

An aerial photograph of a coastal landscape, likely in the Waikato region of New Zealand. The image shows a large, sandy beach in the foreground, a dense forest of trees along the shoreline, and a golf course with several green fairways and sand traps. In the background, there are residential areas with houses and roads, and a body of water (the sea) on the right side. The entire image is overlaid with a dark teal color.

SECTION B: WAIKATO COASTAL ENVIRONMENTS

Introduction to the Waikato Region & its Coasts

The Waikato Region encompasses a tract of land extending across the central upper North Island to connect with two very different coastal areas; the rugged west coast, which includes Kawhia and Raglan harbours and the Hauraki Gulf, Firth of Thames and waters off the Coromandel Peninsula within the Region's east. The Region is highly fertile and retains a varied topography from the low-lying Hauraki Plains bordering the Firth of Thames, to the indigenous forest-clad mountains that define the spine of the Coromandel Peninsula. The coastal environment of this Region of two coasts is justifiably varied and is recognised by its broad topography and large population of people that live and reside within and adjacent to this area.

The Region comprises a number of Districts. Those with a coastal component include Waikato, Otorohanga and Waitomo Districts in the west and Hauraki and Thames Coromandel Districts in the east.

In the west, the large harbours of Raglan, Aotea and Kawhia are accessible sheltered areas which are very different from the remaining rugged and broadly isolated coastline.

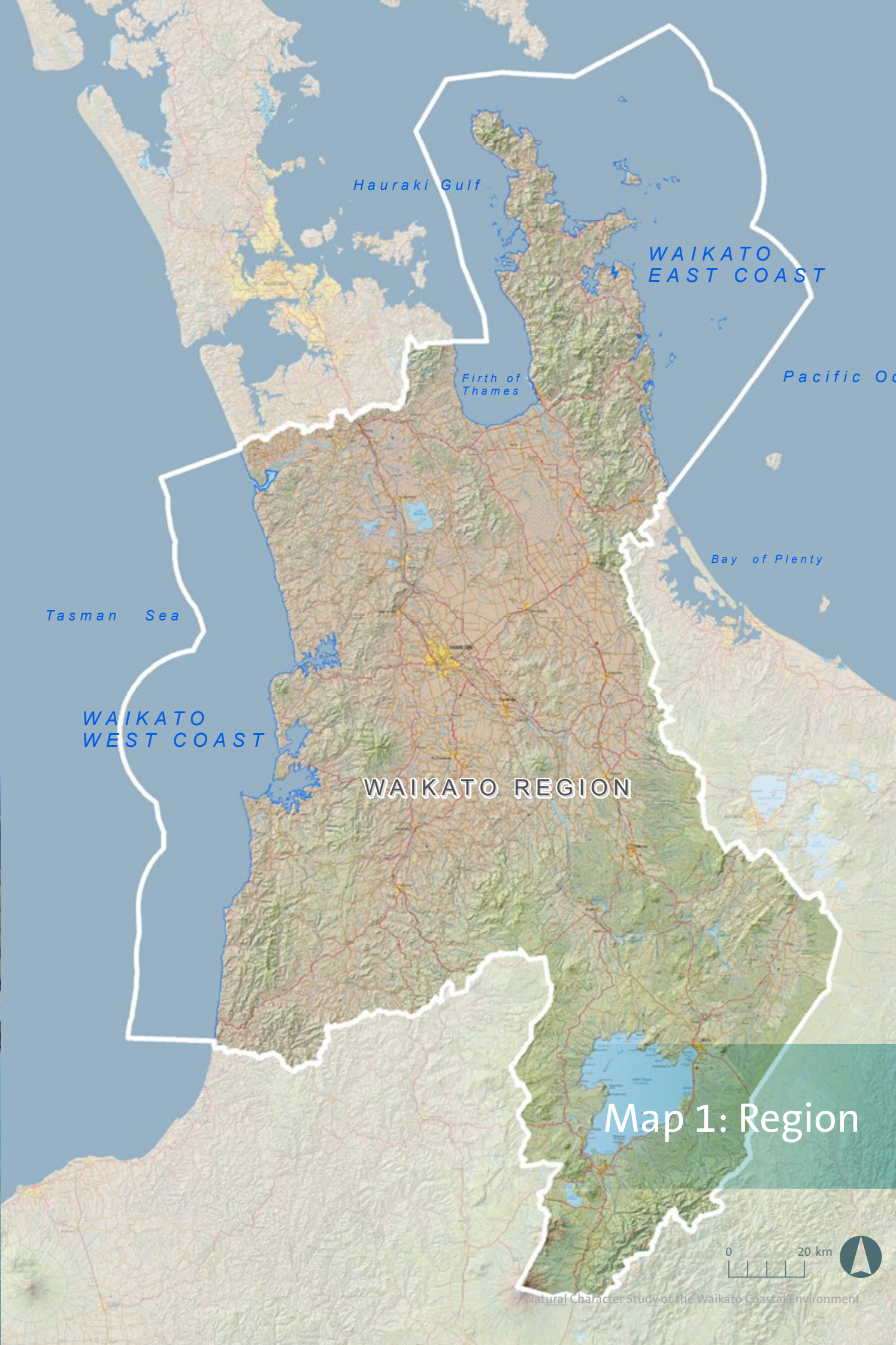
Central to the Region's eastern shores is the prominent Coromandel Peninsula which forms a significant part of this part of the region's coastal landscape. The coastal environment of this part of the region also includes the calmer waters of the Firth of Thames.

Broadly, the East Coast coastal environment can be divided into two broad areas; the Hauraki Gulf and Firth of Thames Area (western side) and the Western Bay of Plenty and Pacific Ocean Area (or the eastern side). Within the West Coast, the deeply indented, predominantly sheltered harbours contrast with the linear, exposed coastline which forms the majority of this coastal length.

Each coast area is outlined and described over the page.

Below: Te Kouma Harbour





Map 1: Region



Waikato East Coast: Hauraki Gulf & Firth of Thames

The Hauraki Gulf and Firth of Thames occupies the western half of Waikato's East Coast. The broad open and predominantly sheltered waters of the Hauraki Gulf extend further westwards towards the adjacent Auckland Region. The Firth of Thames is framed by the Hunua Ranges to the west and the Coromandel Range to the east. Towards the north, the waters are associated with the more open character of the Hauraki Gulf and support numerous islands, craggy peninsulas and large embayments.

Waikato East Coast: Eastern Coromandel Peninsula

Extending from Cape Colville to the border with the Bay of Plenty Region, the eastern half of Waikato's East Coast is rugged and more open and exposed than the western half. This part includes many indented bays, coves and numerous island groups. Large estuaries frequent this side of the peninsula supporting an array of habitats.

Broad Collective Characteristics

The coastal environment of the Waikato East Coast comprises a relatively slender strip of land which varies considerably from the western shores of the Firth of Thames to the eastern shores of the Coromandel Peninsula. This section outlines the collective characteristics and values at the Level 1 and 2 scales. For the purpose of this report, only Level 2 (the Waikato East Coast) will be rated at the end of this section.

The interplay of the various characteristics both on land and within the sea create a unique environment for its broad scale variability. The marine component is described first, followed by the terrestrial component.

Left: Hauraki Gulf Mangroves

Marine

Collective Abiotic Characteristics of Waikato's East Coast Coastal Marine Environment

The Coromandel Peninsula comprises an uplifted horst block that is tilted eastward and forms the eastern-most part of the Hauraki Volcanic centre (Bradshaw, 1991). The East Auckland current flows southward adjacent to the north-east coast as a series of vortices. Along the northeast coast of New Zealand the tidal stream runs northeast on the flood tide and southeast on the ebb tide. The tidal velocity on a spring tide in the open ocean is approximately 0.5 m/s, reducing to approximately 0.13m/s on the east coast (Bradshaw, 1991).

As the northeast coast of New Zealand is sheltered from winds and swells generated across the Tasman Sea, the wave energy is lower and more variable on the northeast coast of New Zealand compared to other exposed coastlines. The northeast coast is a variable and mixed storm/swell wave environment (Bradshaw, 1991).

There is an active tectonic plate margin beneath the East Coromandel coastline which results in a steep rocky coastline and a relatively narrow continental shelf. The coastline comprises steep rocky headlands separated by narrow shallow bays. The southern exposed coast is higher energy and the conditions are current dominated, whereas the northern embayed coastline is lower energy and conditions are wave or current dominated. The east Coromandel coastline has a history of coastal erosion associated with episodic storms from the north and east (Bradshaw, 1991).

Firth of Thames lies within the southern part of the Hauraki Gulf. Both the Waihou and Piako rivers drain into this area along with smaller natural waterways and numerous canals from the extensive drainage networks located on the Hauraki Plains. These drainage networks have flows sourced from the intensively farmed Waikato Plains, peat bogs and occasional point source inputs such as municipal wastewater treatment and industrial facilities. In aggregate, these water ways contribute to the nutrient and sediment loads entering the Firth.

The tidal environment of the east coast of the Coromandel is microtidal, with small variations in tide height (Bradshaw, 1991).

Estuaries of the east Coromandel are generally small and shallow, whereas beach morphologies are either coarse grained pocket systems or medium to fine beaches with barrier spits.

There has been rapid expansion of mangrove habitat in estuaries on the Coromandel Peninsula over the past 25 years primarily due to increased sediment discharged from the land.

Wetlands of the Firth of Thames comprise extensive intertidal mudflats. Large shell banks (Chenier Plains) were formed some 4,500 years ago and are arguably one of the best functioning examples of this ecosystem globally. This wetland is of international importance for wading birds - under the RAMSAR Convention.

Collective Biotic Characteristics of Waikato's East Coast Coastal Marine Environment

The Firth of Thames lies within the Hauraki Gulf Marine Park. The Hauraki Gulf is recognised as having high biological diversity and environmental quality (O'Donnell, 2011). The Firth of Thames comprises extensive intertidal mudflats and large shell banks were formed some 4,500 years ago. This wetland is of international importance for wading birds.

Firth of Thames is a wetland of international importance under Ramsar Convention. Threats to the ecological values of the Firth of Thames include dairy-farm runoff, historic mussel dredging (>40 ago) and sedimentation. Southern right whales and Bryde's Whales can be seen in the bay to calve and rest.

The west coast of the Coromandel Peninsula contains a number of gravel beaches, sandy beaches, estuaries and rocky shore habitats. The marine environment comprises a diversity of invertebrates and fish and supports a number of coastal and wading bird species. There are also a number of Areas of Significant Conservation Value (ASCV) on the west coast.

The east coast also contains a number of ASCVs, all of which are important for coastal and wading birds (Dowding, 2013). Most of the sand dunes and spits present in this area have been modified to some extent by human activity e.g. introduction of exotic species, coastal subdivision, grazing and pine plantations. Some foredunes have natural communities of spinifex and shore bindweed and some rear dunes contain communities of pohuehue, knotted sedge, tauhinu and sand coprosma. Natural gravel beach communities are rare and are primarily dominated by exotic species. Some of the estuaries and harbours have retained their natural vegetation communities (Humphreys and Tyler, 1990).

Aquaculture (only mussel and oyster) is a dominant feature along the western coasts of the Coromandel Peninsula, with only minimal presence along the eastern coast.

New Zealand dotterel, an endangered bird, can be found on a number of beaches on the Coromandel.

Sheltered from the worst of the southerly winds Te Whanganui A Hei Marine Reserve supports an array of rich and varied habitats. Reefs of hard rock, soft sediments, intricate caves and underwater arches provide homes for complex communities of plants, crustacean, molluscs and fish (DOC).

Collective Experiential Characteristics of Waikato's East Coast Coastal Marine Environment

The Coromandel Peninsula is regarded as one of the North Island's most popular recreation and leisure destinations. From open sandy coastline to sheltered harbours to wide sand bays and rocky coastline, the Coromandel offers opportunities for almost every type of water based recreational activity. Fishing, diving, snorkelling, sailing, surfing, water skiing, kite boarding, stand up paddle boarding, canoeing and kayaking and kaimoana gathering are some of the many recreational activities that frequent these coastal waters. Access to the water's edge is apparent along the majority of the coastline. Steeper rocky shorelines and islands are the few areas where the coastal edge becomes inaccessible. Boating is a popular activity within the Coromandel with a number of settlements including marinas, being Whitianga, Tairua and Whangamata.

Three main water bodies comprise different experiences and modifications as compared to one another. The sweeping bay of the Firth of Thames with its expansive intertidal zone demonstrates a striking transient seascape with wildlife apparent throughout. Marine farming is visually apparent from most of the coastline within the Firth of Thames and is coupled with recreational fishing amongst the mussel and spat catching farms.

Further north along the Coromandel Peninsula the harbours and estuaries of Manaia, Te Kouma, Wyuna Bay, Amodeo Bay up to Colville provide sheltered harbours flanked by a scattering of islands. Pockets of mussel and oyster farms are found throughout these areas and are sited in close proximity to the islands and headlands. The waters of this area are frequented with recreational use, commercial fishing and transport routes. A sense of remoteness and isolation is gained within pocketed areas around headlands, bays and islands, however by in large the area is frequented with recreational and commercial activity. Similarly many of the waters surrounding the coastline contain marine farms, jetties, boat ramps and reclamation that affects the experience of naturalness within this landscape.

Beyond Port Jackson the Eastern Coromandel Coastal Marine Area extends south along the entire eastern edge of the peninsula to meet Orokawa Bay, within the Bay of Plenty Region. The series of bays, harbours, estuaries and rocky shoreline are pocketed with settlements that maximise access to the water. Commercial use of the open waters is associated with offshore shipping that extends on the outer edges of the region. Other than where the coastal settlements are sited, the coastal edges and immediate adjoining water body remains unmodified. Marine farming is minimal and the coast's only marine reserve, Whanganui A Hei Marine Reserve, is located offshore of Cathedral Cove. This reserve offers good snorkelling, with excellent opportunities to view large rock lobster, snapper and other coastal species up close.

The numerous offshore islands along the Eastern Coastline provide isolated coves and bays visually discrete from the mainland shoreline.

Above: Marina at Whitianga



Terrestrial

Collective Abiotic Characteristics of Waikato's East Coast Coastal Terrestrial Environment

Waikato's East Coast encompasses a range of land types that have a direct influence on the coastal environment. The hard rock hills and mountains of the Hunua Ranges in the east and the ancient volcanic Coromandel Peninsula to the west, are separated by the low-lying alluvial Hauraki Plains. The axial Hauraki Fault, which follows the western extent of the Coromandel Peninsula, is also pivotal to the region's geomorphology.

The Waihou and Piako Rivers are the largest watercourses in this part of region and drain into the relatively shallow waters of the Firth of Thames. Formed and moulded by tectonic, fluvial and climatic forces, this area retains distinctive geomorphic coastal features that are seen nowhere else in New Zealand.

The largest component of this dynamic coastline is associated with the ancient volcanic region of the Coromandel Peninsula. Sculpted by millions of years of erosion and coastal processes, this area retains prominent and spectacular landscape features that are remnants of solidified magma from the volcanoes that erupted during the Miocene and Pliocene periods (Molley, 2002). The landscape is therefore well dissected by prolonged weathering and erosion, where deep ridges, mountain plateaus and rocky pinnacles define the geomorphology of the peninsula. The 'spine' of the peninsula is flanked by rugged undulating hill-country which extends towards the coastlines creating rocky cliffs and sandy beaches.

Underlain by greywacke, some of the more impressive volcanic remnant landscapes formed by wave erosion are evident on the peninsula's eastern coast and include the coastal arch of Cathedral Cove and many of the offshore islands, including the Mercury Islands. The iconic Moehau Range dominates the northernmost part of the Coromandel. The Kuaotunu Peninsula also has some striking outcrops of basaltic rocks (Molley, 2002). Due to the previous volcanism of the peninsula, remnant reminders of hydrothermal activity are still evident along the eastern coastline and include places such as Hot Water Beach.

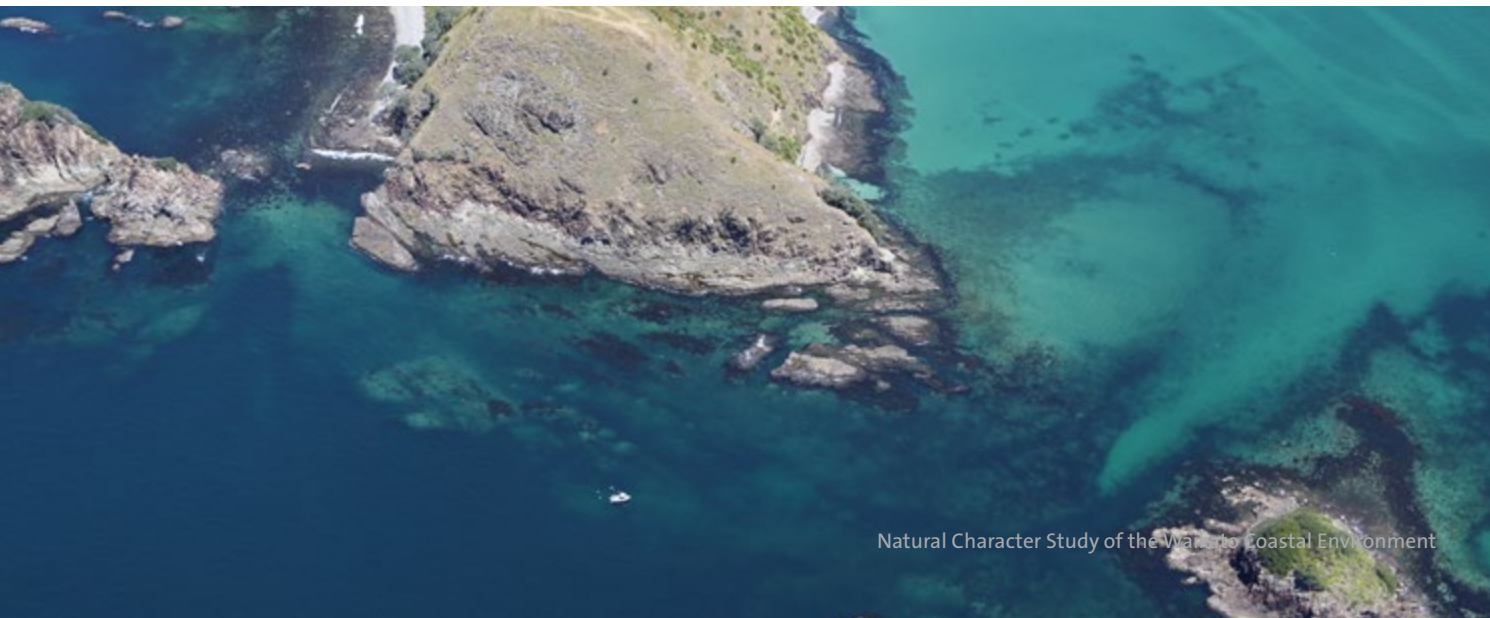
Streams and watercourses tend to be short, with steep valleys and often wide alluvial accumulations at the river's mouth. It is often in this more 'easy' country where settlement has occurred.

A noted abiotic feature of the Coromandel are the numerous islands that dot the shoreline. Resultant of sea-level rises through glacial and past fluvial activity, the islands hold many spectacular distinctive features such as the basalt exposures on Red Mercury Island.

To the west are the flat Hauraki Plains. Formed through fluvial activity and tectonic processes, the coastal component of the Hauraki Plains comprises waterlogged gley soils, wetlands and mudflats remaining from the ancient bed of the Waikato River. An extensive shell bank (chenier plain) is a striking feature at Miranda.

The climate of this coastal environment is variable, but generally very warm during the summer and moderately warm in the winter months. Frosts are light and infrequent. Humidity is high. With predominantly north-westerly and north-easterly airflows the Coromandel Peninsula tends to receive high quantities of rainfall, often in short intensive storms, varying from 1,150mm in low lying area to 2,500mm at higher elevations.

Turquoise waters around Rabbit Island off Opito Point



Collective Biotic Characteristics of Waikato's East Coast Coastal Terrestrial Environment

Land cover analysis: The total land area of the Coastal Terrestrial Areas is 83,932ha which includes 3,367ha of islands. Of this, 38% of the land cover is rural production land, 23% is indigenous shrubland, 13% is indigenous forest and 11% is exotic treeland. Of the remainder, 5% is waterbodies, 4% is artificial surfaces, 3% is mangroves and 1.4% is indigenous wetlands. There are very small areas (<1% each) of bare surfaces and exotic scrub, in aggregate covering only 1.2%. The total indigenous land cover is 41%.

The terrestrial coastal biota of Waikato's East Coast ranges from relatively intact and extensive indigenous ecosystems at the more remote northern end of the Coromandel Peninsula, to the highly modified and depleted production dominated areas around the Firth of Thames. Roding access and slope appears to be a principal influence on whether the steeper land is covered in exotic forest or indigenous forest or shrubland. The more remote and inaccessible areas are still dominated by indigenous forest or shrubland.

In general, if they are present at all, mangroves, indigenous wetlands, water bodies and bare surfaces comprise only very minor parts of the landscape in every Coastal Terrestrial Area.

Pohutukawa trees are a feature of coastal slopes and are one of the most noted species in this area, principally due to their close coastal presence next to main highways.

There are numerous offshore islands, some of which are public conservation land administered by the Department of Conservation, some of which are privately owned and some of which are Maori-owned. Islands managed by DOC include the Mercury group (excluding Great Mercury Island (Ahuahu), Cuvier Island (Repanga Island), the Aldermen Islands and Whenuakura and Rawengaiti islands off Whangamata. These islands hold endangered fauna such as tuatara, Middle Island tusked weta, Duvaucel's gecko, tieke/North Island saddleback and Pycroft's petrel. There are also rare plants including Cook's scurvy grass, parapara, giant flowered broom and milk trees.

Collective Experiential Characteristics of Waikato's East Coast Coastal Terrestrial Environment

The sweeping curve of the Firth of Thames and the indented coastline of the Coromandel Peninsula imbues the East Waikato Coastal Terrestrial Environment with a multitude of experiential characteristics. How people experience the terrestrial component is highly dependent on their accessibility to and involvement with the coastal environment. Although there is overlap with the experiential characteristics of the Coastal Marine Areas, the focus here is on experiences, perception, intactness and modification of naturalness in the coastal terrestrial environment.

The rugged cliffs, narrow peninsulas, sandy beaches, harbours, islands and coastal flats culminate in making the coastal environment of the East Waikato Coastal Terrestrial Environment extremely memorable for both residents and visitors.

The more sheltered inner waters attract greater concentrations of residential/ commercial development, while more exposed wild and rugged areas offer different opportunities. The highest areas of natural character for experiential values tend to be located on more difficult terrain, or the more exposed, isolated locations, including islands, prominent headlands, peninsulas and rocky bays and cliffs. More accessible and modified areas, such as sheltered bays, typically hold lower levels of natural character. However, this is not always the case as some sheltered coastal flats retain very high perceived naturalness due to their intact ecosystem.

Popular locations such as Hot Water Beach, Cathedral Cove and sandy beaches at Whitianga, Tairua, Pauanui and Whangamata hold reasonably high degrees of naturalness. Some, such as New Chums Beach, have international recognition as being the jewel in New Zealand's crown! However, their popularity results in experiential aspects including remoteness and wildness being considerably lower, due to the presence of numerous people and associated modifications (such as car parks and walkways) to facilitate access. Other common types of modification include houses built to capitalise on sea views and recreational facilities built to provide opportunities for experiences (i.e. camping, tramping). These factors impact on the natural character of the coastal terrestrial environment.

Much of the Coastal Terrestrial Area has road access along the coastline, although there are parts where accessibility becomes more restrictive. Such areas includes part of the northernmost part of the region, around the exposed coastline north and south of Port Charles and the rugged coastline north of Wharekaho Beach (north of Whitianga). Where road access is more limited, the experience of remoteness tends to be highest. Coastal walkways, such as the Coromandel Walkway, Muriwai Walk and numerous tracks leading into the Coromandel Range are wholly located within the coastal environment, offering people opportunities in which to experience the coastline.

Offshore there are numerous islands, many of which are free of significant modification. Some islands are habitat for regionally rare or threatened species and function as wildlife sanctuaries. Others, such as Mahurangi Island, offer an experience of remoteness for visitors.

Summary of Level 2 Marine & Terrestrial Values			
Degree of Natural Character	Natural Character Attributes		
	Abiotic	Biotic	Experiential
<i>Very High</i>			
<i>High</i>	✓	✓	
<i>Moderate to High</i>			✓
<i>Moderate</i>			
<i>Moderate to Low</i>			
<i>Low</i>			
<i>Very Low</i>			
	Overall Natural Character Rating		High





Waikato West Coast: Raglan, Aotea and Kawhia Harbours

The highly indented and sheltered harbours of Waikato's West Coast are in contrast to the more exposed, predominantly linear coastline that forms the majority of this area. Although settlement within the West Coast is sparse, most are concentrated within these harbours. The harbours are the focus of the numerous watercourses that drain the surrounding undulating catchments, and are often calm which is ideal for access to the water.

Waikato West Coast: Exposed Western Coast

The active Exposed West Coast is typical of a high energy-wave coastal environment. The coastline varies from wide sandy ironsand beaches with large dune incursions and dune sheets to steep rocky shorelines with coastal caves to steep erosive sedimentary cliff faces. The coastline is exposed and reflective of the high energy wind and wave action that extends along the entire coast.

Broad Collective Characteristics

The coastal environment of the Waikato West Coast is very different from the East Coast. This section outlines the collective characteristics and values at the Level 1 and 2 scales. For the purpose of this report, only Level 2 (the Waikato West Coast) will be rated at the end of this section.

The interplay of the various characteristics both on land and within the sea create a unique environment for its broad scale variability. As with the East Coast, the marine component is described first, followed by the terrestrial component.

*Left: Grazing land terminates
abruptly at the coast below
Tirua Point*

Marine

Collective Abiotic Characteristics of Waikato's West Coast Coastal Marine Environment

Waikato Region's west coast is part of a large coastal unit that extends from Cape Egmont to Cape Reinga. It is regarded as one system comprised of a high energy coastline with uniform orientation to prevailing westerly airflow, waves and sediment sources. Sediment transport is from south to north, with pulses of black sand travelling up the coast as a result of large wave events driven by the west to south west swell. Within the larger system are smaller littoral cells defined by physical control features such as headlands, harbour mouths and river mouths that control the local wave climate and the longshore movement of sediment. These littoral cells and their control features impact directly on erosion and accretion dynamics at the coastal margin resulting in shoreline fluctuations that have temporal scales of hours/days to decades/centuries. Many of the long term patterns of shoreline fluctuation that have been observed are not well understood.

The coast line is typically comprised of a soft shore (sands and gravels) with fluctuating width depending on the conditions within the littoral cell and larger scale sediment dynamics in the West Coast unit. Where this exists, it is present as a thin veneer of sand over rock, small dunes, or extensive sand dune formations. This soft shore (position, depth, width) can be highly dynamic, especially near harbour entrances and river mouths where the high energy coastal environment influences tidal and sub-tidal channels, tidal currents, and swell waves. In circumstances when sediment supply becomes limited, beaches can rapidly erode and shorelines shift landward. Conversely, when sediment supply is available, beaches can accrete and shorelines shift seaward. Where this occurs adjacent to development, seawalls and other erosion protection measures have been installed with varying success and sometimes impacting on beach widths and levels.

Where there is no soft shore, the coastline consists of coastal cliffs comprised of soft sedimentary rock, hard sedimentary, or hard volcanic rock. The long term instability in this coastal cliff environment as influenced by a range of factors (climate, wave conditions, land use) contributes to sediment dynamics in the adjacent littoral cell.

Collective Biotic Characteristics of Waikato's West Coast Coastal Marine Environment

In general, there is very little information about coastal marine biotic characteristics for the West Coast compared to the wealth of information available for the East Coast. Although there is more information relating to the three harbours, long term data on biotic indicators is lacking and most information is sporadic and limited to one-off surveys.

There are few rocky reefs or offshore islands, and almost no information on those few that are present. Benthic soft sediment communities have only been surveyed within the harbours or river mouths, with no information available for the open coast. Information on fish and marine mammals is similarly limited, but data on West Coast marine area use by shorebirds is comparatively good.

On the open coast, given the very low degree of modification of the marine environment and good water quality, benthic marine life on the open coast can be expected to be relatively unmodified. Benthic communities can be expected to have naturally low abundance and diversity in soft sediments and higher abundance and diversity where physical features provide habitat variability (e.g. rocky reefs, islands, etc.). Fish life is likely to be similarly unmodified.

The harbours and river mouths are focal points for biotic diversity and abundance. The harbours have extensive sea grass meadows and shellfish beds. All three harbours have relatively low rates of sedimentation and water quality largely unchanged by anthropomorphic activity, so fish diversity can be expected to be relatively unmodified. The harbours and river deltas are likely to perform significant ecosystem services as nurseries for fish and other aquatic life, and provide a notable food resource for shorebirds.

The West Coast is internationally renowned for its significant role in supporting resident and migrating shorebirds, principally within the harbours but also at Port Waikato and along some of the beaches. For instance 95% of the global wrybill population migrate along the West Coast.

Maui's dolphin, the world's rarest dolphin species, is only found on the West Coast from New Plymouth to Dargaville. However, there is no information about the relative importance of the Waikato Region's portion of the West Coast. A range of other dolphin and whale species are also found along the West Coast but data on these is limited to records of strandings. New Zealand fur seals are also present, with three known haul out locations and one known breeding site.

Collective Experiential Characteristics of Waikato's West Coast Coastal Marine Environment

Waikato's West Coast encompasses a range of land types that have a direct influence on the coastal environment. The marine environment is effectively divided into the sheltered harbours and the exposed open ocean. The range of experiential attributes of both are quite different, however retain a sense of congeniality. Despite the three harbours of Raglan (Whaingaroa), Aotea and Kawhia retaining a more sheltered coastal experience to the exposed open coast to the west, all retain senses of wildness and remoteness that is different from that of the East Coast.

With the three harbours retaining the greatest population of the whole West Coast, the sheltered intended harbour waters are used for a variety of activities, including boating and swimming. There are a few boat ramps and a small number of aquaculture related activities that directly affect the degree of naturalness of these harbour waters.



Top: NZ Fur Seal; Middle: Wrybill
and main Maui dolphin

The open ocean is exposed and often wild, and along with parts of the harbours retain senses of remoteness and isolation. There are three surf breaks of national significance noted near Raglan (Manu Bay/ Whale Bay and Indicators) and a number of other areas including Vortex Bay where surfing has almost idolised this small West Coast area. During summer, the waters can become very busy, although surfing is undertaken all year round.

Due to the semi-remoteness of accessibility to this coast, the waters retain a high level of naturalness, where the elements, patterns and processes appear very evident and almost intact.

Terrestrial

Collective Abiotic Characteristics of Waikato's West Coast Coastal Terrestrial Environment

The majority of Waikato's West Coast land types are associated with the Triassic-Jurassic sedimentary rocks that extend almost along the entire coastline. These ancient rocks have been overlain with limestones, calcareous sandstones and siltstones during the Oligocene and have been weathered by climatic and alluvial forces.

Much of the landform along the coast is reasonably linear, resultant of faulting and folding parallel with the coast, with only the three large harbours of Raglan, Aotea and Kawhia providing physical relief along the coast. Kawhia Harbour, the largest of all three, is a drowned valley, impounded by a sand bar, with sand-dunes up to 100m in height on the northern side. Aotea Harbour also has giant sand dunes along its northern coast. The dunes are rich in titanomagnetite, with some areas being mined for iron ore.

Ancient volcanic activity has also assisted in forming this landscape, where Karioi, the largest volcano on the coast is estimated to be 2.3-2.4 million years old. Thick lava flows resultant from constant, often violent volcanic activity has created numerous dramatic rock features, notably the regionally significant Te Toto sequence of lavas.

There are numerous Geopreservation Sites along this coastline, many of which are associated with Kawhia Harbour and are of national significance. They comprise a comprehensive collection of geomorphological features that are extremely legible, clearly demonstrating the formative processes. Coupled with this are the numerous small features that pepper this coastal environment, ranging from steep and precarious cliff faces, exposed rocky shelves, waterfalls, deeply incised gullies and extensive sand dunes.

The Waikato River is the largest river in the area, with numerous other smaller rivers draining the landscape. Streams and watercourses tend to be short as they wend themselves through relatively easy pasture country towards the coast.

The climate is typically warm, with humid summers and mild winters, with the prevailing winds being from the west and southwest. Due to the orientation and position of Kawhia Harbour, moist winds from both the south and northwest bring rain.

Collective Biotic Characteristics of Waikato's West Coast Coastal Terrestrial Environment

Land cover analysis: The total area of the West Coast Coastal Terrestrial Environment is just over 45,000ha. Almost 80% of the land cover is rural production land with a further 22% being plantation forestry and 3% being a sand mine. Of the remainder, 15% is estuarine open water, lake/pond, and sand/gravel, and 2% is urban area. Only 8% is indigenous vegetation comprising forest, wetland or manuka/kanuka scrubland. There is a very small area (<1%) of gorse/broom.

While primary production (rural farmland or forestry) dominates the entire coastal terrestrial area, indigenous vegetation is clearly higher in the southern half of the coastline, with the largest forest remnants associated with Aotea Harbour, Karioi, and the Marokopa and Awakino Coastal Terrestrial Areas. If the findings of the Shore Futures report play out in respect of a continued slow decrease in population and land use intensity, indigenous vegetation cover can be expected to slowly increase over time on rural land south of Kawhia as marginal land continues to revert to indigenous scrub and gorse. While landform and waterway connectivity is relatively unmodified, primary production land use will continue to dictate terrestrial ecological values and, to a lesser extent, freshwater ecological values by fundamentally affecting vegetation cover.

Besides land use, the dominant influence on biotic characteristics of the coast will continue to be the abiotic processes experienced at the coastal margin. These include:

- Extreme weather conditions including persistent westerly winds and salt spray shearing off and stunting vegetation and causing sand dune movement.
- A linear high energy coastline with narrow beaches, heavy wave action, and long shore sediment transport with continued active erosion of sand dune and sedimentary rock formations.
- A steep high coastal cliff environment that naturally limits coastal vegetation extent, diversity and cover and fish passage for migratory species returning to freshwater.
- Sheltered harbour environments experiencing relatively little anthropogenic pollution with abundant resources for fish and birds, particularly migratory shorebirds.

*Mangrove habitat at
Waingaro, Whaingaroa
Harbour*



Although the collective biotic values are low, there are hotspots where biotic value are high. The highest ecological values are contained within the intertidal and sub-tidal areas of the harbours, particularly Aotea and Kawhia, where estuarine vegetation (seagrass beds) continue to cover large areas. High ecological values are associated with Karioi, Te Tehe Bush, Moeatoa Scenic Reserve, and large forest patches around Aotea Harbour, where indigenous forest is least modified and ecological sequences from coastal vegetation to submontane forest are likely to be most intact.

Collective Experiential Characteristics of Waikato's West Coast Coastal Terrestrial Environment

The relative isolation of the west coast is punctuated only briefly by a small number of settlements that are located adjacent to the main harbours. The biggest, Raglan, services as a holiday and relaxed living location, where people come to experience predominantly the active waves for surfing and other marine-related recreational activities. Kawhia and Aotea are two further smaller settlements located south of Raglan which services a similar kind of clientele. The large indented harbours of Raglan, Aotea and Kawhia provide a more sheltered and serene setting than the more active and exposed coastline. The harbours are the focus of the numerous watercourses that drain the surrounding undulating catchments, and are often calm which is ideal for access to the water.

As with the East Coast, the West Coast imbues a wide variety of experiential characteristics and values. How people experience these environments will tend to be dependent on how accessible they are. Much of the land tenure of the West Coast is in private hands and used for grazing. The undulating terrain of a mix of back dunes, limestone and greywacke (with volcanic rock also apparent) mean that any roads are small and winding. There is no road that singularly extends along the coastline. Most are small farm tracks, with only Port Waikato and Raglan being connected via a sinuous track located frequently outside of the coastal environment within the coastal context zone.

It is with this in mind that settlement is sparse outside of the three main settlements. Occasional baches are noted along the coastline, and further smaller grouping of buildings and hamlets are also evident, such as at Port Waikato, Marokoa, Awakino and Mokau.

As a result of the geology and topography, there are a number of natural features that draw visitors to the area. The exposed and geomorphologically interesting rocks at Kawhia Harbour attract geologists from around the country. Caves and ancient lava flow areas (such as around Karioi) also promote local and regional interest. A walk up to the summit of Karioi also provides expansive views of the coast. Numerous limestone outcrops which are accentuated within the pasturelands in the country north of Raglan are noted characteristics.

Along the open coast, via air, or on a floating vessel, where the land meets the sea, are an intricate and often breath-taking sequence of coastal features, which reveal this relatively isolated coasts secrets. Coastal cliffs, dunes, stacks, platforms, waterfalls and coastal caves reveal the geological history and active coastal processes. Experiential values are reasonably high, with the predominant modification resting in pastoral grazing activities.

This exposed and rugged coastline, indented by the three large harbours of Raglan, Aotea and Kawhia expresses a range of experiential characteristics. Much of the coastline is inaccessible, however it is the harbours where most activity occurs. These harbours contain the West Coast's three largest towns, Raglan, Aotea and Kawhia and are often regarded as holiday destinations, although a number of people permanently reside here. The harbours are the focus of the numerous watercourses that drain the surrounding undulating catchments, and are often sheltered which is ideal for access to the water.



Summary of Level 2 Marine & Terrestrial Values			
Degree of Natural Character	Natural Character Attributes		
	Abiotic	Biotic	Experiential
Very High			
High	✓	✓	
Moderate to High			✓
Moderate			
Moderate to Low			
Low			
Very Low			
Overall Natural Character Rating			High

Above: The small coastal settlement of Marokopa on the Marokopa River

