Management Group.

Further research is underway to better understand the risk posed by tsunami to our region. For more information visit: www.bopcivildefence.govt.nz



Sensitivity of the Bay of Plenty coastline to coastal flooding (inundation). Data provided courtesy of NIWA

Ōhiwa Harbour

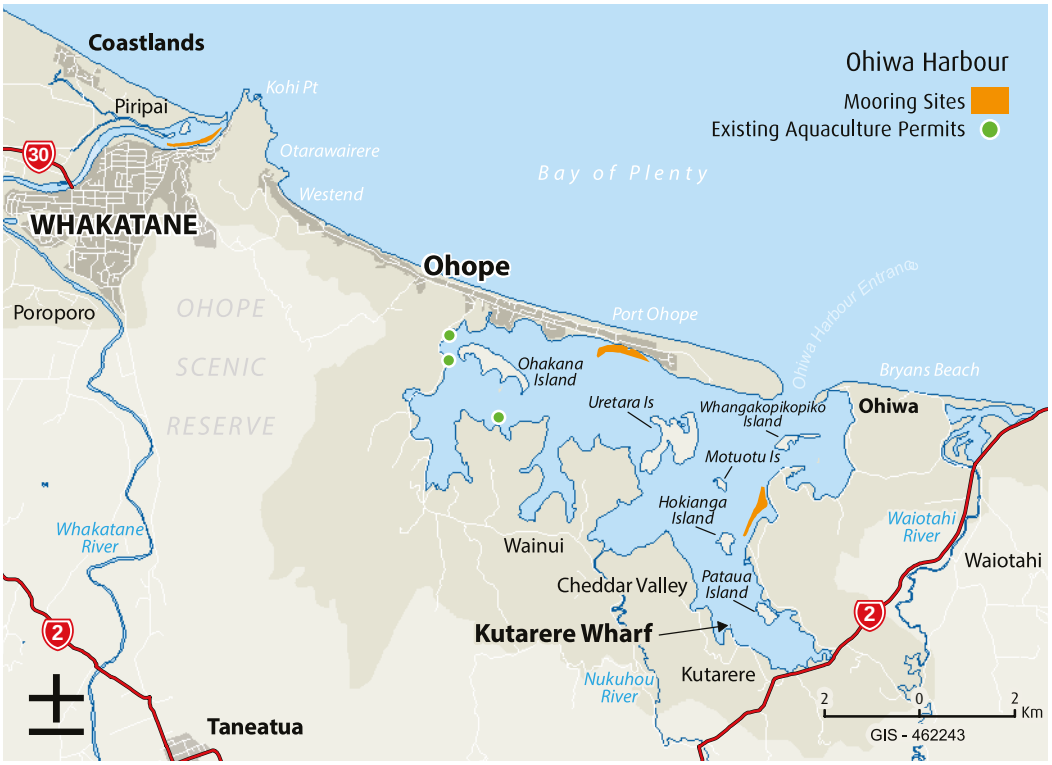
Ōhiwa Harbour is a shallow estuarine lagoon with an area of approximately 26 square kilometres. It is mostly intertidal - 83 percent of its area is exposed as sand or mudflats at low tide. Like many other estuaries, Ōhiwa Harbour is constantly changing and gradually infilling over time. Seventeen main tributaries provide freshwater inflow to Ōhiwa Harbour - Nukuhou River is the largest.

Bay of Plenty Regional Council has identified Ōhiwa Harbour as an area of significant natural heritage value due to its ecological, natural character and landscape values. Areas of the estuarine margins and multiple islands within the harbour are protected by legislation and several locations are listed as wetland protection areas.

Tauwahre Pa looking out to Ōhiwa Harbour

The Ōhiwa district has a population of approximately 4000 residents with a relatively even division of urban and rural populations. Although growth is at a rate lower than many districts in the Western Bay of Plenty, development continues to place greater pressure on the harbour environment.

The Ōhiwa Harbour Strategy 2008 identifies key outcomes and concerns raised by local residents and Iwi. It specifies actions that should be taken to achieve key outcomes. After five years, all identified actions have either been completed or are in progress, demonstrating the success of this collaborative model.



Areas of concern are:

- Health of the Ōhiwa Harbour
- Kaimoana
- Management of development pressures
- Recreational opportunities
- Kaitiakitanga and co-operative management
- Greater information transparency for the community
- Sustainability of natural areas, plants and animals

Sedimentation

Sedimentation is the most significant impact on the health of Ōhiwa Harbour. The supply of sediment has steadily increased as population has grown along with more intensive land development and clearance. The upper reaches of the harbour are at risk of sedimentation as stream and rivers like the Nukuhou River, which run through agricultural land, deposit fine sediments and nutrients. The rapid spread of mangroves in the upper harbour is evidence that accelerated infilling is occurring.

Sedimentation can also affect water quality and animals that live on the harbour floor. Sea grass (*Zostera* spp.) and kaimoana beds have reduced in the Harbour, which may be directly related to increased sedimentation.

Bay of Plenty Regional Council has established cross-section monitoring of tidal flats to monitor sedimentation rates within the harbour. Water quality monitoring is also conducted to measure suspended solids, nutrient and bacteria levels.

As part of an initiative to sustainably manage growth in the Ōhiwa district, a strong relationship has been formed with not only the community but the forestry and agriculture industries within the Ōhiwa catchment. Regional planning has seen the management of land development and disturbance to reduce sedimentation as well as the implementation of strategies to prevent stock access to streams and the harbour and improve effluent disposal. An example of the success of this work has been the reduction of suspended sediments and nitrogen in the Nukuhou River, a major tributary of Ōhiwa Harbour.

Kaitiakitanga

The local iwi and hapū who have strong connections with the harbour (Te Upokorehe, Ngāti Awa, Whakatōhea and Ngāi Tūhoe (Waimana Kaaku)) are signatories to the Ōhiwa Harbour Strategy. As strategy partners, all are deeply involved in the implementation of the strategy through their representatives on the Ōhiwa Harbour Implementation Forum and the Ōhiwa Harbour Strategy Co-ordination Group and in on-the-ground actions. Their kaitiakitanga of the harbour is active, well recognised, documented and underpins the implementation of the strategy actions.

State of the Ōhiwa Report

The State of the Ōhiwa report was released in 2013. This report provides provide a comprehensive overview of the ecological quality of the Ōhiwa Harbour and its Catchment.

Rena

On October 5 2011, the MV Rena collided with Otaiti (Astrolabe Reef), grounding in the process. It has since become one of New Zealand's most significant maritime environmental disasters. A quick response meant many programmes were set up to protect and remediate our coastline.

On-going programmes

The Environmental Recovery Monitoring Programme is the largest of the monitoring programmes and is assessing the long-term environmental effects of the Rena grounding. The programme focuses on kaimoana and their marine habitats. Surveying and sampling is used to check for any ecological changes.

Results of the monitoring programme were released in December 2013. The oil and other contents have had few long-lasting effects on the Bay of Plenty's marine habitats. The University of Waikato will continue to monitor some areas and the Rena owner is co-ordinating ongoing monitoring at Otaiti (Astrolabe) Reef.

Rena grounding in its early stages

Public help with the clean-up at Waihī Beach

Iwi consultation during the cultural programme

The shoreline programme is monitoring recovery of beaches, rocky shorelines and offshore reefs from exposure to oil and Rena debris. The shoreline programme will also oversee the recovery of dunes damaged during clean-up operations.

The wildlife programme is assessing the effects of Rena contamination on wildlife, with a particular focus on sensitive ecosystems containing endangered species, predominantly birds. Pest control is being used to improve the breeding success of endangered bird species.

The biosecurity programme surveys high risk sites and habitats, close to where salvage vessels have been operating, to see if any unwanted aquatic organisms have established. A particular focus is on areas where barge and support vessels from overseas have been located.

The cultural impacts programme has provided an opportunity for tangata whenua to assess how their cultural values have been affected. Each iwi has the option to express the impact on their needs and present their perspectives.

The Matauranga programme has focussed on researching the Rena grounding using a Matauranga Māori approach. Traditional ecological knowledge has been applied alongside science to create a plan for restoration of the mauri of the environment to its pre-Rena state.

The integration of these programmes is globally unique and constitutes a benchmark for environmental and socio-economic monitoring in response to pollution events internationally.

The future of the Rena wreck

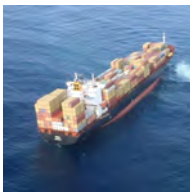
The remainder of the accomodation block needs to be removed. A resource consent application to leave the wreck on the reef will be lodged with Regional Council.

Bow of the Rena, February 2013.

Rena timeline of events

2011 2012

October 2011

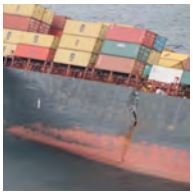


5 October 2.20am
MV Rena collides with Astrolabe Reef, becoming grounded. On board are 1368 containers, 1712 tonnes of heavy fuel oil and 200 tonnes of marine diesel. Exclusion zone established.

6 October onwards
Clean up groups organised and deployed.

10 October
130 - 350 tonnes of oil spills from the Rena creating a 5 km slick around Rena. The first oil washes up on beaches.

13 October
Ship on 20° list with 88 containers lost so far.



14 October
Rena splits apart with only its internal structure and its position on the reef holding it together.

December 2011

Bad weather hampers recovery efforts and causes more oil to leak.

January 2012

10 January
The two sections separate and the stern partially sinks.

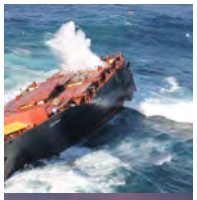
24 January
Wildlife team are stood down with DoC on standby for any further action.

31 January
497 containers of 1368 have been retrieved and processed on land.

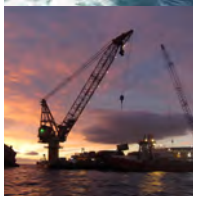
February/March 2012

Coastal clean-up continues alongside retrieval of cargo and oil from the ship.

April/May 2012



4 April
Stern section sinks after severe weather with one recorded 12 metre wave.



May
815 of 1368 containers retrieved and recovery of ship/debris from sea floor begins.

June/July 2012

June
All accessible containers removed from submerged stern section, 944 in total.

July
Representatives of the Rena's owners meet with community groups and leaders to recognise and appreciate the efforts made.

October/November 2012

October
The government and MV Rena Owners reach a comprehensive financial settlement for the clean-up and monitoring operations.

First monitoring results from over 30,000 samples are released showing polycyclic aromatic hydrocarbons (PAH's) are dissipating in most areas.

November
Te Mauri Moana Iwi leader's forum is held for an update on the Rena situation.

December 2012

Summer (and final) monitoring programme begins. Future monitoring is dependent on results. Recovery of debris between and surrounding the wreck steps up with the aid of specialised underwater equipment.

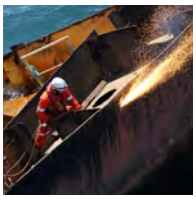
2013 2014

January/February 2013

January
Dive surveys of stern and cargo. 1007 containers now recovered.

February
Community consultation continues on proposal to deal with remaining wreck.

April/May 2013



Bow removal continues - 1006 tonnes of steel removed so far.

22 April
Severe weather conditions, including swells of up to four metres at Astrolabe Reef cause the release of plastic beads from a container in the sunken stern.

April/May

Work continues to remove bags of beads from the sunken stern and to clean up the beads washed up onshore.

June/July 2013

June
Owner and insurer of Rena decide to remove the wreck's submerged accomodation section.

July
$11 million compensation fund made available to individuals and businesses who have suffered loss.

August 2013

Work on the bow section complete. It is now at least one metre below the sea's surface. Material being removed from the debris field around Rena.

Dive surveys reveal an abundane of fish life in and around Rena.

December 2013

Final preparations to remove the accomodation block.

February 2014

The Rena's owner and insurer decide to lodge an application for resource consent to allow the remains of Rena to be left on the seabed.

Lodgement is expected in May 2014.

March 2014

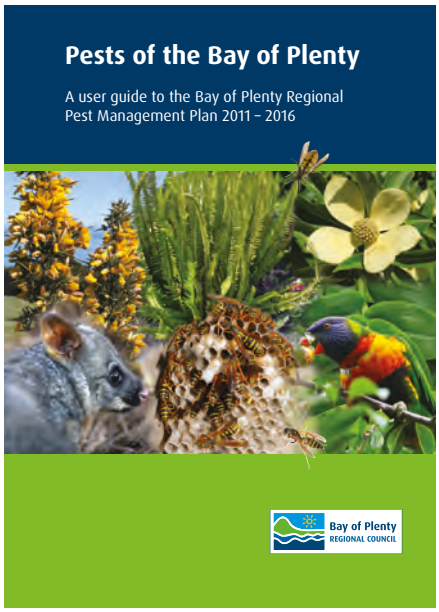
The first piece of the accomodation block is cut and removed from Astrolabe Reef.

20 March
The wreck of Rena changes position on Astrolabe Reef following Cyclone Lusi. A full wreck condition survey is to be undertaken.

Photographs courtesy of Maritime New Zealand, Andy Belcher and Darryl Torkler.

Biosecurity

As New Zealand is an isolated location, it is difficult for pest species to migrate here naturally. Transfer by vectors such as ships, structures or equipment used in coastal waters is the main cause of pest introduction to our harbours and estuaries. The Ministry for Primary Industries is responsible for policing our borders for pest control; however responsibility may be shared or delegated depending on the situation.

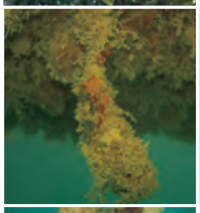
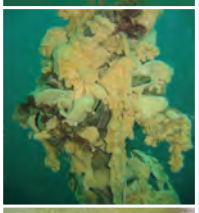


The Bay of Plenty Regional Pest Management Plan contains rules for the control of pest plants and pest animals across the Bay of Plenty. It sets out the roles and responsibilities for Council and all landowners and occupiers in the region.

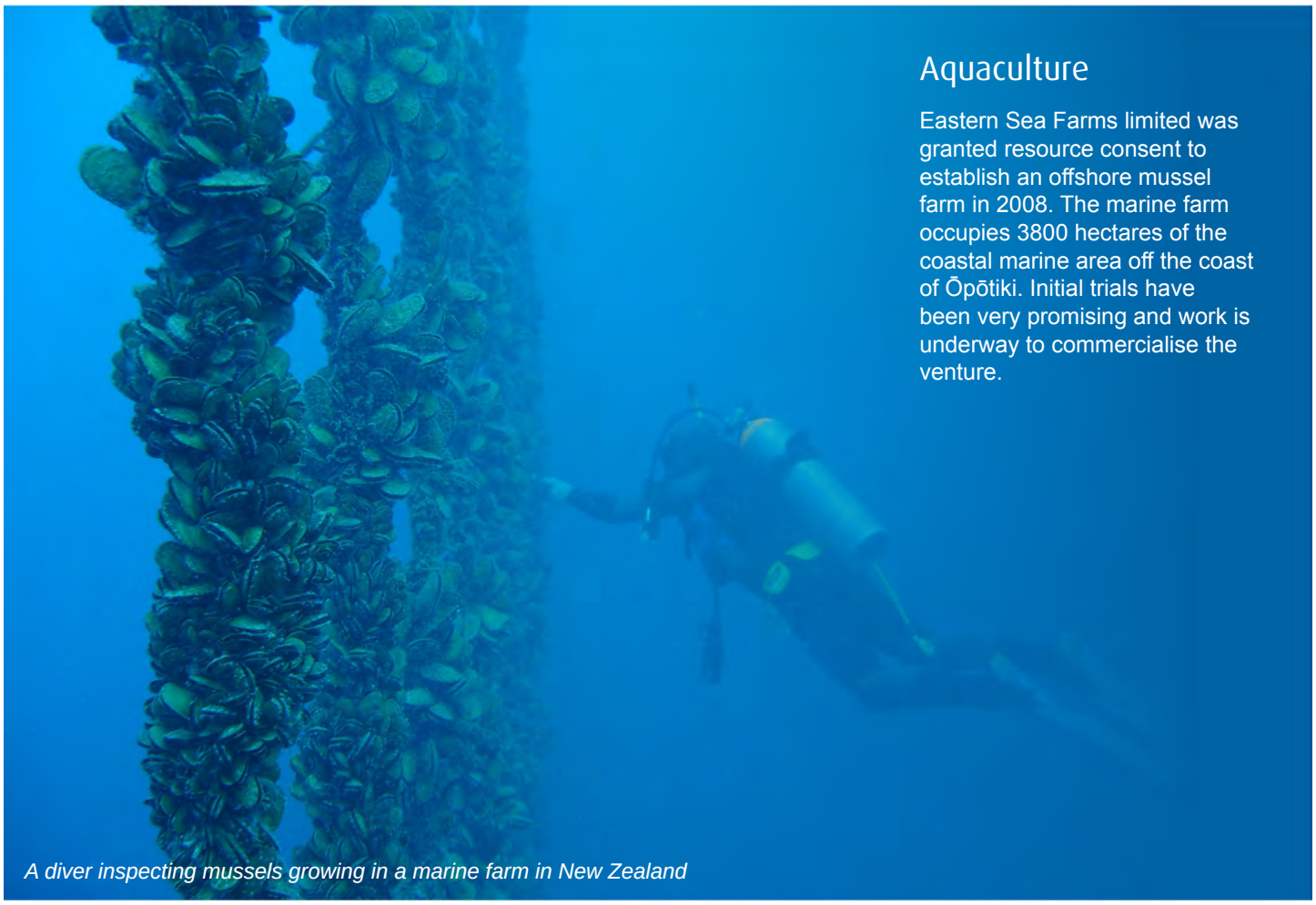
Responsibilities and jurisdictions

Who	Role	Why
Regional Council	▪ Manage species already identified in NZ but not previously found in the region. Protect the natural land and water assets that contribute towards the quality of life, cultural identity, economy and natural ecosystems. ▪ Manage adverse effects of development in the coastal marine area via the resource consent process.	▪ Required to implement a regional pest management plan under the Biosecurity Act 1993. ▪ Responsible for control of the coastal marine area under the Resource Management Act 1991.
Ministry for Primary Industries	▪ Manage species not previously detected in NZ or when no containment or removal plan has been established. ▪ Prevent establishment and movement of species between regions. ▪ Biosecurity requirements for vessels and structures entering New Zealand – including discharge of ballast water.	▪ The statutory authority for biosecurity, including marine biosecurity, under the Biosecurity Act 1993. ▪ Lead the national pest management and surveillance program and responsible for border security.
Department of Conservation	▪ Manage marine reserves and wildlife management reserves or sanctuaries.	▪ Statutory responsibilities under various legislation including the Marine Reserves Act 1971, Wildlife Act 1953, and Reserves Act 1977.
Private/industry	▪ Management of privately owned properties or structures.	▪ Responsibilities under the Biosecurity Act 1993 and Resource Management Act 1991.

Pest species and potential threats in the Bay of Plenty

Some of the pest species found in the Bay of Plenty Region and potential threats		
	***Musculista senhousia*** (Asian Date Mussel)	The Asian date mussel is small (up to 3 cm) and a brown/green colour. It lives in shallow calm areas (harbours) where it produces threads that collectively form hard mats that can prevent bed penetration by other species. It is established in Tauranga Harbour. *Image provided by S.Wilkens, NIWA.*
	***Undaria*** (Asian kelp)	Fast growing, *Undaria* can form forests on permanent structures or shell beds in sheltered environments that can prevent native species from colonizing. Not found in the Bay of Plenty. *Image provided by S.Wilkens, NIWA.*
	***Styela clava***	This sea squirt is not yet established in the Bay of Plenty; however, infestations were recently found and removed from two boats in Tauranga Harbour. It is considered to be a pest to marine farms as it establishes itself on the surface of equipment and man-made structures. An effort to ensure invasion of this species does not occur is on-going.
	***Didemnum vexillum***	This sea squirt is established in the Tauranga Harbour. There is currently uncertainty as to whether it is native or introduced. Its yellow mustard colour and leaf-like veins make it easily identifiable. It has similar impacts to *Styela clava,* smothering man-made structures.
	***Paspalum vaginatum*** (saltwater paspalum)	A semi-aquatic, saline tolerant perennial grass with long creeping stolons. When successfully established, it can alter the structure of indigenous vegetation, reduce penetration of soils and alter fish spawning grounds by accumulating sediments. Widespread throughout the Bay of Plenty coastline in harbours and estuaries and also in sand dunes in some places.
	***Spartina* spp.** (cord grass)	Robust grass species with an extensive root system which occupies vast areas of estuarine habitat. *Spartina* traps sediment and prevents colonisation and penetration of the area it occupies. Currently only found in the Kaituna Estuary.
	**Asian paddle crab** *(Charybdis japonica)*	An aggressive crab that has the potential to out-compete native crabs for food and space. A threat to marine farms as it is a predator on shellfish and other aquaculture species. Widespread in the Hauraki Gulf, however, has not yet been detected in the Bay of Plenty. *Image provided by S.Wilkens, NIWA.*
	**Marram grass** *(Ammophila arenaria)*	An exotic sand-binder found at many beaches around New Zealand, favouring environments of rapid wind burial where it out-competes native plants like Pingao. Scattered at low levels in sand dunes throughout the region. *Image: Crown Copyright: Department of Conservation: Te Papa Atawhai (1991)*

Major consents



Aquaculture

Eastern Sea Farms limited was granted resource consent to establish an offshore mussel farm in 2008. The marine farm occupies 3800 hectares of the coastal marine area off the coast of Ōpōtiki. Initial trials have been very promising and work is underway to commercialise the venture.

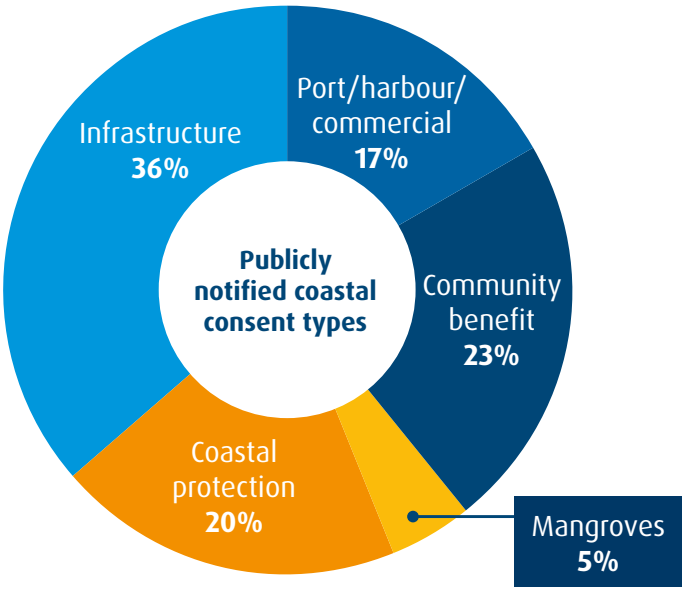
A diver inspecting mussels growing in a marine farm in New Zealand

Ōpōtiki Harbour entrance

Ōpōtiki District Council holds a resource consent to create a new Ōpōtiki Harbour entrance. These works involve cutting a new entrance through existing sand-dune, construction of a harbour entrance structure, capital and maintenance dredging of the river channel and extensive ecological restoration and mitigation works. The new harbour entrance will provide an all-weather entrance to Ōpōtiki harbour – access is currently restricted due to the shallow river bed and sand-bar.

Waterfront redevelopment

Tauranga City Council holds multiple resource consents for the first stage of the proposed redevelopment of the Tauranga waterfront. The location is on the seaward side of the Strand railway and involves converting areas currently used for car parking into a multipurpose public space for recreation, events and play spaces.



Port of Tauranga

In 2009 the Port of Tauranga applied for resource consent to deepen the shipping channel in the harbour and entrance by approximately three metres to enable larger vessels to use the Port of Tauranga.

Following a public notification process, consent was granted by an independent committee of commissioners and referred to the Minister of Conservation for final approval. Tauranga Moana iwi representatives took that decision to the Environment Court where the original decision was essentially upheld. The Minister of Conservation gave approval for the consent in March 2013.

Port of Tauranga

References and Further Reading

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Reports can be downloaded from our website www.boprc.govt.nz/knowledge-centre

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