Environment Report for Invest Bay of Plenty

Bay of Plenty Regional Council
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5 Quay Street
PO Box 364
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NEW ZEALAND

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Bay of Plenty
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1 Purpose of report

Environmental characteristics and the availability of environmental resources affect economic growth of a region. Development and future urban growth can be affected in a wide variety of ways. For example, a good, clean water supply is an important pre-requisite for urban development.

The purpose of this report is to understand environmental constraints in the Bay of Plenty, their potential impact on future economic development (including rural production) and urban growth. Resource constraints have been mapped from existing reports to give a clear picture of current environmental constraints.

Bay of Plenty Regional Council carries out works programmes to maintain or improve environmental quality. Possible alternative approaches to these programmes are discussed, in order to consider whether the programmes could be modified to deliver greater economic and social outcomes.

This report:

- Summarises climate change predictions for the region.
- Provides a region-wide analysis of environmental constraints on development and urban growth.
- Documents environmental maintenance and improvement programmes carried out by Bay of Plenty Regional Council and territorial authorities in the region.
- Provides a discussion of whether Bay of Plenty Regional Council environmental improvement programmes can be carried out using alternative approaches.

2 Climate change and sea level rise

Projected changes in rainfall and temperature for the Bay of Plenty have been modelled by NIWA[1]. Sea level rise is able to be modelled, and the implications for coastal areas have been mapped in relevant district plans[2] (e.g. as coastal inundation areas). The combined implications of rainfall, flooding events, sea level rise, ground subsidence and inundation of low-lying land is able to be modelled, but has not been mapped at this stage.

The following are the region-wide climate change predictions (relative to 1980-1999):

- 1.2°C temperature increase by 2040, 2.7°C by 2090.
- Sea level rise 0.2 m to 0.27 m by 2040, up to 0.8 m by 2090.
- Little change in mean annual rainfall but change in seasonal patterns:
  - Drier winter/spring.
  - More variable rain in summer/autumn – both very dry/very wet seasons but with an overall increase on average.
- More extreme (24-hour) rainfall events increase in magnitude:
  - By 2040 a 1 in 50 rainfall (150 mm) is likely to fall every 29 years, and every 16 years by 2090.

These changes will affect:

- Agricultural and horticultural production (including crop types and yields, need for water storage and irrigation, and sustainability of current land uses in low-lying areas).
- Soil quality in low-lying, coastal areas (increasing salinity from higher salt water table).
- Development in coastal and low-lying areas.
- Stormwater management and infrastructure in urban areas.
- River and drainage scheme infrastructure, maintenance and sustainability.
- Settlement patterns (including the possibility of managed retreat in high risk areas).
- Community health and safety.

Further information on local implications is given below. Also refer to Appendix 5 for fact sheets that have been prepared for each of the sub-regions.

2.1 Local implications of climate change

Sections 2.1.1 to 2.1.5 are sourced from:

http://www.boprc.govt.nz/sustainable-communities/climate-change/

2.1.1 Temperatures

Temperatures will rise over the rest of this century.

[1] Refer to: An updated climate change assessment for the Bay of Plenty, 2011. NIWA report for the Bay of Plenty Regional Council.
[2] Refer to Whakatāne District Plan Coastal Inundation Risk Zones maps, Tauranga City Plan Flood Hazard area, Western Bay of Plenty District Plan Coastal Protection Area.

- By 2040, the average annual temperature will be 1.2°C warmer than it was in 1990.
- By 2090, it will be between 2.7ºC (mid-emission scenarios) and 3.6°C warmer (high emissions scenario).
- Warming will be fairly uniform across the region.
- Autumn and winter are projected to warm slightly more than summer and spring.

There will be more hot days by the end of the century.

	Days of 25°C or more (based on mid-range scenario)		
	Now	**By 2040**	**By 2090**
Rotorua	About 12 days a year	About 25 days a year	About 50 days a year
Tauranga	About 22 days a year	About 42 days a year	About 70 days a year
Whakatane	About 22 days a year	About 47 days a year	About 80 days a year
Opotiki	About 10 days a year	About 26 days a year	About 60 days a year

2.1.2 Rain

Rain is likely to fall more heavily in future.

The warmer air gets, the more moisture it can hold - about seven or eight percent more for each degree of warming - so rain is likely to fall more heavily in future.

The region will get roughly the same average annual rainfall in 2090 as it does now, but rain may fall at different times. For instance, winters are expected to get drier as the century unfolds; by 2090, coastal and south-eastern areas may receive 10% less rain than they do now. On the other hand, summer rainfall is projected to increase – particularly inland – and to become more variable. We may see a sharp year-to-year contrast of either very dry summers, or very wet ones.

Based on mid-range scenario	**What is considered to be a 1-in-50-year event**	**The estimated frequency in the future**	
		By 2040	**By 2090**
Whakarewarewa	160 mm rainfall in 24 hours	1-in-33-year event	1-in-18-year event
Tauranga	200 mm rainfall in 24 hours	1-in-34-year event	1-in-20-year event
Whakatane	150 mm rainfall in 24 hours	1-in-29-year event	1-in-16-year event

2.1.3 Wind

More easterly winds during summer - more westerly winds during winter.

By analysing historical weather maps that have produced extreme winds in the past and comparing them against the sort of maps we might expect in a warmer climate, scientists calculate that extreme winds may be less frequent during future summers, but more common during winters.

2.1.4 Frosts

There will be fewer frosts.

By 2090, frosts will be a rare thing in the Bay of Plenty. At present, Ōpōtiki gets around five frosts a year, while Rotorua may get 20. By the end of the century, Rotorua is projected to experience frost just once or twice a year – none at all in some years. Other locations may get perhaps one frost every three years. There will be fewer cold nights.

	The estimated frequency of frost days (based on mid-range scenario)		
	Now	**By 2040**	**By 2090**
Rotorua	About 20 days a year	Around 8 - 9 days a year	Around 1 - 2 days a year
Katikati	About 11 days a year	Around 3 - 4 days a year	Around once in every 3 years
Te Puke	About 7 days a year	Around 1 - 2 days a year	Around once in every 5 years
Opotiki	About 5 days a year	Around once a year	Around once in every 10 years

2.1.5 Sea level

Sea levels may rise between 50 cm and 80 cm.

There is some uncertainty around the likely rate of sea level rise this century, so scientists can only estimate a range of possible increases. Current predictions are for a sea level rise of between 50 cm and 80 cm by the 2090s.

However, scientists can't rule out the increase in sea level could be more than a metre by 2100, which should at least be considered in planning and development. They expect sea levels to go on rising for at least a few centuries after 2100. That means new coastal development should factor in rises of between one and two metres to avoid future risks.

2.1.6 Agriculture and horticulture production

Source: Introduction to Climate Change 7 – Effects and impacts: Waikato and Bay of Plenty. Ministry of Primary Industries fact sheet, November 2010.

The greatest gains are likely to arise from the potential for increased pasture production, depending on species, and increased opportunities, to grow a greater diversity of sub-tropical fruit crops in the Bay of Plenty.

Greatest losses could result from an increased incidence of lower quality pasture species on Bay of Plenty dairy farms, a decline in suitability of Hayward kiwifruit in warmer locations and increased risk from invasive pests.

A useful indicator of potential future changes in the Bay of Plenty are current changes in Northland and Auckland, for example, the spread of sub-tropical grasses in pasture, greater infestation of pests and reduced winter chill for crops like kiwifruit.

Bay of Plenty could experience increases in temperate pasture yield, although high summer temperatures could become increasingly limiting over time in warmer areas. The extent to which any production gains are realised will depend strongly on changes in pasture composition.

Sub-tropical grasses such as kikuyu and paspalum are already spreading and are likely to become more widespread over time.

The possibility of increased drought risk in coastal and eastern Bay of Plenty resulting from increased evapotranspiration and lower average rainfall, could contribute to reduced clover content in pastures and a higher incidence of sub-tropical species.

A warmer, wetter climate is likely to see diseases such as facial eczema increase and greater problems with internal parasites. Heat stress will become more of a problem for cattle over time.

Warmer, wetter conditions could lead to increased problems with pests, weeds and diseases in arable crops, pasture and horticultural crops.

Conditions for some existing weedy species, such as woolly nightshade, may improve in some areas and new plant pests could emerge with warmer, drier conditions. There is already evidence of new plant pest species. Whether this is presently because of gradual acclimatisation, greater awareness, or a definite southward spread because of climate change is unknown, but it is indicative of the sort of changes that could become more common.

Warmer, wetter conditions would generally be of benefit to maize production, although increased summer rainfall may not always be beneficial, depending on timing and intensity. In areas where conditions could be drier on average, the greatest constraint on production would be from any increase in frequency and intensity of summer drought.

Without significant use of dormancy-breaking agents and other management practices, Hayward kiwifruit could become uneconomic in warmer parts of the Bay of Plenty.

Avocados would benefit from higher average temperatures although there will be ongoing problems with diseases such as phytophthora. The citrus industry could also benefit from higher temperatures and other sub-tropical crops could become increasingly viable.

Increased demand for water is already placing pressure on water resources. If parts of the region, such as coastal and eastern Bay of Plenty, become drier on average, then there will be increased pressure to irrigate.

Changes in rainfall, with the possibility of more extremes of wet and dry, will have consequences for local and regional infrastructure including: land drainage; flood protection; community water schemes; culverts and bridges; erosion control; farm dams; water reticulation and irrigation.

2.1.7 What does this mean for the Bay of Plenty?

The following implications of climate change are from:

http://www.mfe.govt.nz/issues/climate/about/climate-change-affect-regions/bayofplenty.html.

The table below shows the areas where the impact will be greatest.

Climate change implication	Area impacted				
	Western		Rotorua	Eastern	
	Coastal	Inland		Coastal	Inland
Coastal hazards – Coastal roads and infrastructure will face increased risk from coastal erosion and inundation, increased storminess and sea-level rise.	✓✓	N/A	N/A	✓✓	N/A
Heavy rain – The capacity of stormwater systems may be exceeded more frequently due to heavy rainfall events, which could lead to surface flooding. River flooding and hill country erosion events may also become more frequent.	✓	✓	✓	✓	✓
Drought – By 2090, for the Bay of Plenty, the time spent in drought ranges from minimal change through to more than double, depending upon the climate model and emissions scenario considered. More frequent droughts are likely to lead to water shortages, increased demand for irrigation and increased risk of wild fires.	✓	✓	✓	✓	✓
Disease – There may be an increase in the occurrence of summer water-borne and food-borne diseases, such as Salmonella. There could also be an increased risk from some vector-borne diseases such as Dengue fever and Ross River virus.	✓	✓	✓	✓	✓
Lakes – Higher temperatures and changes in rainfall are likely to result in higher lake levels, on average, in western and central parts of New Zealand, and lower levels in some eastern areas such as the Rotorua Lakes. Warmer water temperatures could lead to more algal blooms, a reduced range of trout and the spread of pest species like carp.	N/A	N/A	✓✓	N/A	✓ (Matahina and Aniwhenua)
Biosecurity – Warmer, wetter conditions could increase the risk of invasive pests and weeds.	✓	✓	✓	✓	✓

Agriculture – Warmer temperatures, a longer growing season and fewer frosts could provide opportunities to grow new crops and farmers might benefit from faster growth of pasture and potentially better crop-growing conditions. However, these benefits may be limited by negative effects of climate change, such as prolonged drought or greater frequency and intensity of storms. Warmer winters could affect kiwifruit production, making some varieties uneconomic in warmer parts of the region.	✓✓	✓	✓	✓✓	✓✓

3 Analysis – Environmental constraints on development and urban growth

These appendices are relevant to the analysis of environmental constraints on development and urban growth:

- Appendix 1 - list of the maps produced for this report, and an explanation of the environmental constraints indicated by the maps.
- Appendix 4 – relevant slides from the "State of the Bay of Plenty Environment" presentation to Bay of Plenty Regional Council workshop 17 June 2014.

Environmental factors	Environmental constraints on development and urban growth		
	Western	**Rotorua**	**Eastern**
Land use capability[3] and versatile soils[4]	Urban development in the Western Bay is managed through specific policies in the Regional Policy Statement, which account for versatile land. Good, accessible areas of LUC Class 1, 2, 3 around Te Puke, south of Tauranga and margins of Tauranga Harbour, allow for high value production (agriculture and horticulture), and easy transport. Much of the area is LUC Class 6 land, which is suitable for perennial vegetation (including pasture) with good land management practices.	Small areas of LUC Class 2 and 3 around Lake Rotorua. Will constrain urban development on eastern side of Lake Rotorua as a result of policies in the Regional Policy Statement to protect versatile soils. Much of the remaining area is LUC 4, 6 and 7 (with some class 8). Largely restricts land use to agricultural and forestry uses.	Large areas of LUC Class 1, 2 and 3 land on Rangitaiki Plains, Galatea and south of Ōpōtiki. These areas are easily accessible. There are also small pockets along east coast, which are less accessible. Intensive agricultural and horticultural production is largely restricted to these areas. Large areas of LUC Class 4 areas to the south of the district, currently under production forest. Potential for higher value use, depending on water availability and possible water quality protection mechanisms in the Rangitaiki River Catchment. Large tracks of LUC Class 7 and 8 land, predominately under Department of Conservation (DOC) reserve, which are not suitable for arable uses. Urban growth of Whakatāne (to the west) and Ōpōtiki (surrounds) is constrained by versatile land (LUC Class 1, 2, 3). However, population projections indicate significant

[3] Refer to Appendix 2A for an explanation of Land Use Capability.

[4] Analysis includes consideration of the new Bay of Plenty Regional Policy Statement Policy direction to protect versatile land (LUC Classes 1, 2, 3).

Environmental factors	Environmental constraints on development and urban growth		
	Western	**Rotorua**	**Eastern**
			growth is unlikely.
Land cover and Department of Conservation reserves	Department of Conservation reserves largely on LUC Class 4, 6, 7, 8 land – little constraint on development.	Department of Conservation reserves largely on LUC Class 4, 6, 7, 8 land – little constraint on development.	Department of Conservation reserves largely on LUC Class 6, 7, 8 land (small areas of Class 4 land) – little constraint on development.
Water allocation[5]	An area of high water allocation pressure. Shallow aquifers available, except in Kaituna and Pongakawa areas. Surface water under allocation pressure. Likely to limit any further intensive agriculture and horticulture development. Shallow aquifers in Tauranga city are geothermal (30-60 degrees), and are used for residential and commercial uses. This aquifer is fully allocated, which will restrict future development that is reliant on geothermal resources for heating purposes. Deep (confined) aquifers have been modelled, and water is available for allocation. Policy WQ 3B of the Regional Policy Statement states that water will be allocated (or re-allocated) to municipal water supplies – so such uses are not restricted by water allocation status.	Surface water allocation pressure in Utuhina and Waipa streams in Lake Rotorua Catchment. This may restrict rural and commercial development in these areas, depending on where water supply is sourced (e.g. groundwater or municipal water supply may be available). Shallow and deep aquifers have not been modelled yet in this area – allocation status unknown. Policy WQ 3B of the Regional Policy Statement states that water will be allocated (or re-allocated) to municipal water supplies – so such uses are not restricted by water allocation status.	Surface water allocation pressure in some streams/rivers, particularly on in Galatea area – likely to restrict intensive agriculture and horticulture development. Of particular concern on the East Coast as no groundwater alternatives, and river flows are fully dependant on rainfall. Shallow aquifers have not been modelled yet in the upper Rangitaiki – allocation status unknown. Other shallow aquifers available, except on upper Tarawera and around Te Teko. Note – there are no aquifers on the east coast due to geology. Deep aquifers have not been modelled yet in this area – allocation status unknown.
Marine Environment	Development in the marine environment is restricted in areas with high ecological values, by regulations in the	N/A	Development in the marine environment is restricted in areas with high ecological values, by regulations in the

[5] To date (June 2014), only deep aquifers in western Bay of Plenty have been modelled. Shallow aquifers have not been modelled for the Rotorua Lakes and upper Rangitaiki. There is no groundwater on the East Coast due to the geology of the area.

Environmental factors	Environmental constraints on development and urban growth		
	Western	**Rotorua**	**Eastern**
	Regional Coastal Environment Plan. Tauranga Harbour is of particular value, and depending on the location, nature and scale of the proposal, and the values of the activity site, development may be prevented or be subject to additional costs. There is development pressure in the southern Tauranga Harbour, with associated risk to the environment. The Port of Tauranga activities are provided for in a specific Port Zone, and no unduly restricted. There are Harbour Development Zones (HDZ) in Tauranga adjacent to the central business district, Bowentown, Tanners Point, Omokorua and Opureora, which provide for activities and development, consistent with the purpose of the HDZ. The Rena grounding has affected environmental and cultural qualities in the Tauranga – Mōtītī area. Commercial aquaculture is prohibited in Tauranga Harbour, the Port Zone, Harbour Development Zone, within 5.5 km of commercial shipping lanes, and in mooring areas. Regulatory restrictions largely preclude commercial aquaculture from the Western Bay, except offshore of Ōtamarākau/Pukehina[6].		Regional Coastal Environment Plan. Ohiwa Harbour is of particular value, and depending on the location, nature and scale of the proposal, and the values of the activity site, development may be prevented or be subject to additional costs. There is little development pressure in the Ōhiwa Harbour. There are (HDZ's) in Whakatāne and Opotiki, which provide for activities and development consistent with the purpose of the HDZ. Commercial aquaculture is prohibited in Ōhiwa Harbour, except for the existing oyster farms. There are approved or proposed marine farms offshore of Ōpōtiki and Factory Bay. Also refer to final comment under 'Western' for quality of shelf water.

[6] Modelling indicates large scale commercial aquaculture in the two offshore locations of Ōtamarākau/Pukehina and Ōpōtiki are unlikely to have adverse effects on the environment (refer to Bay of Plenty Primary Production Modelling: Aquaculture Management Areas, 2006. Report by ASR Marine Consulting and Research for Bay of Plenty Regional Council).

Environmental factors	Environmental constraints on development and urban growth		
	Western	**Rotorua**	**Eastern**
	Bay of Plenty off-shore shelf waters are 'moderate to good' for mussel growth[7].		
Contaminated sites[8]	There are confirmed contaminated sites that may limit development at those specific sites. However, this does not appear to be significant, or restrict areas of future urban growth. Potentially contaminated sites are largely concentrated in existing industrial/commercial areas.	Confirmed and potentially contaminated sites are largely concentrated in existing industrial/commercial areas in and around Rotorua city. This seems unlikely to restrict areas of future urban growth.	There are a number of managed contaminated sites to the west of Whakatāne township. As this is the general area where urban growth is being considered, it is likely to restrict development or at least add costs to developments – depending on the nature of proposed land use change. Confirmed and potentially contaminated sites in other parts of the sub-region are unlikely to restrict urban development.
Water quality	Many of the streams in the catchment of Tauranga Harbour, do not meet their water quality classification standard in the Regional Water and Land Plan. This is largely due to the effects of land use on water quality. This is unlikely to restrict use of surface water for horticulture, but may restrict stock watering and domestic supply uses. Any new municipal water supplies may need to be sourced from groundwater or be extensively treated. Implementation of the NPS Freshwater may require land use controls around Tauranga Harbour to improve water quality. Water quality in the remainder of the Western Bay of Plenty appears to be good	The 12 Rotorua lakes range from very poor (Ōkaro) to good (Rotomā) water quality. By itself, lake water quality is unlikely to restrict urban development. However, poor lake water quality poses a risk to tourism operations that directly use the lakes. The Regional Water and Land Plan ("Rule 11") and the On-Site Effluent Treatment Plan (OSETP) contain regulations to control nutrient loss or discharges that affect lake water quality. Urban development in Rotorua city is not restricted by these provisions. "Rule 11" applies to land use in the catchments of Lakes Rotorua, Rotoiti, Rotoehu, Ōkāreka and Ōkaro. Nitrogen and phosphorous loss is capped, meaning land	Water quality in rivers and streams in the area is generally good, except for specific 'hot spots' such as Nukuhou and Tarawera. Development is unlikely to be restricted by water quality. E.coli levels are elevated (suitability for recreation is Fair, Poor and Very Poor) in some streams and coastal areas in the east, (particularly in downstream parts of larger rivers). This does not affect development, but presents a risk to community health and safety.

[7] Refer to Bay of Plenty coastal productivity monitoring – 2010. Bay of Plenty Regional Council Environmental Publication 2011/10.

[8] For all areas – potentially contaminated sites may limit development, depending on the nature of the contamination, and intended land use change. At the least, these sites will add costs as a result of site investigation. Additionally, the requirements of the Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations 2011, will have implications for development on sites where activities on the Hazardous Activities and Industries List (HAIL) have occurred.

Environmental factors	Environmental constraints on development and urban growth		
	Western	**Rotorua**	**Eastern**
	to reasonable relative to physical water quality standards. E.coli levels are elevated (suitability for recreation is Fair, Poor and Very Poor) in many streams and coastal areas around the Tauranga Harbour and Western Bay. This does not affect development, but presents a risk to community health and safety.	use intensification is restricted, unless efficient nutrient management is used to comply with the cap. The next generation of "Rule 11" is currently being developed for the Lake Rotorua Catchment. This will require the reduction of nitrogen loss from rural properties in the catchment. This may lead to land use changes (to those with lower nutrient loss), and a reduction in land use intensity (unless efficient nutrient management practices are used in order to comply with the requirements). The On-site Effluent Treatment Plan manages discharges of septic tanks in residential development not connected to municipal sewage schemes. Around the Rotorua Lakes, the regulations will mean additional costs to non-sewered development, including greater maintenance costs and requirements for higher specification systems. Reticulated sewage schemes are planned for some lake communities. Water quality in streams with natural geothermal influences can be poor. This does not limit development as alternatives are available. E.coli levels are elevated (suitability for recreation is Fair and Poor) in a small number of streams around Lake Rotorua. This does not affect development, but presents a risk to community health and safety. The suitability of streams for recreation use is largely Good to Very Good in the Rotorua district.	

Environmental factors	Environmental constraints on development and urban growth		
	Western	**Rotorua**	**Eastern**
Biodiversity sites[9]	There is an array of biodiversity sites, mainly in upper catchment or hilly areas and many in DOC management/ownership. There are some high value ecological sites in, or adjacent to urban areas. These are largely managed as reserves. High value coastal sites in eastern Pāpāmoa may restrict development in some areas, or place additional costs on development in those areas. The existence of biodiversity sites in the area may contribute to lifestyle and environment qualities that are attractive to residents and visitors.	Many of the larger biodiversity sites are in DOC management/ownership. There are no biodiversity sites that would constrain the growth of Rotorua city. Many of the biodiversity sites are also landscape features (e.g. Mt Tarawera), which are important lifestyle and tourism qualities in the Rotorua district.	Large areas of the eastern bay are identified as biodiversity sites (e.g. Te Urewera). However, the majority of these areas are currently under DOC management/ownership. Te Urewera will be transferred to Ngāi Tūhoe under their Treaty settlement. The location of biodiversity sites may constrain or place additional costs on development around Matatā, Whakatāne (Coastlands/Piripai area), and Ōpōtiki (Huntress Creek coastal area). Rural lifestyle developments may have additional restrictions where adjoining biodiversity sites. The existence of biodiversity sites in the area is likely to contribute to lifestyle and environment qualities that are attractive to residents and visitors.
Air quality	There are currently no air quality constraints on development in the Western Bay. However, there are localised dust concerns around the industrial/port area of Mount Maunganui. Reverse sensitivity issues for residential developments near horticulture due to the effects of spraying will have some effects on both sides (e.g. development and operation of horticulture operations).	Part of Rotorua city is a designated Air Shed where there is a specific programme to reduce PM_{10} levels (particulates). There are regulatory provisions for residential heating options in the Air Shed area. Existing industrial discharges to air are managed through resource consents. New industrial PM_{10} discharges affecting the Air Shed must use offsets (i.e. offset the new discharge by reducing PM_{10} discharges from other sources). This will add costs or restrict such developments.	There are currently no formal air quality constraints on development in the eastern bay. Discharges of odour from industrial activities are controlled through resource consents.

[9] Refers to indigenous biodiversity sites. Although 51% of the Bay of Plenty region has indigenous forest land cover, not all of this area is a 'biodiversity site'.

Coastal erosion	The open, sandy coast is prone to erosion, which may be exacerbated by sea level rise. Coastal erosion has the potential to impact existing development in localised areas. There are isolated erosion hot-spots around Bowentown, localised areas between the Mount and Pāpāmoa, and in the stretch east of Pukehina. Erosion is also evident in two areas on the seaward side of Matakana Island. There is erosion at locations within the Tauranga Harbour, which is impacting existing development.	N/A	Coastal erosion is currently evident in Ōhope and the area between Ōpōtiki and Ōpape. Coastal erosion has the potential to impact existing development in these localised areas.

4 Analysis – Environmental maintenance and improvement works

The purpose of this section is to document existing environmental maintenance and improvement works and programmes occurring in the Bay of Plenty.

Area	Environmental maintenance and improvement works and programmes	Work funded and/or carried out by		Explanation
		Bay of Plenty Regional Council	Territorial authorities	
Western	Tauranga Harbour	✓	✓	Integrated management strategy and programme.
	Riparian retirement and plantings	✓	✓ (WBOPDC)	Funding for works by interested landowners.
	Steep land retirement	✓	✓ (WBOPDC)	Funding for works by interested landowners.
	Kaituna River and Ongatoro/Maketū Estuary	✓	✓	Integrated management strategy and programme.
	Kaituna River re-diversion and wetland creation	✓		Increase volume of water from Kaituna River to Ongatoro/Maketū Estuary and creation of 100 ha wetlands.
	Riparian retirement and plantings	✓		Funding for works by interested landowners.
	Sustainable land use advice	✓	✓ (WBOPDC)	Free advice to landowners and rural sector industry, Māori land owners.
	Biosecurity	✓		Advice and works with landowners, TA's, agencies, general public.
	Biodiversity	✓	✓ (WBOPDC)	Working with landowners, community groups, agencies.
	Coast Care	✓	✓ (funds programme)	Plantings and works with community groups on sandy beaches.
	Urban sewage treatment	✓ (has funded some infrastructure)	✓	Provision, management and maintenance of urban sewage reticulation, treatment and disposal schemes.
	Urban stormwater		✓	Provision, management and maintenance of stormwater reticulation, treatment and disposal schemes.
	Recreation/Open space	✓ (Pāpāmoa Regional Park only)	✓	Provision and management of parks and recreational facilities.

Area	Environmental maintenance and improvement works and programmes	Work funded and/or carried out by		Explanation
		Bay of Plenty Regional Council	Territorial authorities	
	Community-led environmental projects	✓		Funded through Environmental Enhancement Fund, subject to criteria.
Rotorua	Rotorua lakes	✓	✓	Integrated management programme.
	Water quality engineering works	✓		Engineering works to improve lake water quality.
	Riparian retirement and plantings	✓	✓	Funding for works by interested landowners.
	Land use change	✓		Funding for works by interested landowners.
	Sustainable land use advice	✓		Free advice to landowners and rural sector industry, Māori land owners.
	Biosecurity	✓		Advice and works with landowners, TA's, agencies, general public.
	Biodiversity	✓		Working with landowners, community groups, agencies.
	Urban sewage treatment	✓ (has funded some infrastructure)	✓	Provision, management and maintenance of urban sewage reticulation, treatment and disposal schemes.
	Urban stormwater		✓	Provision, management and maintenance of stormwater reticulation, treatment and disposal schemes.
	Recreation/Open space		✓	Provision and management of parks and recreational facilities.
	Community-led environmental projects	✓		Funded through Environmental Enhancement Fund, subject to criteria.
Eastern	Ōhiwa Harbour	✓	✓	Integrated management programme.
	Riparian retirement and plantings	✓		Funding for works by interested landowners.
	Sustainable land use advice	✓		Free advice to landowners and rural sector industry, Māori land owners.

Area	Environmental maintenance and improvement works and programmes	Work funded and/or carried out by		Explanation
		Bay of Plenty Regional Council	Territorial authorities	
	Biosecurity	✓		Advice and works with landowners, TA's, agencies, general public.
	Biodiversity	✓		Working with Landowners, community groups, agencies.
	Urban sewage treatment	✓ (has funded some infrastructure)	✓	Provision, management and maintenance of urban sewage reticulation, treatment and disposal schemes.
	Urban stormwater		✓	Provision, management and maintenance of stormwater reticulation, treatment and disposal schemes.
	Recreation/Open space	✓ (Onekawa Te Mawhai Regional Park only)	✓	Provision and management of parks and recreational facilities.
	Community-led environmental projects	✓		Funded through Environmental Enhancement Fund, subject to criteria.

5 Analysis – Bay of Plenty Regional Council environmental improvement programmes

5.1 Purpose of environmental improvement programmes

The purpose of works funded and/or carried out by Bay of Plenty Regional Council is related to Council's functions and responsibilities under the Resource Management Act and other legislation, Council's outcomes (as stated in the Long Term Community Plan), and implementing integrated management strategies[10] and regional plans.

Bay of Plenty Regional Council is responsible for:

- Water quality.
- Soil conservation.
- Indigenous biodiversity.
- Biosecurity.

Many of BOPRC's environmental improvement programmes are non-statutory (refer to Appendix 3 for an explanation), and how these programmes are carried out is at the discretion of Council.

5.2 Current approach

The activities (i.e. sustainable land use advice, biodiversity, biosecurity and riparian/land retirement) are directed to sites where people want support, funding or advice. Ōhiwa Harbour, Tauranga Harbour, Rotorua Lakes, Kaituna and Waiotahi are priority catchments for riparian retirement works and, as such, receive proportionately greater funding. Environment works are intended to benefit the wider community - whether they are nearby or not – as a result of improved water quality, erosion control and indigenous habitat improvement.

Bay of Plenty Regional Council's water quality, soil conservation and biodiversity activities are largely focused on the effects of rural land use and management practices. As such, works are generally not in, or in close proximity to urban areas. Council's environmental improvement works are generally not for amenity values as there is currently no legislative responsibility or Council direction around such values, except in relation to Environment Enhancement Fund projects.

Parks, reserves and amenity opportunities for urban communities are acquired and managed by territorial authorities, in relation to their functions and responsibilities.

5.3 Possible alternative approaches

5.3.1 Regulatory mechanisms

It may be possible to use regulatory mechanisms to achieve the same environmental outcomes.

Regulatory mechanisms under the Resource Management Act can't be written to improve the environment per se – these can only be used to avoid, remedy or mitigate adverse effects on the environment. Bay of Plenty Regional Council could only achieve land and retirement by requiring resource consents for rural land uses, in relation to Council's water

[10] Kaituna River Ongatoro/Maketū Estuary Strategy, Ōhiwa Harbour Strategy, Tauranga Harbour Strategy, Rotorua Lakes Strategy.

and land responsibilities, and imposing appropriate conditions. This would be difficult to justify across the region, but could be considered on a catchment basis as part of the NPS Freshwater Implementation Programme.

Taking a regulatory approach is also likely to affect the collaborative approach ('community ownership') currently taken within catchment areas. However, it would provide a focus for individual landowner responsibilities.

5.3.2 Focus on highly populated areas

Shifting the focus of sustainable land programmes to more populous locations, could result in improved amenity values for urban areas. However, such a shift could likely mean that other environmental outcomes (soil conservation, water quality and biodiversity) are not achieved in some catchments. For example, a total focus on Tauranga, Rotorua and Whakatane would remove effort from other areas such as the Nukuhou Catchment, where there are water quality issues. In many catchments, water quality and soil conservation works in rural areas are a major contribution to achieving environmental goals.

5.3.3 Members of public carry out work

This approach would involve incentivising members of the public or the community to undertake the works, and providing skills for youth to carry out works. CoastCare already take this approach, where interested members of the community participate in planting days and weed control. The Environmental Enhancement Fund also relies on this approach through the funding of community-led projects. The approach is also suitable for works on publicly-owned land (e.g. territorial authority or Department of Conservation reserves), or on easily accessible privately-owned land where there are community benefits (subject to agreement of the landowner). However, many private landowners may not be willing to have members of the public (including youth) carry out works on their land. There are health and safety matters to consider on farms. As such, it may limit achievement of environmental outcomes.

5.3.4 Land purchase

Purchasing or securing access to land for public benefit has significant costs implications to Council – both for the initial purchase and on-going development and/or maintenance. As such, it should be limited to sites that meet carefully considered criteria.

Negotiating access strips for public access in land or riparian retirement areas may be possible, subject to the agreement of individual landowners. The Lake Okareka walkway is a successful example of this arrangement. Providing for formal public access will incur costs to either BOPRC or territorial authorities due to track maintenance and signage.

Territorial authorities are able to require esplanade strips and reserves under the Resource Management Act, generally where subdivision of private land occurs. To maximise community amenity values these areas need to be part of coherent and contiguous unit, and public access facilities maintained.

5.4 Future implications for environmental improvement programmes

The BOPRC focus on environmental issues (soil conservation, water quality, biodiversity) stems predominantly from statutory responsibilities. At present, environmental improvement programmes are not explicitly tailored to achieve amenity values, or explicit social and economic outcomes[11]. Some programmes, such as the

[11] The environmental improvement programmes have social and economic benefits to the wider community in relation to improved water quality, indigenous biodiversity, and soil conservation.

Environmental Enhancement Fund, are primarily for social and community values, while others, such as riparian planting on rural land, is predominantly about improving environmental outcomes.

The current focus on the Rotorua lakes is to primarily achieve nutrient reduction and water quality targets. This work will also have associated social (recreational use), cultural and economic benefits (tourism associated with the lakes). The situation around Tauranga Harbour is somewhat different with a large, predominantly urban population seeking improved harbour quality for intrinsic and cultural purposes. The main concern in Tauranga Harbour relates to sedimentation, and the need to reduce sediment from land use, including land-disturbance activities such as earthworks.

In both target areas, there is a challenge to the community to identify and undertake effective environmental improvement works and land use change. The Rotorua Lakes Programme is well mapped-out, including the development of regulatory mechanisms to control nitrogen and phosphorus from land use. A small number of sediment related actions for Tauranga Harbour are identified in a 2010 report[12,] of which the retirement of steeper pasture land or planting of pine plantations on steep slopes was identified as a key mitigation option for most sub-catchments.

For now, BOPRC's existing environmental improvement programmes are currently appropriate for the outcomes sought and priority areas. Review of these programmes is necessary at regular intervals. There are built-in review mechanisms for integrated management strategies and associated actions.

At the next review of environmental improvement programmes, these matters should be considered:

Implementation of the National Policy Statement on Freshwater Management (there are potentially significant implications to achieve water quality maintenance and improvement across the region).

Legislative changes to the Resource Management Act and case law decisions, particularly in relation to indigenous biodiversity and control of land use for water quality purposes.

Relevant legislative changes to the Local Government Act.

Scientific evidence and research.

Technology changes.

Climate change implications.

Allocation of resources across the region (e.g. especially where riparian retirement, and land use change/retirement targets have been achieved in priority catchments).

Predicted population and settlement change, and related community needs and priorities.

Opportunities for environmental improvement works to be carried out in ways or in locations to:

achieve environmental outcomes,

- directly contribute to amenity values; and
- have direct social and economic benefits in an area.

[12] NIWA, 2010. Tauranga Harbour Sediment Study: Assessment of predictions for management. Report prepared for Bay of Plenty Regional Council.

6 References

Climate Change

NIWA, 2011. An updated climate change assessment for the Bay of Plenty, 2011. NIWA report for the Bay of Plenty Regional Council. (BOPRC Objective ID A1016867)

Marine Environment

ASR Marine Consulting and Research, 2006. Bay of Plenty Primary Production Modelling: Aquaculture Management Areas, 2006. Report for Bay of Plenty Regional Council.

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Bay of Plenty Regional Council, 2013. State of the Ōhiwa Harbour and Catchment. Bay of Plenty Regional Council Environmental Publication 2013.07.

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Freshwater

Donald, R., 2013. Water Allocation Status Report. Report to BOPRC's Regulation and Monitoring Committee, June 2013.

Bay of Plenty Regional Council, 2011. Water Quality Classification Assessment – Rivers and Streams in the Bay of Plenty. Bay of Plenty Regional Council Environmental Publication 2011/07.

Bay of Plenty Regional Council, 2014. NERMN Groundwater Monitoring Report. Bay of Plenty Regional Council Environmental Publication 2014/02.

Land

D Guinto, July 2012. Analysis of land cover in the Bay of Plenty region. Bay of Plenty Regional Council Internal Report 2012/08.

Air

Bay of Plenty Regional Council, 2011. Mount Maunganui Ambient Sulphur Dioxide Monitoring. Bay of Plenty Regional Council Environmental Publication 2011/03.

Bay of Plenty Regional Council, 2012. NERMN Air Monitoring 2012. Bay of Plenty Regional Council Environmental Publication 2012/02.

Bay of Plenty Regional Council, 2012. Mount Maunganui Dust Monitoring. Bay of Plenty Regional Council Environmental Publication 2012/04.

Appendices

Appendix 1 – Environment maps

The following maps have been used in the analysis for this report, and are attached as a separate document:

Map	Explanation	Constraints	Data source
Land Use Capability (LUC)	Shows Land Use Capability across the region. There are eight land use capability classes, four arable and four non-arable, which are arranged in order of increasing degree of limitation to use and in decreasing order of versatility of use, from 1 (I) to 8 (VIII). Mapped at 1:50,000 scale – shows high level opportunities or constraints (but limited value for individual properties). Land Use Capability does not verify nutrient risk and limits related to water quality restrictions.	Refer to Appendix 2A for an explanation of LUC classes, and Appendix 2B for the land cover/uses on each LUC class in the Bay of Plenty.	Bay of Plenty Regional Council's GeoSpatial Land Use Capability layer.
Land cover	Shows land cover based on 2008 data. Six categories of land cover are used (exotic [forest], indigenous [vegetation], horticulture, water [lakes, rivers], pasture, and other), and urban areas are also shown. Land cover in the Bay of Plenty is: Native bush/forest – 51%. Exotic forest – 24% Pasture – 21% Urban and water – one percent.	Land cover does not necessarily present a constraint in itself. However, when combined with urban areas and DOC reserves, does show which areas are not available for arable and non-arable land uses. Department of Conservation reserves may be available for eco-tourism and recreational developments.	Bay of Plenty Regional Council's GeoSpatial Land Cover layer. Data from Land Information New Zealand, 2008.

Map	Explanation	Constraints	Data source
Water allocation status – surface water and shallow aquifers	Shows the water allocation status of streams and rivers, and shallow groundwater (unconfined aquifers connected to surface water) across the region as at June 2013. This is limited to where data is available (there are some streams/rivers where Council does not collect flow data, and some groundwater aquifers have not been modelled yet).	Where water is close to, or at full allocation, there is currently little or no water to allocate to new uses. Policy WQ 3B of the Regional Policy Statement states that water will be allocated (or re-allocated) to municipal water supplies – so such uses are not restricted by current water allocation.	Donald, R., 2013. Water Allocation Status Report. Report to BOPRC's Regulation and Monitoring Committee, June 2013.
Water allocation status – deep aquifers	Shows the water allocation status of deep groundwater (confined aquifers that do not have a connection to rivers and streams) across the region as at June 2013. This is limited to where data is available (some deep groundwater aquifers have not been modelled yet).	As above.	Donald, R., 2013. Water Allocation Status Report. Report to BOPRC's Regulation and Monitoring Committee, June 2013.
Marine Information – recreation and fisheries	Shows commercial fishing hotspots for three fishing types, marine farms, and recreational boating density. Also shows fish stock status of six main species (based on Ministry Primary Industries – fishing information).	In some situations, areas of high recreational and commercial fishing use may restrict marine and coastal developments - depending on the location, nature and scale of the proposal, and if the proposal conflicts with the existing uses.	Bay of Plenty Regional Council, 2007. Aquaculture Management Areas – Coastal Use and Value Maps (unpublished).
Marine Information – ecological values	Shows areas of ecological importance in the marine environment.	In some situations, ecological values may restrict marine and coastal developments (depending on the location, nature and scale of the proposal).	Bay of Plenty Regional Council, 2007. Aquaculture Management Areas – Coastal Use and Value Maps (unpublished).

Map	Explanation	Constraints	Data source
Contaminated sites	Shows locations of contaminated sites, sites that are being managed, and potentially contaminated sites. The later relate to HAIL land uses.	The location of contaminated sites (and potentially contaminated sites) can limit land use, depending on the nature of the contamination, and intended land use. For example, sensitive land uses (e.g. residential sub-division, schools and child-care facilities, etc.) are at greater risk from contaminated sites.	Bay of Plenty Regional Council contaminated sites geospatial data layer.
Water quality – Rivers and Stream Classification Assessment	Shows river and stream water quality for nutrient levels, Ecoli, stock water suitability, and physical water quality (temperature, pH, suspended solids). These factors are in relation to the Water Quality Classification Standards in the Regional Water and Land Plan.	Water quality may be a constraint on developments that rely on suitable water quality. Water can be treated to municipal water supply, but that does increase the cost of supply. Implementation of the NPS Freshwater may lead to land use and land management restrictions in catchments where water quality is poor and needs to be improved. Restrictions may also be applied in catchments where water quality is good and needs to be maintained in that condition.	Scholes, P., Donald, R., and McIntosh, J., 2011. Water Quality Classification Assessment – Rivers and Streams in the Bay of Plenty. Bay of Plenty Regional Council Environmental Publication 2011/07.
Water quality – Rotorua lakes	Shows lake water quality of the 12 Rotorua lakes.	As above. Nutrient loss from land use is already controlled through nutrient management rules (aka 'Rule 11') in the catchments of lakes Rotorua, Rotoiti, Ōkāreka, Rotoehu and Ōkaro. This restricts high nutrient loss activities (e.g. dairying).	http://www.rotorualakes.co.nz/water_quality

Map	Explanation	Constraints	Data source
Versatile land	Shows the location of versatile land in the region, and where such land has been subdivided since 1990. 'Versatile land' is Land Use Capability classes 1, 2 and 3.	Policy UF 18B of the Bay of Plenty Regional Policy Statement requires versatile land to be protected for rural production activities (excluding existing and planned urban-zoned areas in western Bay of Plenty, and necessary regionally significant infrastructure). As such, there are restrictions on the development of versatile land.	Versatile Land - Bay of Plenty Regional Council's GeoSpatial Land Use Capability layer. Sub-division/fragmentation of land parcels – Land Information New Zealand data.
Biodiversity	Shows the location of high value biodiversity sites in the region. This is not a map for regulatory purposes (i.e. there are not necessarily regulatory rules relating to all or any of the mapped sites).	In some situations, biodiversity values may restrict development (depending on the location, nature and scale of the proposal), particularly where there are regulatory rules to protect the sites.	Biodiversity Sites in the Bay of Plenty Region, December 2010 map and assessment.

Also refer to maps in Appendix 4.

Map	Explanation	Constraints	Data source
Water quality – suitability of Recreation Grade	Shows the suitability of rivers, lakes and coastal sites for bathing relative to the New Zealand Microbiological Water Quality Guidelines for Marine and Freshwater Recreational Areas (Ministry of Health and Ministry for the Environment, 2003).	Bathing and contact recreation can be restricted in areas where water quality does not meet bathing suitability standards. Implementation of the NPS Freshwater may lead to land use and land management restrictions, in catchments where water quality does not meet bathing standards and needs to be improved. Restrictions may also be applied in catchments where water quality meets bathing suitability and needs to be maintained in that condition.	Bay of Plenty Regional Council NERMN monitoring programme.
Stream ecological health	Shows the ecological health of streams across the Bay of Plenty.	No constraints.	Bay of Plenty Regional Council NERMN monitoring programme.
Air quality – PM_{10} levels	Shows particulate (PM_{10}) air quality data from monitored sites.	Air quality may not restrict development per se, but regulatory mechanisms used to achieve air quality standards may restrict development that has particulate discharges.	Bay of Plenty Regional Council NERMN monitoring programme.
Coastal accretion and erosion	Shows 54 sites where the open, sandy coast is accreting, stable or eroding. Note – Ōpape is the eastern boundary of the open, sandy coast. The geology changes to rocky coast east of that location.	Coastal erosion can adversely impact existing development, and present a risk to future development. Sea level rise may increase coastal erosion in some locations.	Bay of Plenty Regional Council NERMN monitoring programme.

Appendix 2 - Land Use Capability

A – Land Use Capability Classes in New Zealand

Source:

http://www.mpi.govt.nz/forestry/funding-programmes/east-coast-forestry-project/land-use-capability-classes-in-new-zealand

http://www.landcareresearch.co.nz/__data/assets/pdf_file/0017/50048/luc_handbook.pdf

There are eight Land Use Capability (LUC) classes, four arable and four non-arable, arranged in order of increasing degree of limitation or hazard to use and in decreasing order of versatility of use, from one to eight.

Class I	Very good multiple-use land. Nearly level, has deep easily worked soils which are well drained but not seriously affected by drought and usually well supplied with plant nutrients and responsive to applied fertilisers. Practically no risk of erosion. High suitability for cultivated cropping, viticulture, berry production, pastoralism, tree crops and production forestry.
Class II	Good land with slight limitations to arable use. Management/conservation practices to overcome these limitations are easy to apply. Land used for cultivated crops, vineyards and berry production, pasture, tree crops or forestry. Limitations occur singly or combined: (a) Slight to moderate susceptibility to erosion. (b) Gentle slopes. (c) Soils of only moderate depth. (d) Wetness, existing permanently as a slight limitation after drainage. (e) Occasional damaging overflow. (f) Unfavourable structure and difficulty in working. (g) Slight to moderate salinity. (h) Slight climatic limitations.
Class III	Moderate limitations restricting choice of plants grown and/or make special conservation practices necessary. May be used for cultivated crops (although crop chose and intensity of cultivation is restricted), vineyards and berry fields, pasture, tree crops, forestry. Limitation result from one or more of the following: (a) Moderate to high susceptibility to erosion or severe effects of past erosion. (b) Rolling slopes. (c) Shallow soils. (d) Wetness or continued waterlogging after drainage. (e) Frequent damaging overflow. (f) Low moisture holding capacity. (g) Moderate salinity. (h) Moderate climatic limitations. (i) Low fertility, not easily corrected.
Class IV	Severe limitations to arable use restricting choice of crops grown and/or necessitate intensive conservation treatment and/or very careful management. Land kept in pasture for long periods with cash for cropping should be restricted to, say, once in five years or less frequently. Suitable for occasional cropping, pasture, tree crops and forestry. Some

	Class 4 land is also suited to vineyards and berry fields. Limiting features occurring alone or in combination: (a) High susceptibility to erosion or very severe effects of past erosion. (b) Strongly rolling slopes. (c) Very shallow soils. (d) Excessive wetness with continuing hazard of waterlogging after drainage. (e) Frequent overflow with severe damage. (f) Very low moisture holding capacity. (g) High salinity. (h) Severe climatic limitations. (i) Low fertility very difficult to correct.
Class V	High-producing land with physical limitation that make it unsuitable for arable cropping, but only negligible to slight limitations or hazards to pastoral, vineyard, tree crop or production forestry use. Most common limitations which preclude arable use include: (a) Moderately steep slopes (21-25°). (b) Erosion risk. (c) Stoniness and/or the presence of boulders or rock outcrops. (d) Excessive wetness after drainage. (e) Frequent flooding.
Class VI	Fairly good stable hill country where soil erosion can be minimised by good pasture establishment/management. Also includes flat rolling land with an erosion risk or other limitation too great to allow safe cropping use but which has moderate limitations/hazards under a perennial vegetation. Usually well suited to grazing, forestry, tree crops (and vineyards in some cases). Soils responsive to fertiliser. Limitations are (usually in combination): (a) Slight to moderate erosion hazard under perennial vegetation. (b) Steep/very steep slopes. (c) Very stony/very shallow soils. (d) Excessive wetness or overflow. (e) Frequent flooding with severe damage to pastures. (f) Low moisture holding capacity. (g) Severe salinity. (h) Moderate climatic limitations.
Class VII	Unsuitable for arable use and has severe limitations/hazards under perennial vegetation. Usually not suited for grazing, as it requires special soil conservation practices, moderately well suited to forestry. Limitations are similar to Class VI but are intensified. Limitations are usually in combination: (a) Severe erosion hazards or severe effects of past erosion. (b) Very steep slopes. (c) Very stony/very shallow soils. (d) Extreme wetness of soils. (e) Very frequent damaging flooding. (f) Very erodible rock type. (g) Very high salinity. (h) Severe climatic limitations.

	(i) Very low moisture holding capacity. (j) Low fertility, very difficult to correct.
Class VIII	Predominantly very steep mountain land, mostly above 4000 ft, descending to lower levels in unfavourable situations and on very steep land in high rainfall areas. Most common limitation is extreme erosion or erosion hazard which may be combined with severe limitations of climate or low fertility. Management for pastoral/forestry production not very commercial as it will be increasingly necessary to give protection for plant growth for on-site and, particularly, off-site benefits. Therefore, unsuitable for pasture or commercial forestry. Use is restricted to catchment protection and recreation.

B - Land use capability classes and dominant land cover in Bay of Plenty

Source: D Guinto, July 2012. Analysis of land cover in the Bay of Plenty region. Bay of Plenty Regional Council Internal Report 2012/08.

Land Use Capability Class	Area (hectares)	Percentage	Composition of dominant land cover (% of LUC Class area)
1	2,839.9	0.24	High producing exotic grassland (81.6%) Short rotation crops (9.0%) Orchards and other perennial crops (4.9%)
2	53,198.1	4.46	High producing exotic grassland (70.8%) Orchards and other perennial crops (14.4%) Short rotation crops (7.5%)
3	74,774.4	6.27	High producing exotic grassland (66.2%) Orchards and other perennial crops (7.5%) Pine forest, closed canopy (6.6%) Pine forest, open canopy (3.5%)
4	182,950.1	15.33	High producing exotic grassland (28.8%) Pine forest, closed canopy (25.7%) Pine forest, open canopy (14.1%) Forest, harvested (11.3%) Indigenous forest (8.1%)
Arable total	**313,762.5**	**(26.30)**	
5	659.1	0.06	High producing exotic grassland (86.3%) Orchard and other perennial crops (6.5%) Pine forest, closed canopy (3.4%)
6	283,029.5	23.72	High producing exotic grassland (29.0%) Indigenous forest (28.9%) Pine forest, closed canopy (18.1%) Pine forest, open canopy (7.2%) Forest, harvested (5.6%)
7	393,059.3	32.95	Indigenous forest (66.7%) High producing exotic grassland (5.7%) Broadleaved indigenous hardwoods (3.7%) Manuka/kanuka (3.5%) Forest, harvested (3.3%) Pine forest, open canopy (3.0%)
8	202,480.6	16.97	Indigenous forest (87.9%) Broadleaved indigenous hardwoods (2.7%) Pine forest, closed canopy (2.2%)
Non-arable, total	**879,228.5**	**(73.70)**	
Grand total	**1,192,991.0**	**100.00**	

Appendix 3 – Bay of Plenty Regional Council's Statutory and Non-Statutory environmental improvement programmes

Environmental Programme	Statutory	Non-Statutory	Explanation
Recreation and open space		✓	Optional role to own and operate regional parks under LGA. Operates under Council's Policy on Regional Parks (2003).
Environmental Enhancement Fund		✓	Discretionary programme.
Sustainable land use implementation	✓		The RMA and Soil Conservation and Rivers Control Act 1941, make regional councils responsible for *promoting* soil conservation and maintaining water quality. It is at Council's discretion how to achieve this.
Biodiversity		✓	Although Council has an obligation to maintain indigenous biodiversity under the RMA, the method of achieving this is at Council's discretion.
Biosecurity		✓	Regional councils have the *option* to be involved in pest management under the Biosecurity Act. If Council develops a Regional Pest Management Strategy, then it must undertake pest control according to the Strategy.
Rotorua Lakes Programme		✓	Although not a specific statutory requirement, there is a legal obligation with Central Government on the four priority lakes, and this programme implements Council's RMA water quality functions and the Regional Water and Land Plan. Delivery on actions for the four priority lakes is 'locked in' by the funding deed. How to manage the other lakes is at Council's discretion.
Sustainable coastal implementation		✓	Programme implements the Regional Coastal Environment Plan, Tauranga Harbour Strategy and Ōhiwa Harbour Strategy, but is not a statutory requirement. How to achieve this programme is at Council's discretion.

Appendix 4 - Relevant slides from “State of the Bay of Plenty Environment” presentation to Bay of Plenty Regional Council, Council workshop, 17 June 2014

What is predicted for the BOP?

- Climate is predicted to change - warmer overall, seasonal changes in rainfall with more intense storm events
- The BOP population continues to increase in the west, but is stable or declines in the central and eastern BOP
- Employment is expected to grow steadily and is driven by the natural resources sector
- There are land use change opportunities, including conversion of pasture to forestry and conversion of forestry or dry stock to intensive pasture
- Demand for water is expected to increase

Bay of Plenty

Land cover

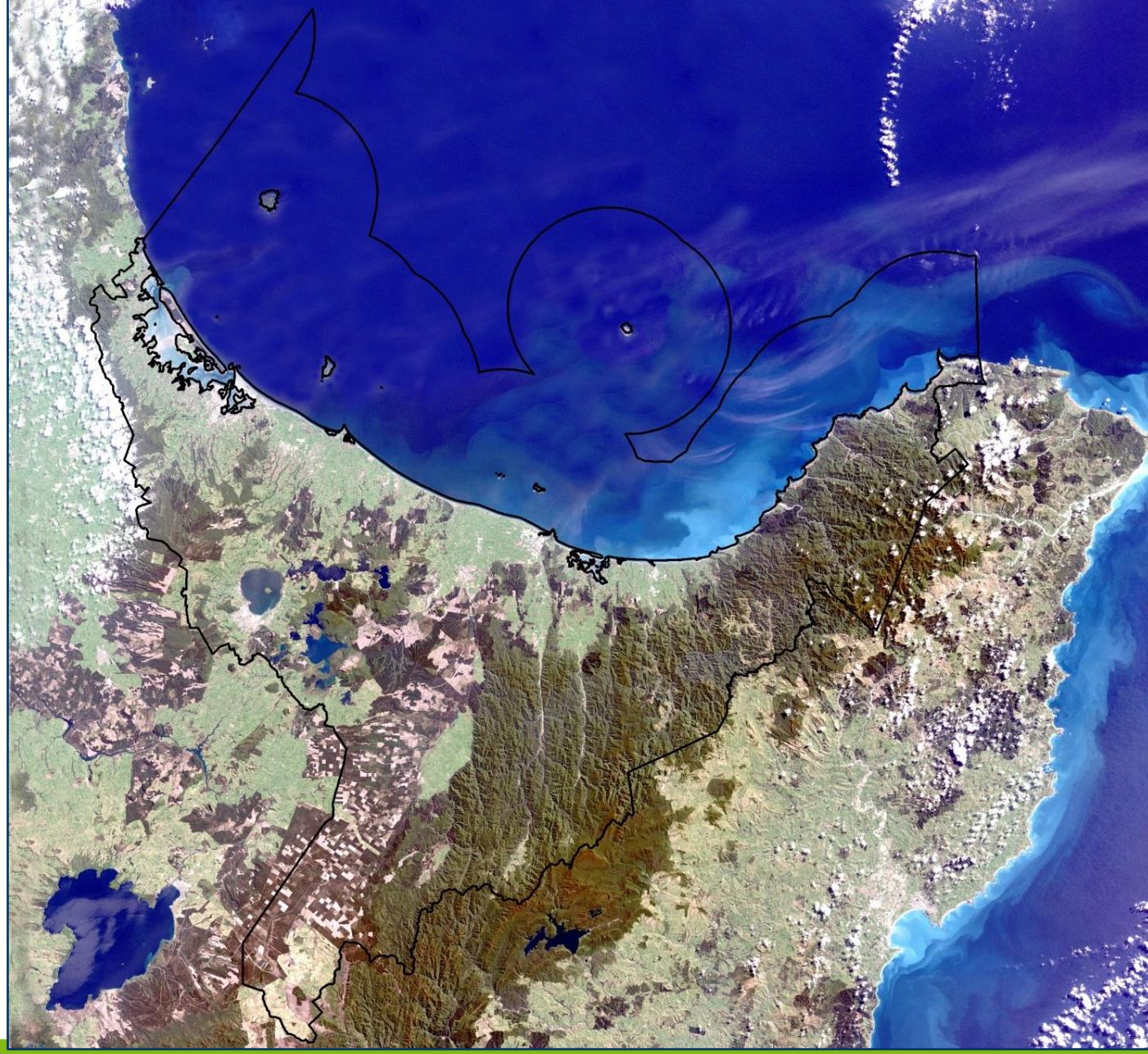
51% - Bush

24% - Exotic

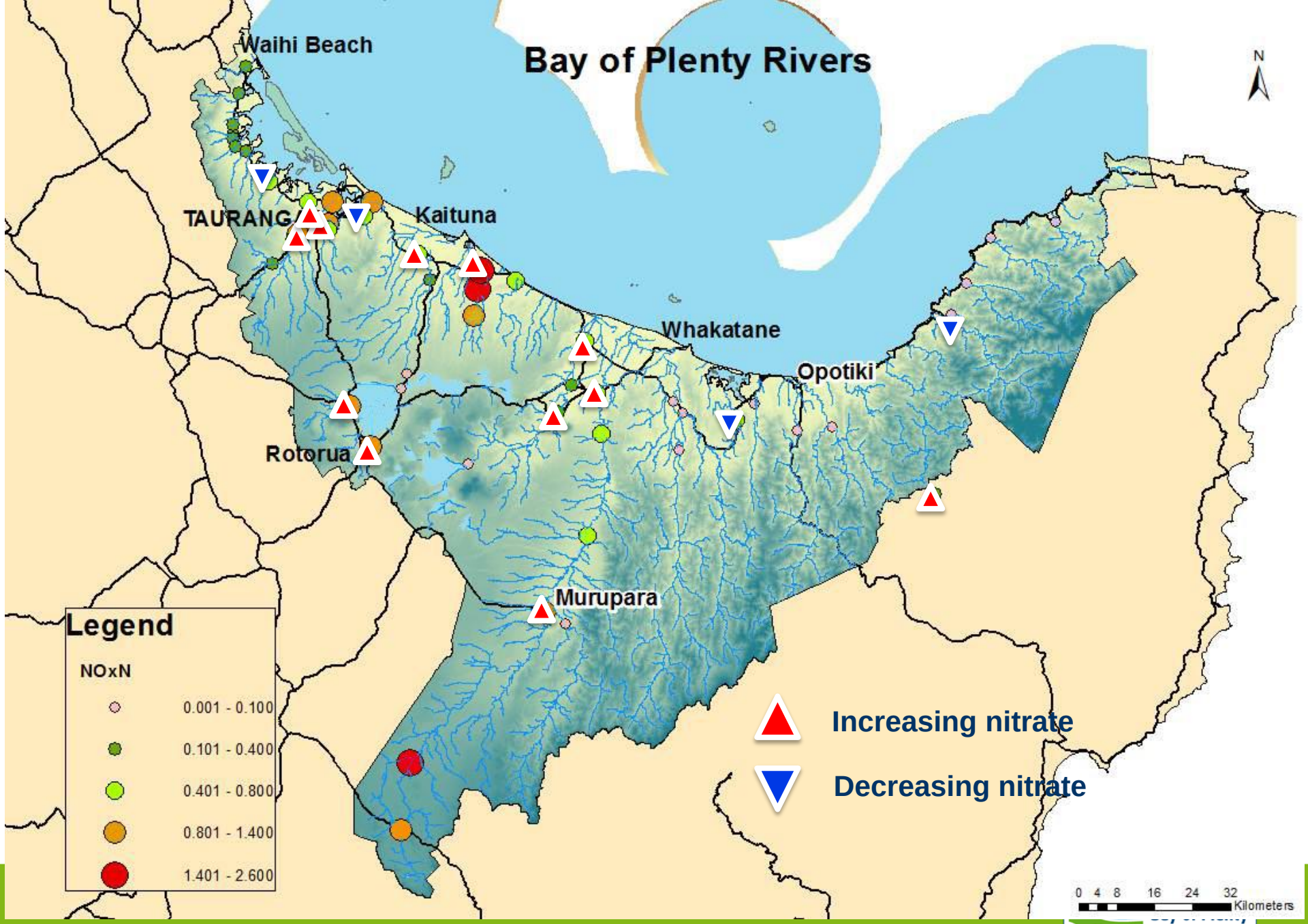
3% - Horticulture

1% - Urban & water

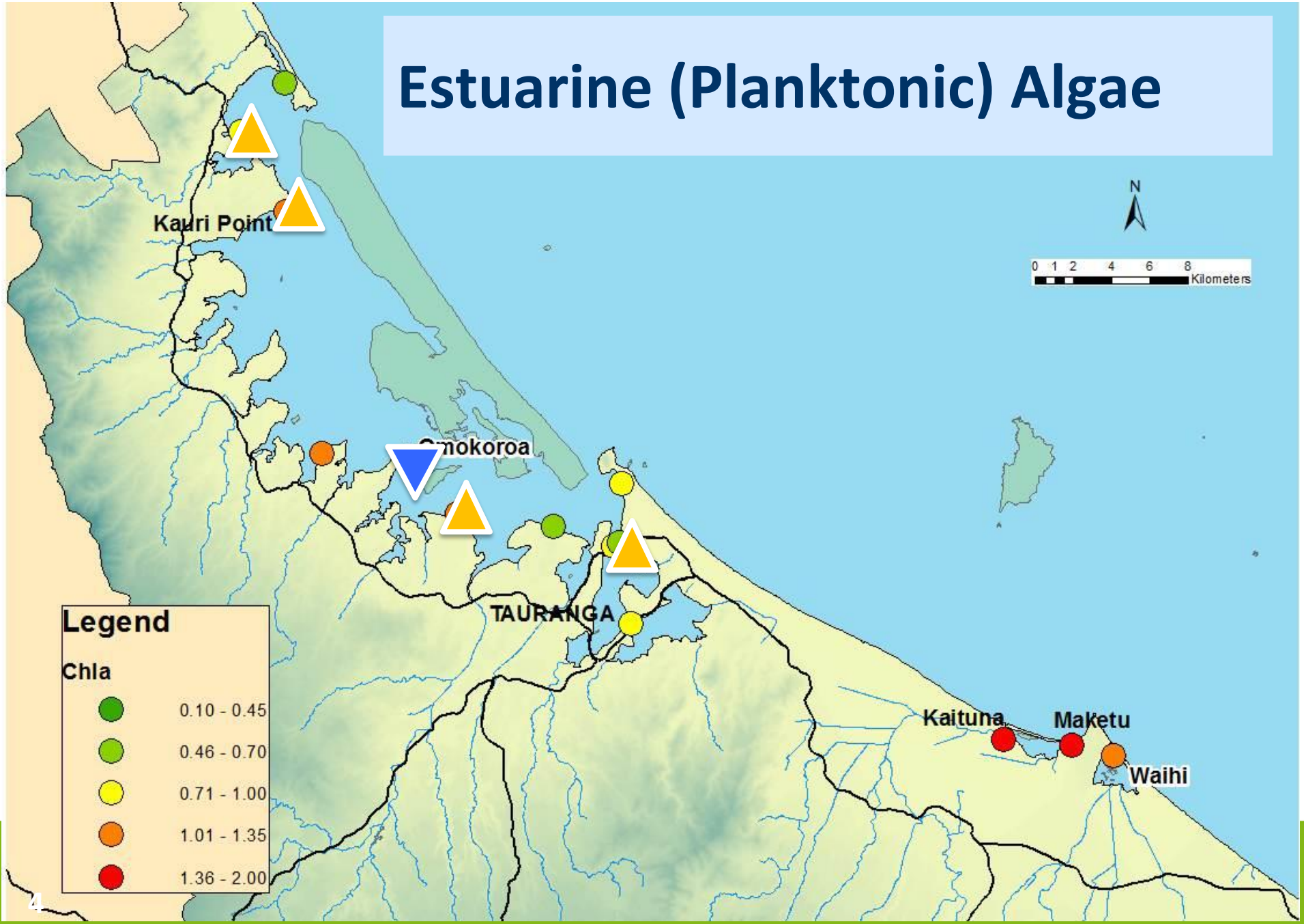
21% - Pasture

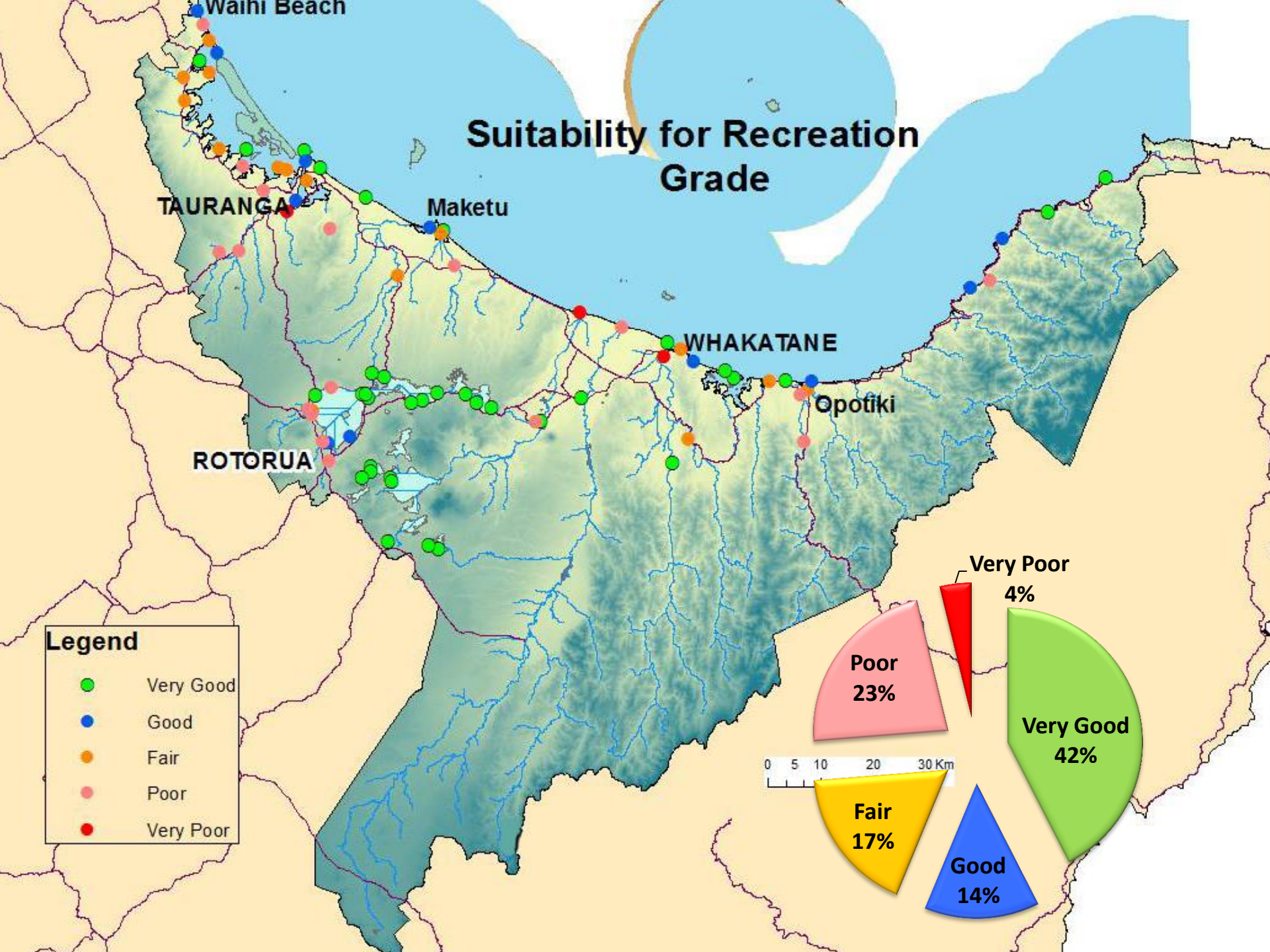


Bay of Plenty REGIONAL COUNCIL

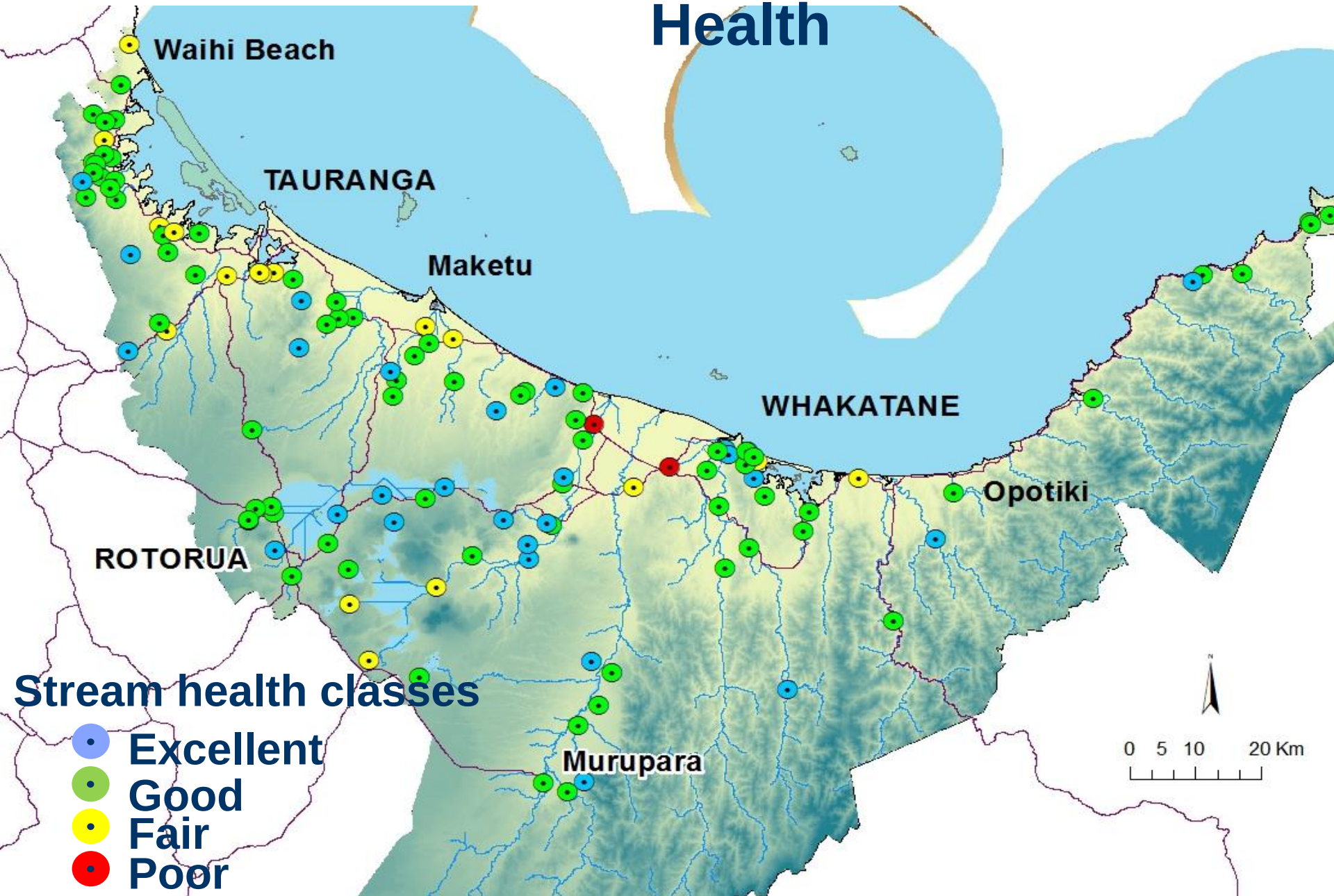

Bay of Plenty Rivers
Waihi Beach
TAURANGA
Kaituna
Whakatane
Opotiki
Rotorua
Murupara
N
Legend
NOxN
0.001 - 0.100
0.101 - 0.400
0.401 - 0.800
0.801 - 1.400
1.401 - 2.600
Increasing nitrate
Decreasing nitrate
0 4 8 16 24 32
Kilometers
REGIONAL COUNCIL

Estuarine (Planktonic) Algae

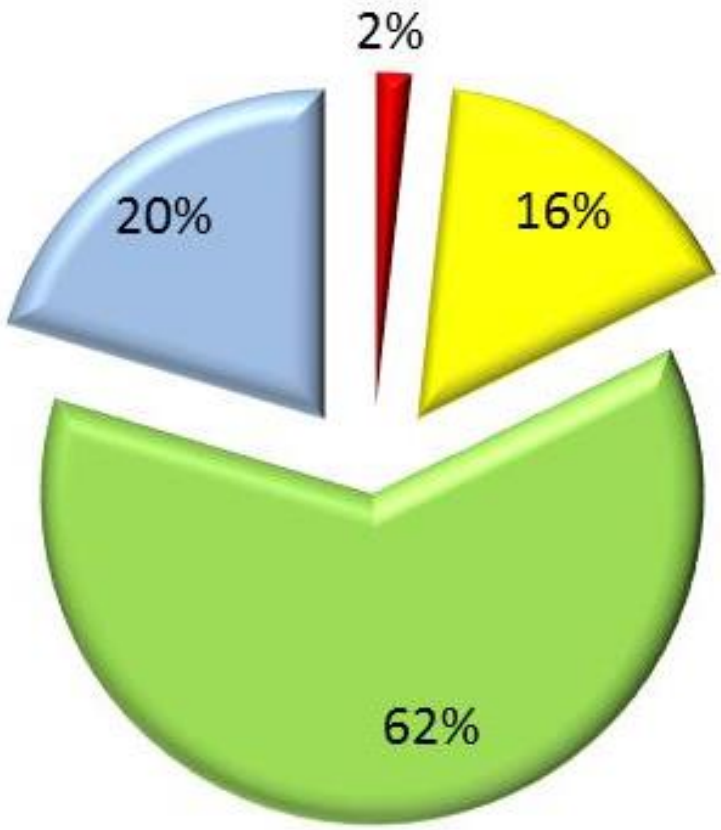



Waihi Beach
Suitability for Recreation Grade
TAURANGA
Maketu
WHAKATANE
Opotiki
ROTORUA
Legend
Very Good
Good
Fair
Poor
Very Poor
0 5 10 20 30 Km
Very Poor 4%
Poor 23%
Very Good 42%
Fair 17%
Good 14%

Stream Ecological Health

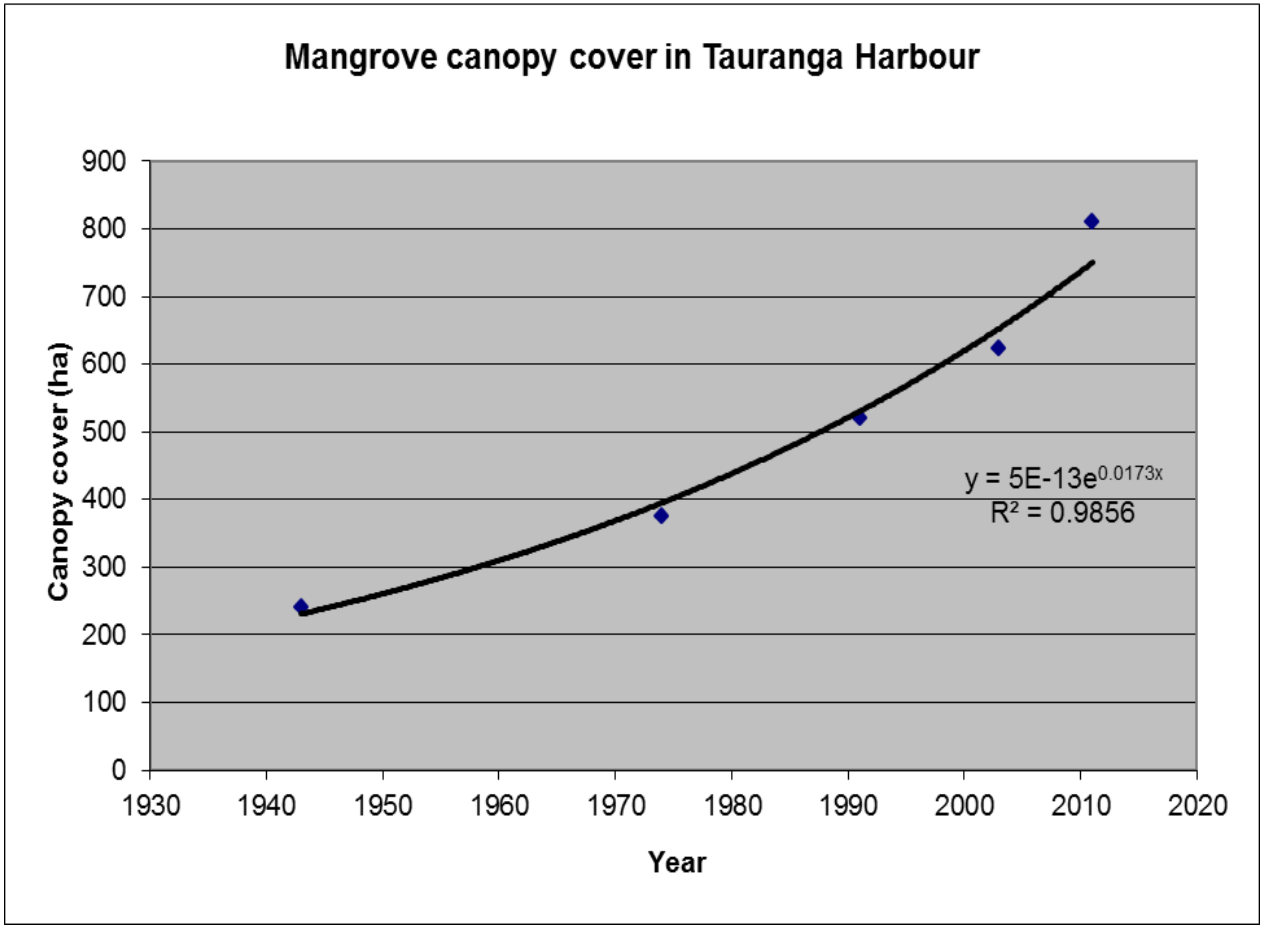


Average Stream health



- Poor (both pasture)
- Fair (14/19 pasture)
- Good (Mostly pasture or native bush)
- Excellent (Mostly native bush

Sediment - Mangrove cover in Tauranga Har.

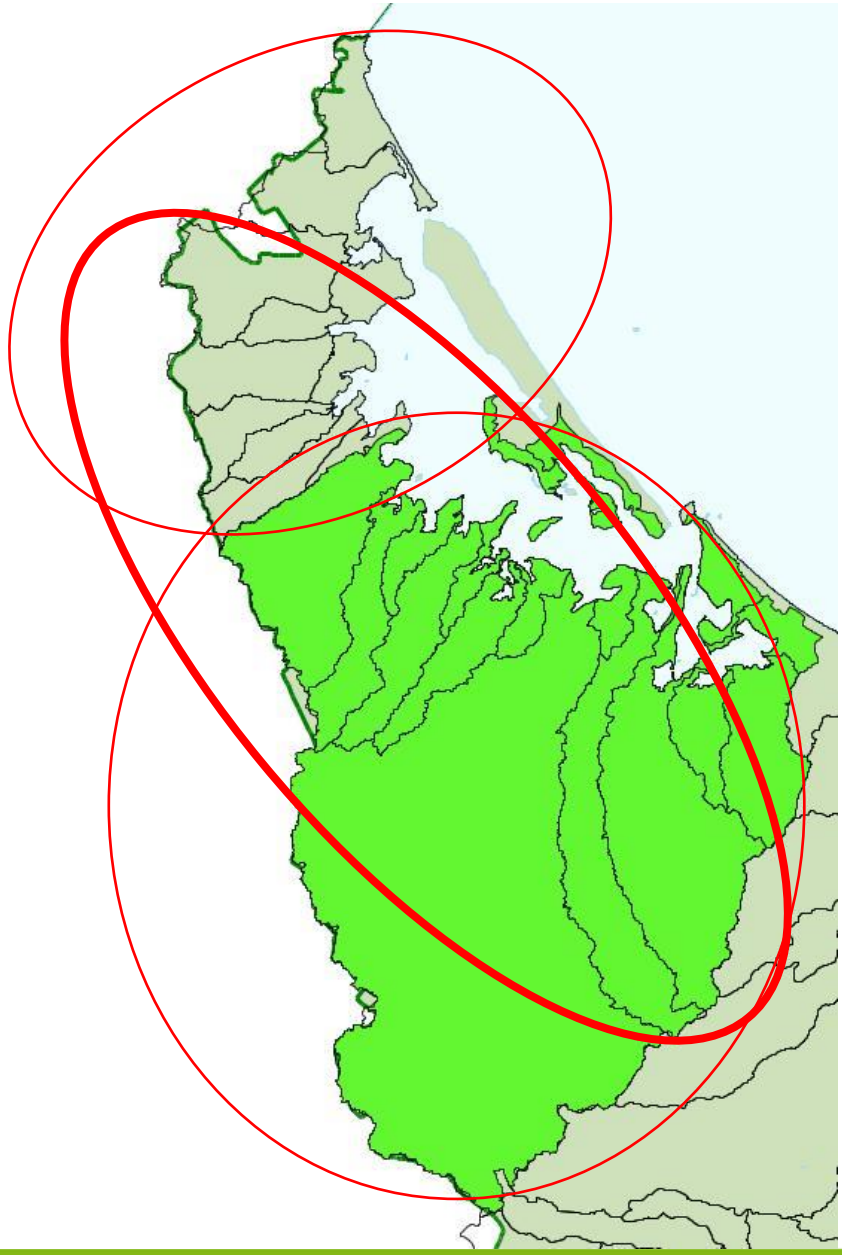


- 811 ha – 2011
- Driven by;
  - Sedimentation
  - Nutrients
  - warming

Bay of Plenty REGIONAL COUNCIL

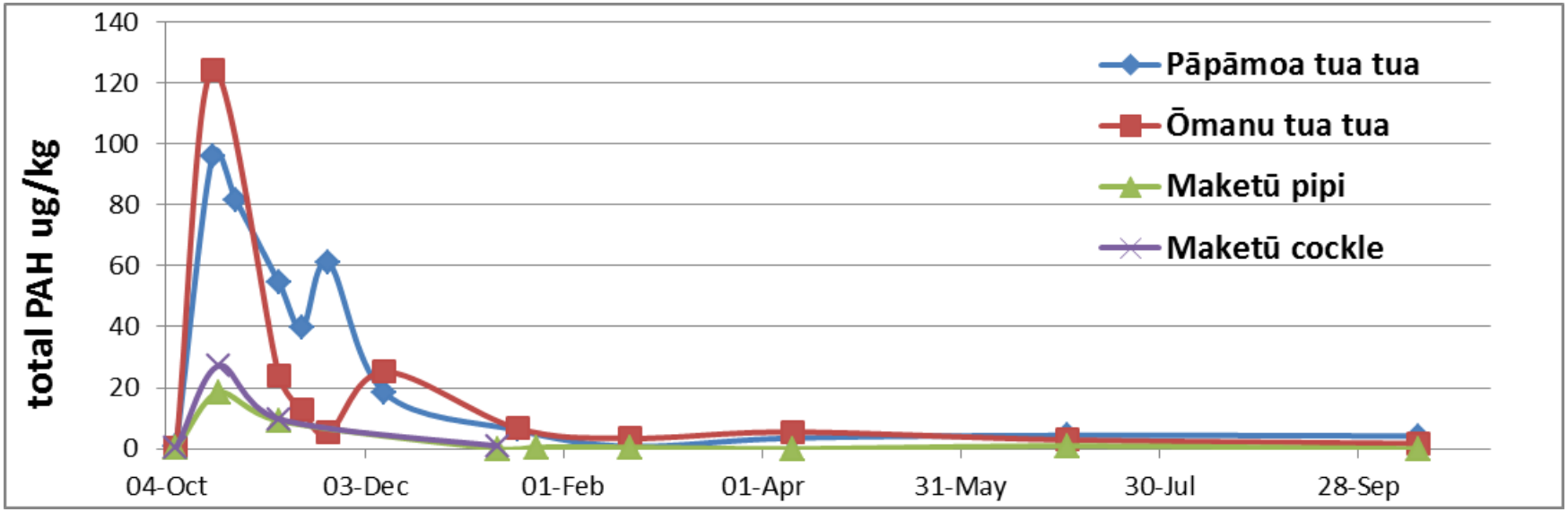
Seagrass loss – 1959/96

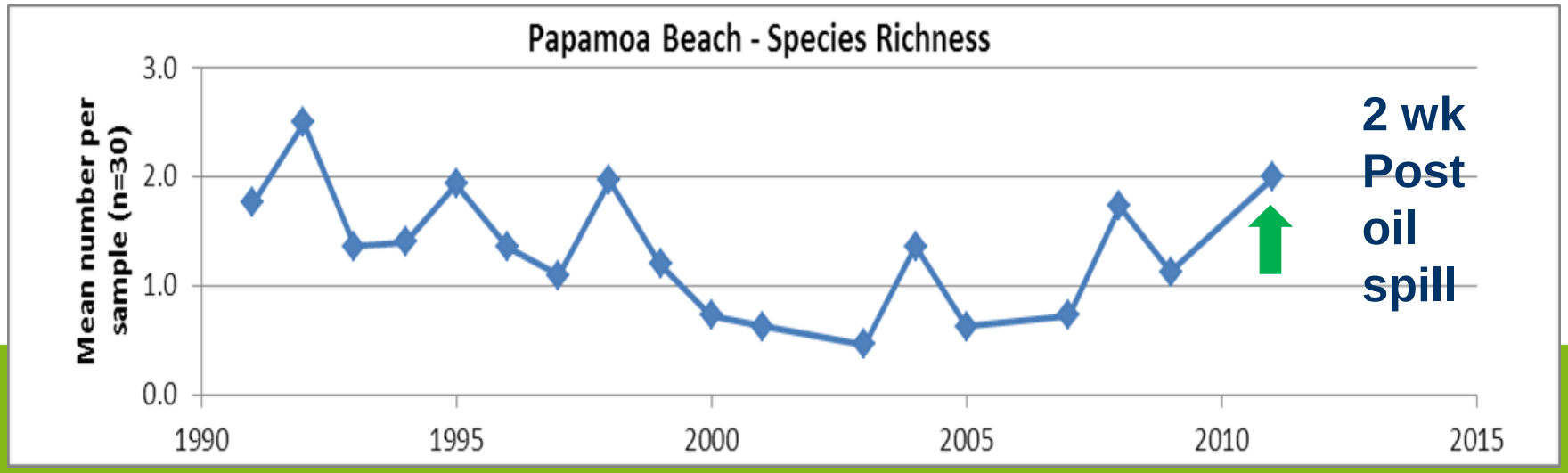
% Change	
Northern	-9.6
Southern	-54.7
Western	-69.0



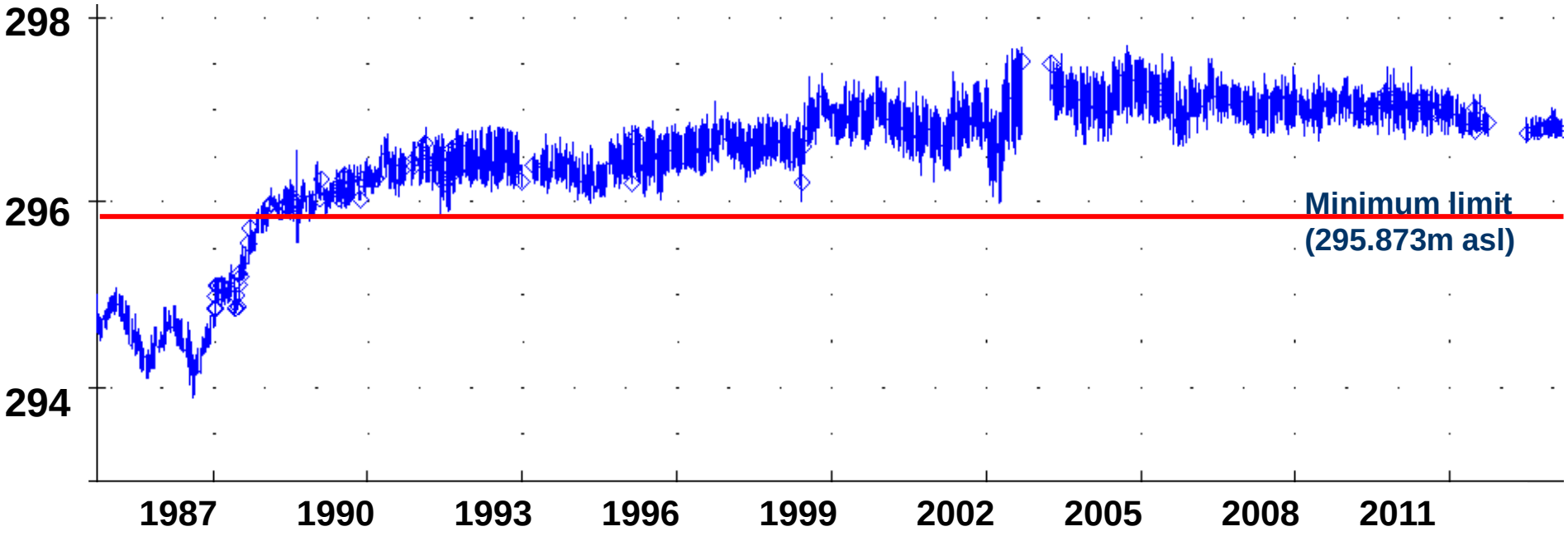
Bay of Plenty REGIONAL COUNCIL

Contaminants – Rena grounding 5/10/12





Rotorua geothermal recovery - water level



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Freshwater wetlands

Historic: 48,087 ha
Current: 3,811 ha (<8%)

Trend:

- Pest plants; pest animals
- Drainage (direct and indirect), clearance, sedimentation/infill
- Nutrients

Sand Dunes

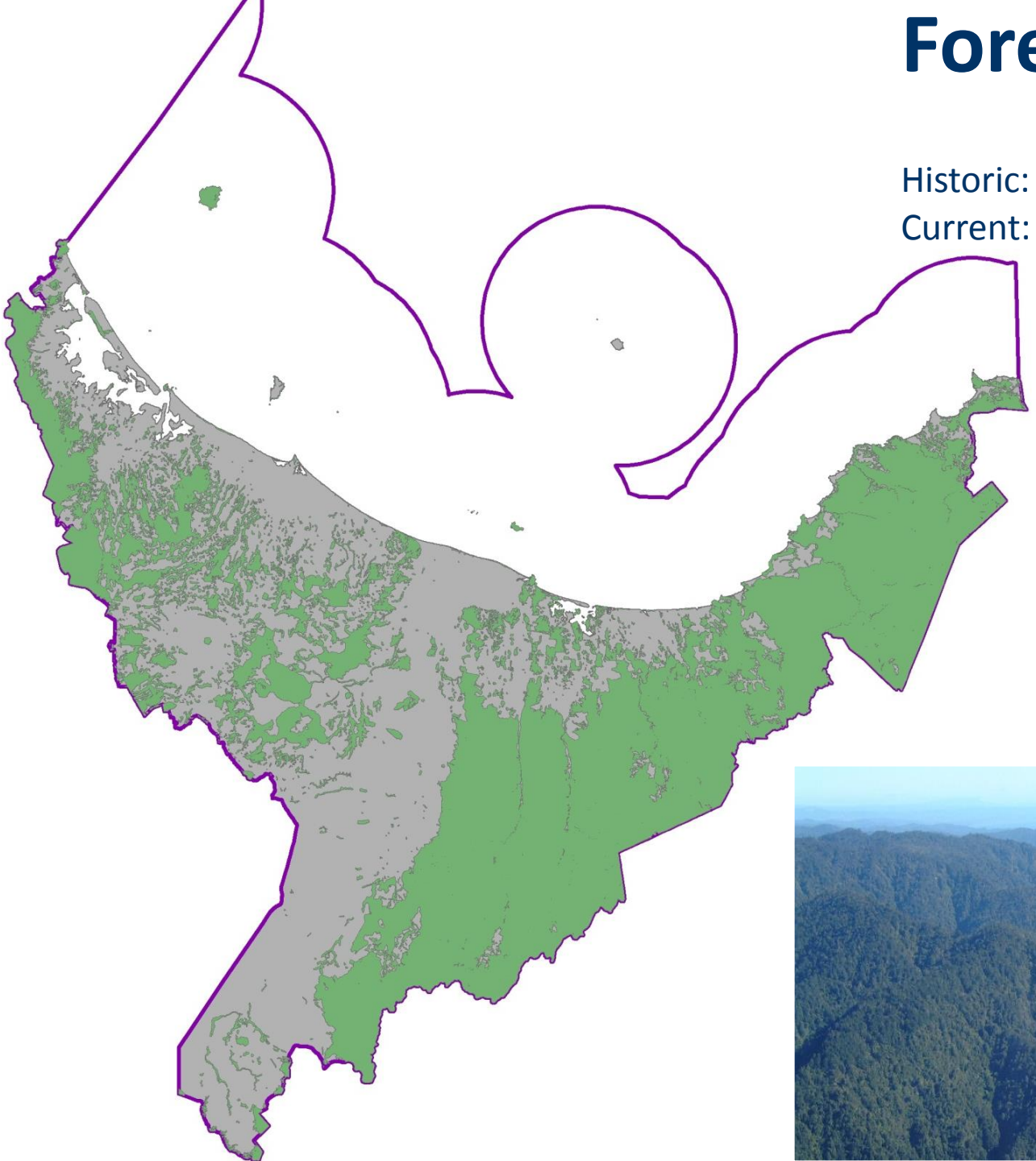
Historic: 11,660 ha
Current: 3,005 ha (26%)

Legal protection: 833 ha (39%)

Trend:

- People, pest plants, pest animals

Forest and Scrub



Historic: 996,560 ha (1840 vege)
Current: 601,645 ha (LCDB3) ≈ 60%

Trend: ↓ ↑

- Introduced pest plants and pest animals

Frost Flats

Historic: “tens of thousands of hectares
Current: “thousands”

Trend:

- Pest plants –
  mouse-ear hawkweed
  wilding pines

Napier-Taupo Highway

Geothermal Vegetation

Historic: ≈ 1025 ha

Current: 313 ha <30%

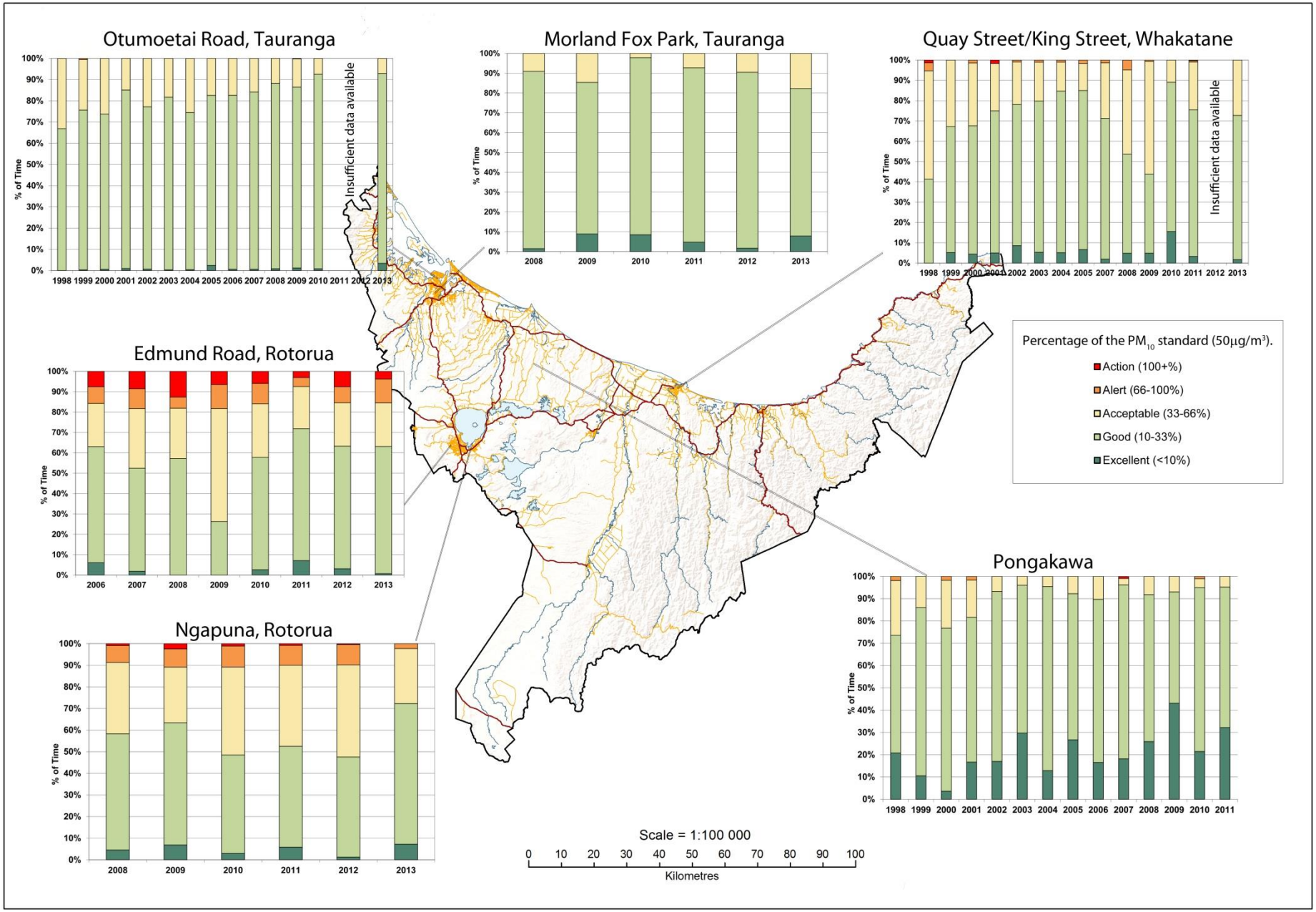
Trend:

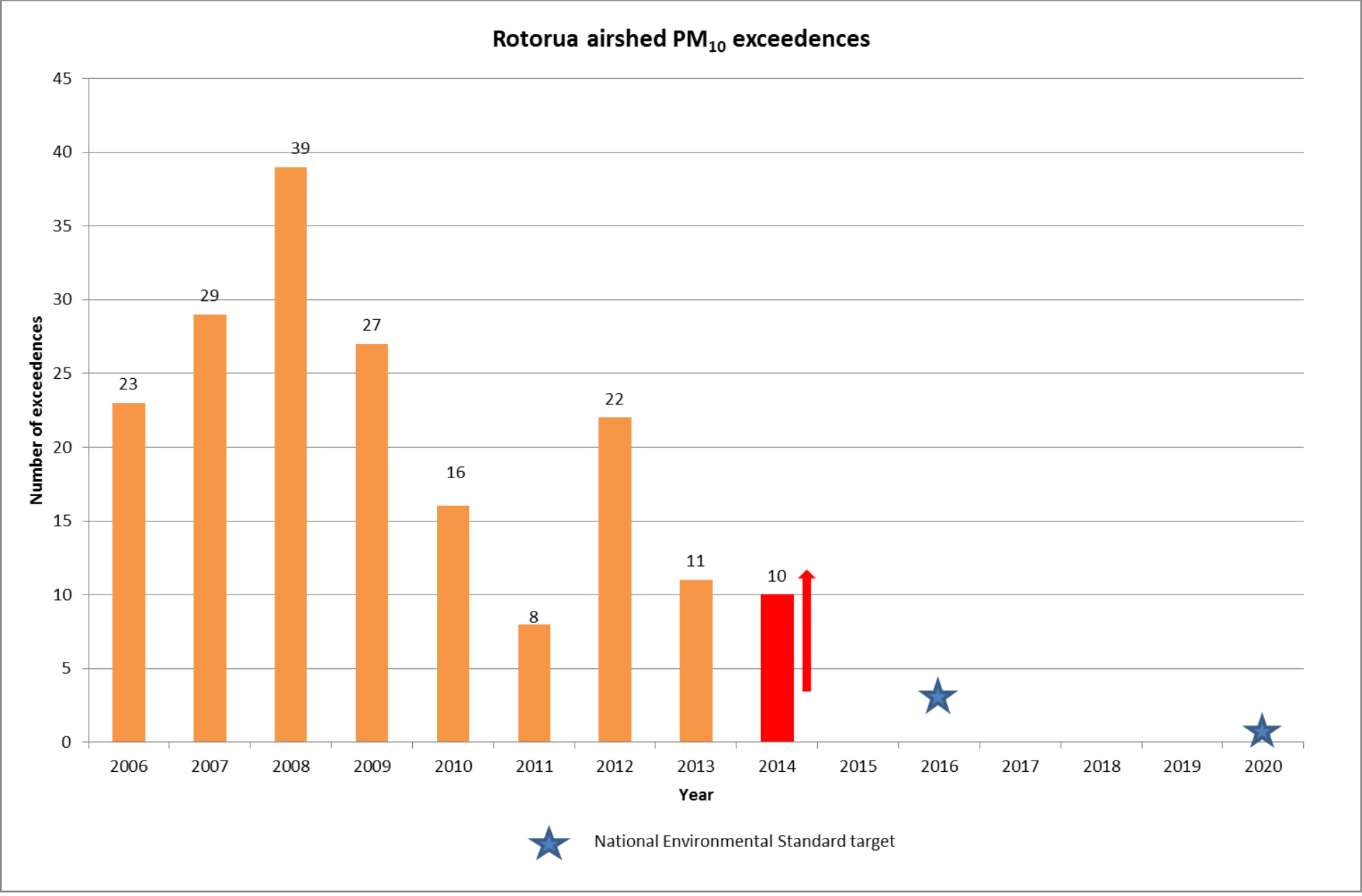
- Resource use, pest plants.

Current State of Pest Management

Successes	
Nassella Tussock	Control to zero density after 30+ years control.
Koi Carp	Eradicated from the region in 2012.
Feral Goats	Significant reductions, zero density at some sites.
Biocontrol	Cost effective option for dealing with legacy pests
Community Groups	More becoming active, doing amazing work controlling weeds at sites significant to them.

Concerns moving forward	
Surveillance	Increased resourcing and better technology needed to improve confidence in detecting significant pests prior to establishment.
Effective control methods	Having effective control options not guaranteed (e.g. wallabies)


Otumoetai Road, Tauranga
% of Time
Insufficient data available
1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013
Morland Fox Park, Tauranga
% of Time
2008 2009 2010 2011 2012 2013
Quay Street/King Street, Whakatane
% of Time
Insufficient data available
1998 1999 2000 2001 2002 2003 2004 2005 2007 2008 2009 2010 2011 2012 2013
Edmund Road, Rotorua
% of Time
2006 2007 2008 2009 2010 2011 2012 2013
Ngapuna, Rotorua
% of Time
2008 2009 2010 2011 2012 2013
Pongakawa
% of Time
1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011
Percentage of the PM10 standard (50µg/m3).
Action (100+%)
Alert (66-100%)
Acceptable (33-66%)
Good (10-33%)
Excellent (<10%)
Scale = 1:100 000
0 10 20 30 40 50 60 70 80 90 100
Kilometres



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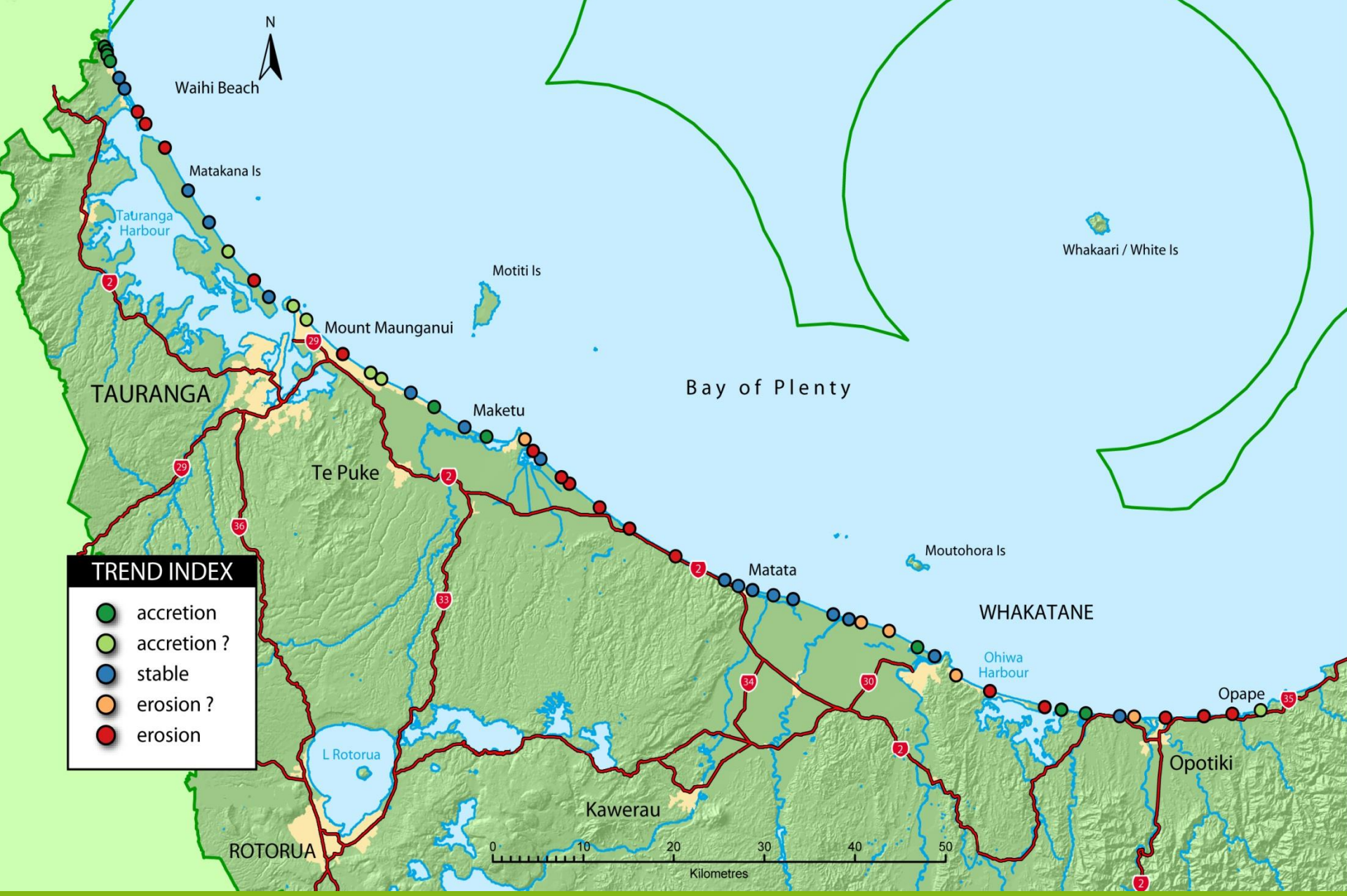

Bay of Plenty REGIONAL COUNCIL

Summary

- Soil and land
  - Nutrient levels increasing on more intensive land uses
- Water quantity
  - A large proportion of rivers and streams have water allocation levels higher than our Water and Land Plan default (i.e. above 10% of the Q5 7 day low flow)
  - Groundwater allocation levels are less of an issue but some takes have been authorised in recharge areas
- Water quality
  - Many rivers and streams are showing increasing trends for nitrate (note links to increasing N in soils)

Summary

- Water quality (continued)
  - Most of the Rotorua lakes are not meeting the TLI targets for water quality, however there are pleasing trends most notably for Rotorua, Rotoiti and Rotoehu
  - Over 70% of sites monitored (freshwater, estuarine and coastal) are rated fair to very good for bathing suitability
  - Over 80% of streams monitored have good to excellent ecological health, pasture and urban streams have lower ecological health
  - Toxic algal blooms have been identified in some of our rivers and streams

Summary

- Habitat, biodiversity and biosecurity
  - Mangroves continue to spread in Tauranga Harbour and there has been further loss of seagrass – these changes are driven by a number of factors including sedimentation, nutrients and habitat disturbance
  - Bay of Plenty beaches have recovered remarkably quickly from the effects of the Rena grounding
  - There are declining trends in a number of habitat types including freshwater wetlands, sand dune vegetation, forest and scrub, frost flats and geothermal vegetation
  - There are a number of biosecurity successes (e.g. goats, koi carp) but new invasive threats remain (e.g. hornwort)

Summary

- Geothermal
  - The Rotorua geothermal field has recovered well since the bore closure programme in the late 1980's
  - The Tauranga warm water geothermal field needs careful management to prevent heat decline
- Air quality
  - Air quality is good across most of the region but Rotorua particulate levels remain a significant challenge
  - Dust is an issue in some areas, particularly Mount Maunganui