

Whāngārei Harbour Water Quality Improvement Strategy

SUMMARY





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Prepared by Northland Regional Council and Whāngārei District Council

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WHANGAREI
DISTRICT COUNCIL



NORTHLAND
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INTRODUCTION

Northland Regional Council and Whāngārei District Council are working together to improve water quality in the Whāngārei Harbour. Together we've created a joint strategy – a blueprint if you like – for how we intend to do this.

The Whāngārei Harbour Water Quality Improvement Strategy looks at what we know – the problem contaminants, the effects that they are having on water quality, and where they are coming from – and what we can do to improve things.

Improving the quality of water in the harbour is a key priority for both councils. For Whāngārei District Council the strategy is a way to align our infrastructure, land use and development planning with clear management objectives (community desired outcomes) for the harbour.

For Northland Regional Council improving water quality in the harbour is a key priority of Waiora Northland Water – an important project that brings together all aspects of the regional council's responsibilities for managing Northland's water quality and quantity. Not only is improving water quality a legislative requirement – through the National Policy Statement for Freshwater Management 2011 and the New Zealand Coastal Policy Statement 2010 – it's what the regional council is all about!

What is the Whāngārei Harbour Water Quality Improvement Strategy?

- It describes the current state of water quality in the harbour;
- It identifies important water quality-related uses and values of the harbour;
- It looks at the way water quality impacts on these uses and values;
- It proposes several water quality objectives for the harbour based on what we have heard from the community; and
- It looks at what we need to do to achieve those objectives.

The strategy should be considered as a statement of intent of both councils to enhance the management of harbour water quality. Central to this going forward is collaborating with the community, stakeholders, and iwi and hapū. This document is a summary of the strategy.



BACKGROUND

Whāngārei Harbour

The harbour is a barrier-enclosed lagoon (lower harbour) and drowned river valley (upper harbour) estuarine system located on the south-east coast of Northland. It is in the middle of the Whāngārei district, both physically and culturally, and it has great economic and environmental importance to Northland.

The harbour is approximately 105 square kilometres in size and is relatively shallow with an average high tide depth of 4.4 metres due to extensive intertidal flats. At low tide water covers approximately 55 square kilometres.

There are different environment types (habitats) within the harbour including mangroves, saltmarsh, seagrass, intertidal flats, subtidal channels, rocky reefs and sand banks.

The harbour can be understood in three distinct areas:

- The upper harbour – the area west of Matakoho/Limestone Island which includes the northern Hātea River arm and the southern Mangapai arm. These areas are sheltered and have low flushing rates, that is, it takes longer for water to leave this area compared to other parts of the harbour. The upper harbour receives approximately 70 percent of the catchment run-off and has been substantially in-filled with sediment.
- The middle harbour – the area east of Matakoho/Limestone Island to a line between Manganese Point and One Tree Point.
- The lower harbour – the area east of the line between Manganese Point and One Tree Point to the harbour entrance. On average the lower harbour flushes out every tidal cycle.

The following map shows these areas and the extent of the harbour catchment.

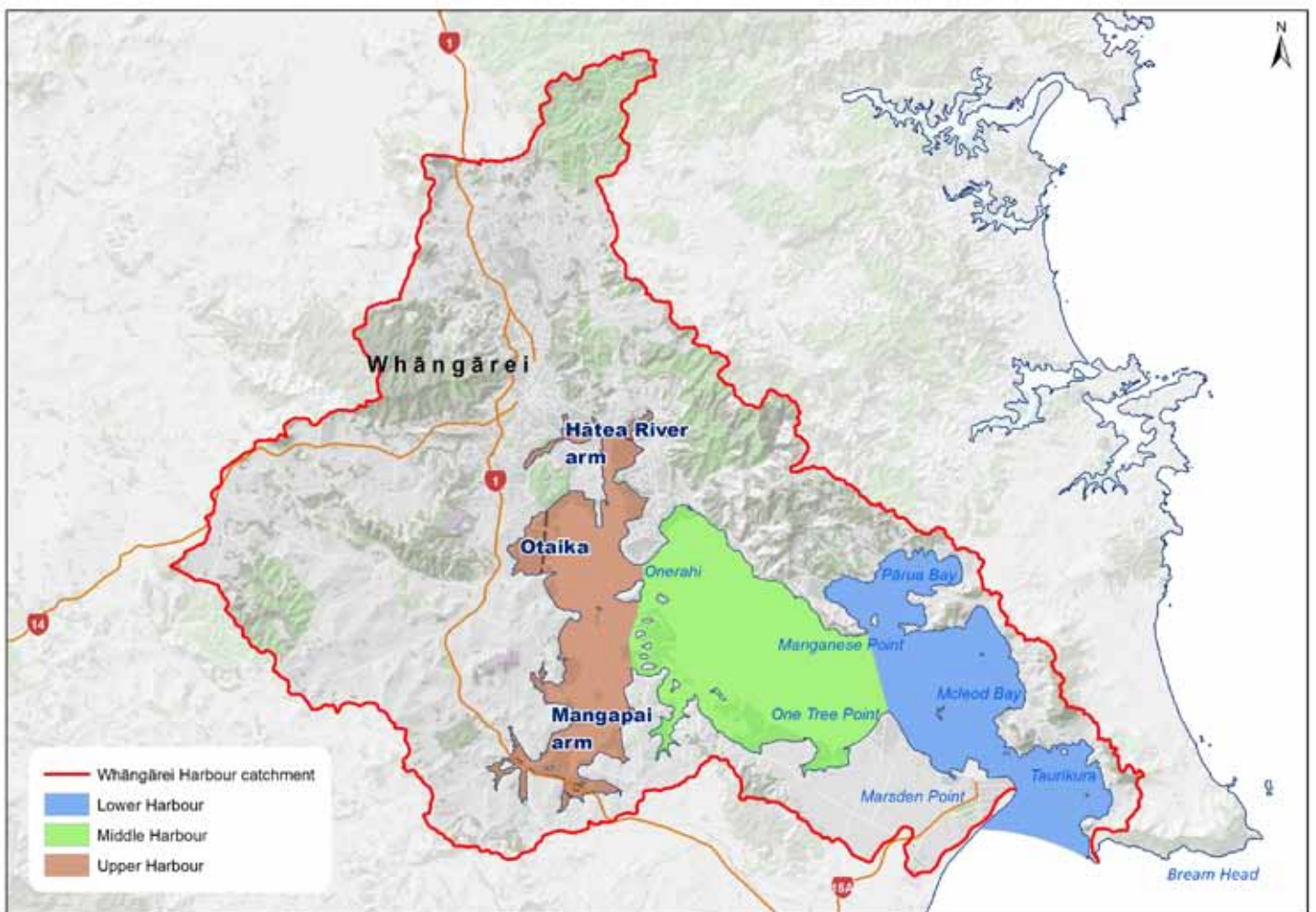


Figure 1: Parts of Whāngārei Harbour

The Whāngārei Harbour catchment is approximately 300 square kilometres in size and is comprised of a number of sub-catchments. The harbour catchment has undergone a lot of change since humans started living in the area around 700 years ago. Prior to the arrival of people the catchment was covered in indigenous forest and shrub and had extensive wetlands. Deforestation began with early Māori and increased substantially from the mid-1800s

with the arrival of Europeans. Catchment deforestation and conversion for pastoral agriculture was largely completed prior to the 1920s. Today, native forest covers around 20 percent of the harbour catchment.

The harbour catchment, its sub-catchments and current land uses are shown in the following figure.

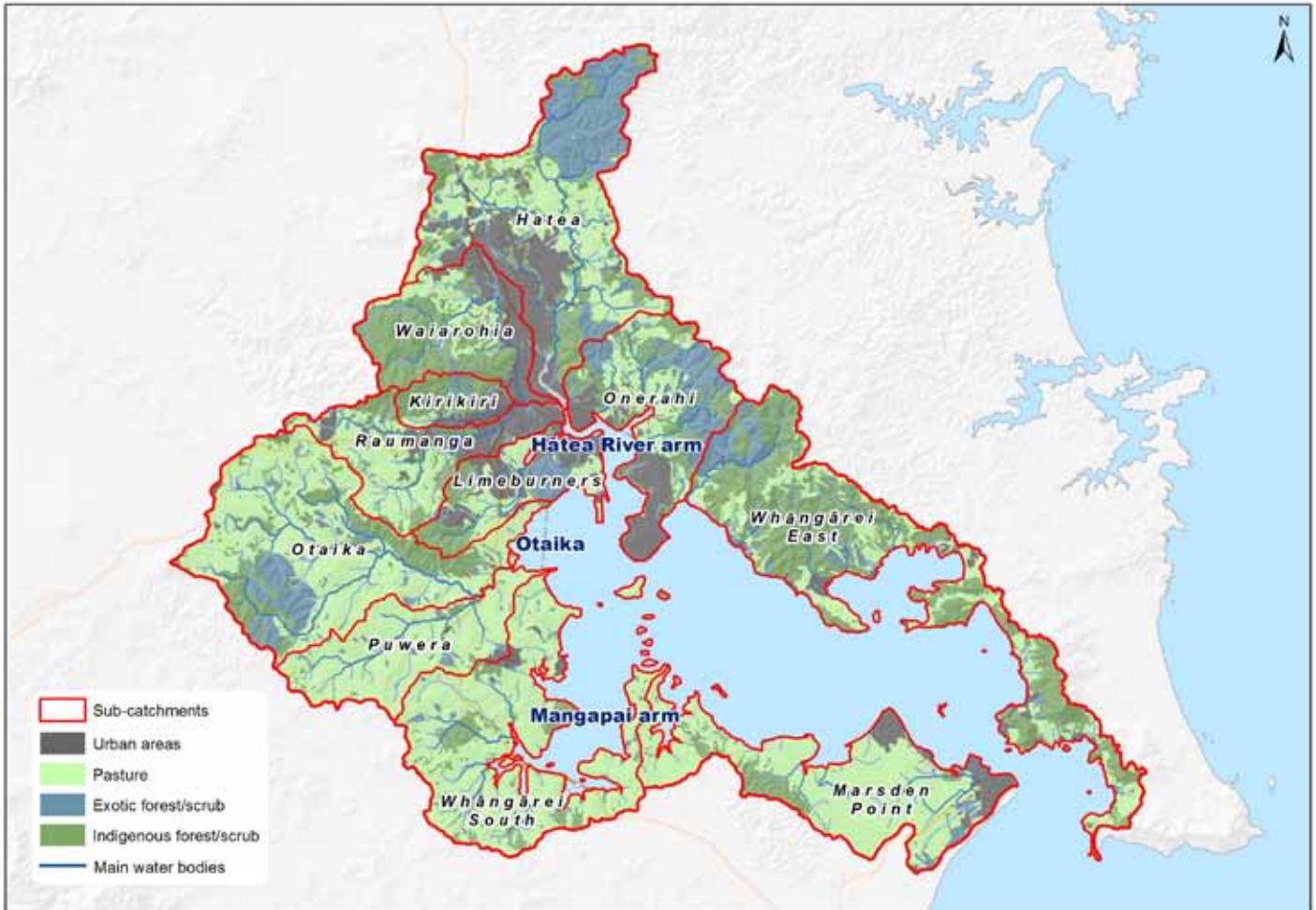


Figure 2: The catchment and sub-catchments of the Whāngārei Harbour

Approximately 52,000 people now live in the catchment, with the majority residing in Whāngārei city. However, there are also pockets of development around the middle and lower harbour. Development has of course impacted on the harbour, both in the form of physical change – through structures like adjoining roads, wharves, and seawalls – reclamation and dredging, and in the quality of the water, as a result of catchment run-off from land uses and direct discharges.

Water quality concerns are the focus of the Whāngārei Harbour Water Quality Improvement Strategy.

Water quality is affected by a wide range of things – there are many sources of contamination, contaminants can interact in complex ways, and there are a variety of ways that they can get into the water.

Improving water quality is also difficult in the short-term because:

- Many impacts are the result of historical changes in land use and vegetation cover that take years to fix. For example, levels of sediment and sediment quality in the harbour reflect the cumulative impact of many years of land uses and discharges;
- Improvement efforts often involve significant costs; and
- There's a 'lag-time' between when you make changes and when you see any improvement.

Uses and values of the Whāngārei Harbour

The Whāngārei Harbour is valued for many reasons. Of particular significance are its natural and ecological values which underpin our cultural and economic identities. For example, the harbour provides kaimoana (seafood) and is an important nursery and feeding ground for commercial fish species.

Its natural and ecological values are also important in their own right. The harbour is ranked second of Northland's estuarine areas for its ecological values and is one of the 10 most important harbours in New Zealand for shorebirds, including at least 12

threatened or at risk species and many migrant bird species.

Estuaries can be considered as having two main ecological zones: shallow margins (intertidal areas) and deeper central channels (sub-tidal areas). Typical unmodified estuarine intertidal areas are made up of saltmarsh, mangroves, seagrass, and soft sand and mudflats (see Figure 3 below). These habitat types are very important components of the harbour ecosystem because they support a diversity and abundance of marine animals, snails, shellfish and other marine invertebrates, which in turn support larger species such as fish and birds.

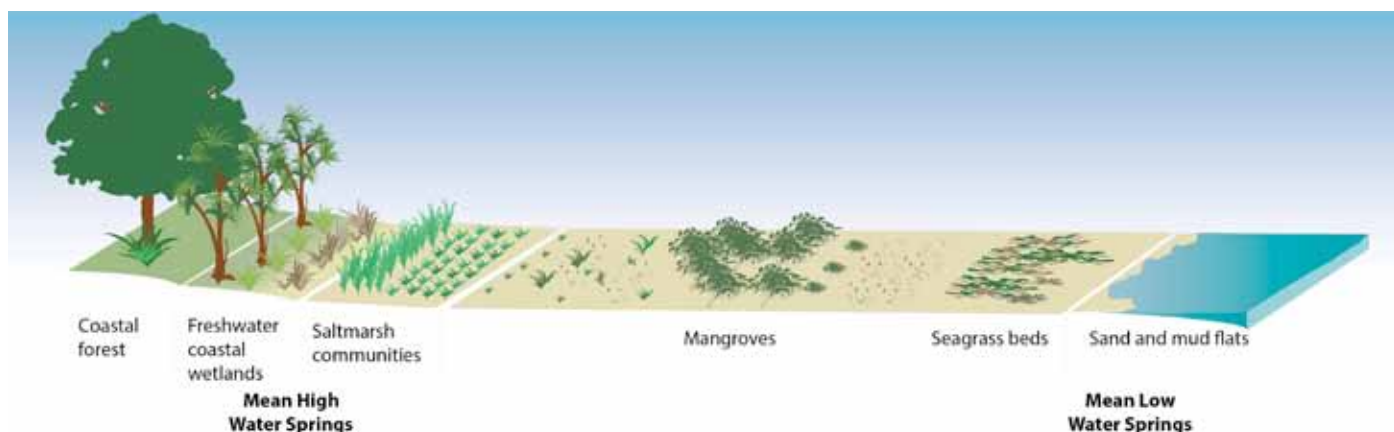


Figure 3: Diagram of an estuarine habitat sequence

Other habitats in the harbour include sub-tidal sandy and muddy areas, sandy reefs, and some limited rocky reefs. The following

map shows the understood locations and extent of key habitats in the harbour.

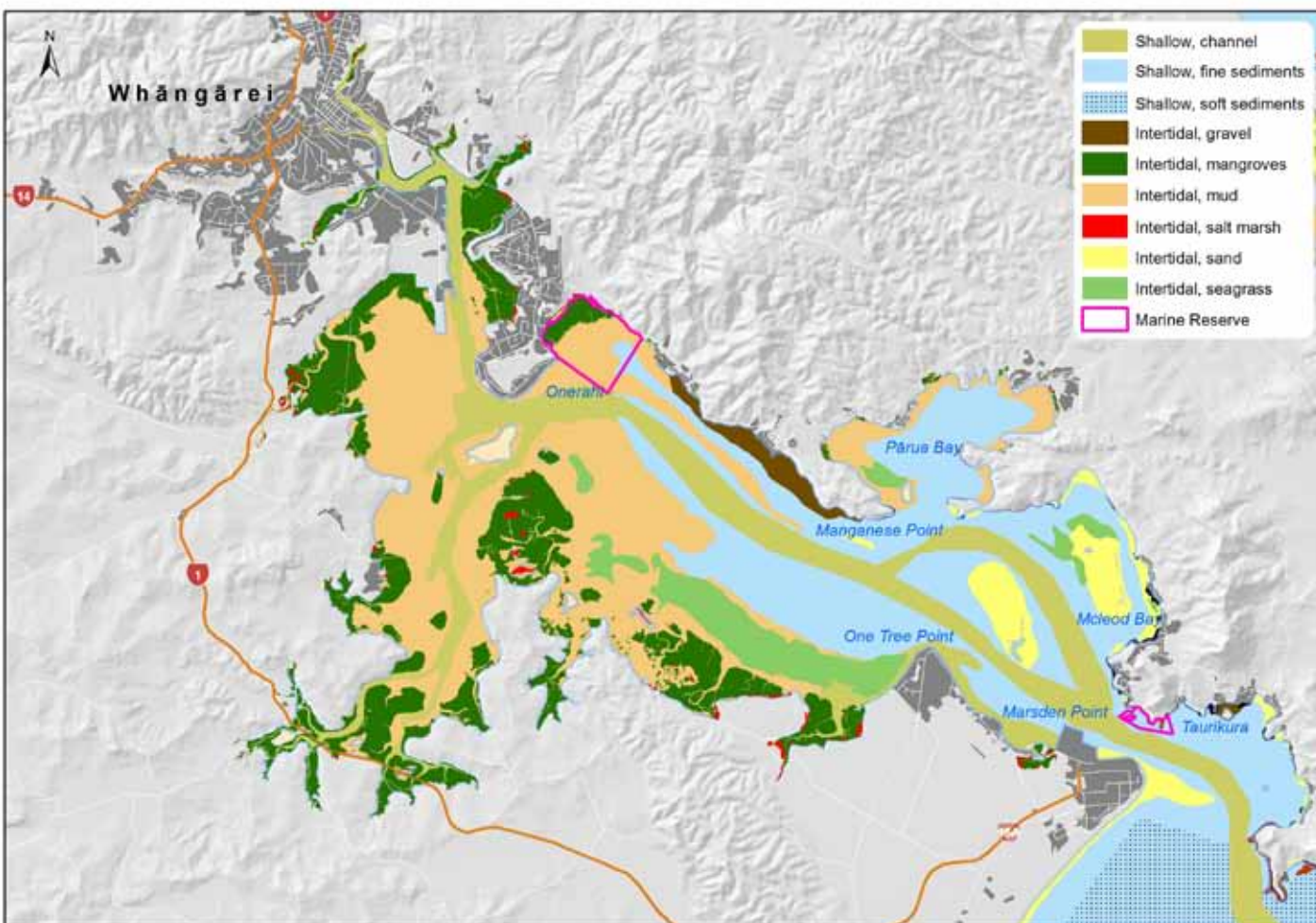


Figure 4: Habitats of the Whāngārei Harbour

The harbour is also important for swimming, sailing, waka ama, and other forms of water-based recreation, particularly in the middle and lower parts of the harbour.

It is also valued for other reasons, including as a transport network (for shipping), its strategic location for business and industry (shipyards and marinas), and because ultimately it's where our wastewater and stormwater ends up.

Many of the uses and values of the harbour are reflected in planning documents relating to it, particularly the Regional Coastal Plan which zones areas of the harbour below mean high water springs for certain uses (for example, mooring areas, ports, marine protection, and mixing zones for discharges).

The following map shows the locations of some popular water based activities as well as the location of important industries adjacent to the harbour.

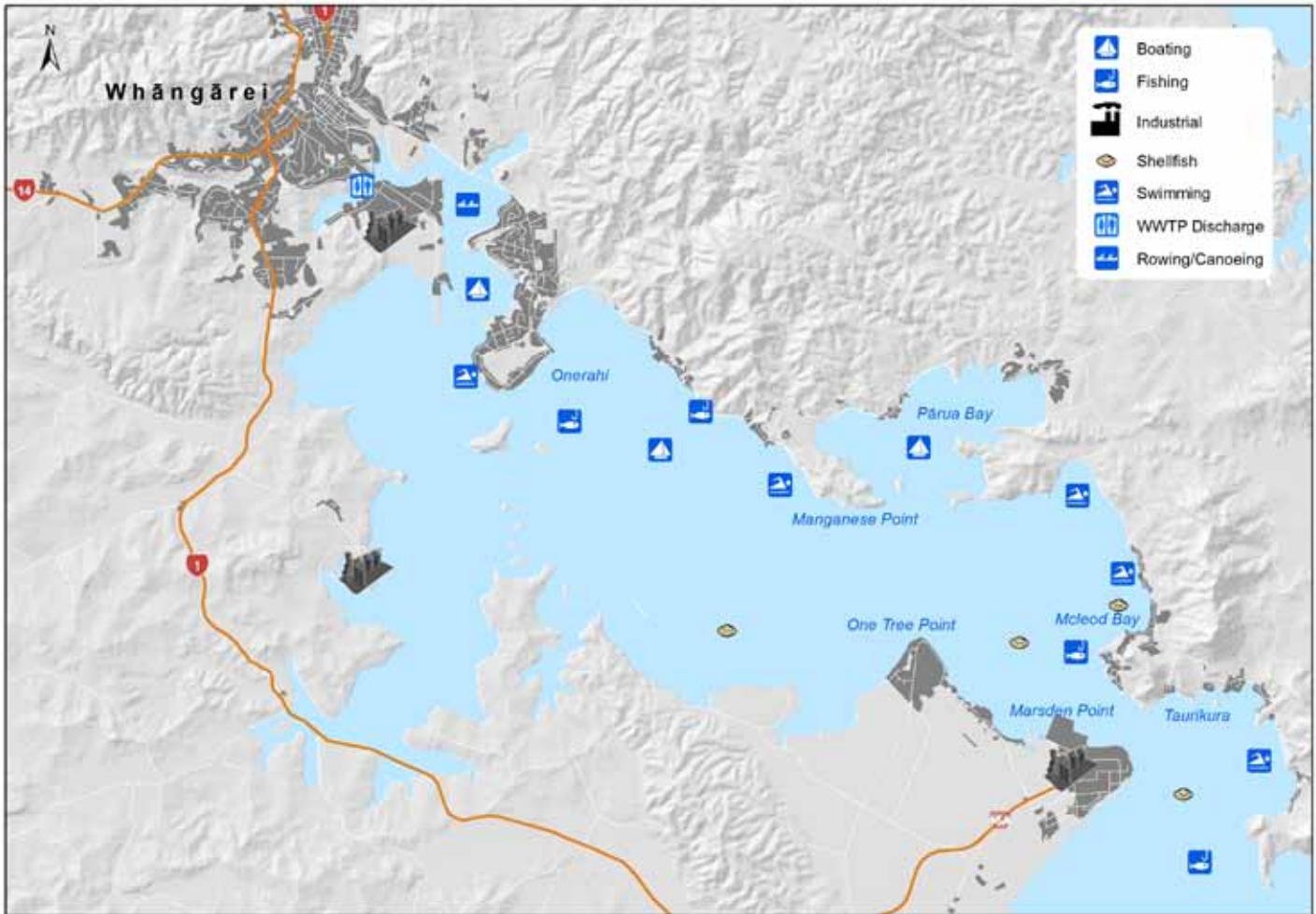


Figure 5: Some important uses of Whāngārei Harbour

Water quality in the Whāngārei Harbour

The ecological health, or integrity, of the harbour ecosystem is related to a number of environmental factors including, but not limited to, the presence of important habitat types (for example, seagrass), key species, the absence of marine pests, hydrodynamics, and good water quality. It is important to note that the relationships between ecosystem health and environmental factors are often complex and unpredictable.

Northland Regional Council undertakes a range of monitoring programmes in the harbour and its catchment, including water quality monitoring, sediment quality monitoring, biological monitoring, and recreational swimming water quality monitoring. Compliance monitoring is also undertaken as part of meeting conditions of resource consents and there have been a large number of one-off studies. The obtained information is able to provide us with a fairly good understanding of the state of water quality in the harbour.

Water in the middle and lower areas of the harbour is generally of a high quality. On the other hand, water in the upper harbour is often degraded to the extent that it impacts on recreation, amenity, and ecological values. This is not surprising as the upper harbour receives approximately 70 percent of the run-off from the harbour catchment as well as wastewater and stormwater discharges from Whāngārei city. It also has much lower flushing rates than the middle and lower harbour.

The contaminants of concern in the upper harbour are elevated levels of sediments (suspended and deposited), nutrients (nitrogen and phosphorus), and to a lesser extent some heavy metals (localised areas only). Bacteriological water quality is also poor at times, particularly after heavy rain. Faecal pathogens (sickness-causing organisms) are not known to affect aquatic species. The following table describes these contaminants and their effects in more detail.

| Contaminant | Impacts | Sources | Situation in the harbour | Trends |
|--|---|--|---|---|
| Suspended sediment | Reduces water clarity (light penetration) and can cause adverse effects on phytoplankton and seagrass. It can also interfere with shellfish and fish. | Diffuse sources: Run-off from land (pasture, forestry, and native forest), stream bed and bank erosion. Point sources: Urban stormwater, earthworks, industrial discharges. | Suspended sediment levels are the highest in the upper harbour and are close to upper guideline levels near freshwater inputs. Levels decline down the harbour. | Levels appear to have remained static (not increased or decreased) over the past five years (2008-2012). Note: generally it takes up to 10-15 years to detect significant trends. |
| Deposited sediment | Elevated sedimentation rates can smother benthic organisms (for example, shellfish, seagrass, and snails) and their habitats. | Diffuse sources: Run-off from land (pasture, forestry, and native forest), stream bed and bank erosion. Point sources: Urban stormwater, earthworks, industrial discharges. | The average sediment accumulation rate in the Whāngārei Harbour is 3.4 mm/year, which is in the mid-range for other measured North Island estuaries. The highest rates are in the upper harbour and on the northern shoreline from Onerahi to Jackson's Bay. (Pre-human rates were likely to have been 0.1-1mm/year.) | Trends are currently being investigated by Northland Regional Council and NIWA. |
| Nutrients (nitrogen and phosphorus) | Nutrients are necessary for life but at elevated levels can cause excessive algal growth (e.g., sea lettuce and phytoplankton) which can reduce water clarity. At high levels some nitrogen compounds can have toxic effects. | Diffuse sources: Pastoral land uses. Point sources: Municipal wastewater and stormwater discharges, farm dairy effluent, septic systems, sewage discharges from boats. | Levels in the upper harbour exceed guideline levels (which means that there is the potential for adverse effects on ecological values), and significantly exceed guideline values in the Hātea arm of the upper harbour. Levels are below guideline levels in the lower and middle harbour. | Levels appear to have remained static (not increased or decreased) over the past five years (2008-2012). Note: generally it takes up to 10-15 years to detect significant trends. |
| Faecal pathogens (some viruses, bacteria and protozoa) | Can cause illnesses such as eye, ear, nose and throat infections, and gastrointestinal disorders. | Diffuse sources: Pastoral land uses, birds. Point sources: Municipal wastewater and stormwater discharges, farm dairy effluent, septic systems, sewage discharges from boats. | Popular swimming sites in the middle and lower harbour are almost always safe to swim at. In the Hātea River arm the risks of getting sick while swimming during dry weather are acceptable (within guidelines), but are often unacceptable during and immediately after heavy rainfall. | Levels appear to have remained static (not increased or decreased) over the 20 years. However, it is expected that with the upgrade of the Whāngārei Wastewater Treatment Plant and ongoing upgrades to the Whāngārei wastewater network there will be a reduction in levels (and in health risks). |
| Heavy metals (copper, zinc, lead) | Elevated levels can have toxic effects on aquatic animals (for example, shellfish, and snails). | Diffuse sources: Catchment geology. Direct discharges: Urban stormwater, some industrial discharges. | Levels of heavy metals are elevated (above natural levels) in the Hātea River arm of the upper harbour, but are all below guideline values. This means that there is only a low risk of adverse biological effects occurring. | Levels of lead, copper, and zinc have decreased over the past 20 years. The removal of lead from fuel, relocation of some industry from city limits, and strengthened controls on some activities are likely reasons for this. |

Table 1: Key contaminants and their effects on the uses and values of the Whāngārei Harbour

The following table provides an initial assessment, based on our monitoring information, of the state of water quality related uses and values of the Whāngārei Harbour.

| | Ecological condition | | | Suitability for recreation and amenity | | | |
|-----------------|-----------------------|---|-------------------------|--|---|---------------------|--------------------|
| | High ecological value | Slightly to moderately disturbed system | Highly disturbed system | Primary contact (swimming) | Secondary contact (for example, waka ama) | Shellfish gathering | Visual |
| Hātea River arm | | | Yes | Much of the of the time except during and after heavy rain | Most of the time | No | Poor water clarity |
| Mangapai arm | | Yes | | Yes | Yes | No | |
| Middle harbour | Yes | | | Yes | Yes | Most of the time | Good clarity |
| Lower harbour | Yes | | | Yes | Yes | Most of the time | Good clarity |

Table 2: State of water quality-related values and uses of the Whāngārei Harbour



HARBOUR WATER QUALITY MANAGEMENT

Overview

Northland Regional Council is responsible, under the Resource Management Act 1991 (RMA), for managing the region's fresh and coastal water resources by controlling discharges and land use activities.

Whāngārei District Council, on the other hand, is responsible, under the Local Government Act 2002 and the Health Act 1956, for the maintenance and provision of public water services, including water supply, stormwater drainage, and wastewater reticulation and treatment. It is also responsible, under the RMA, for managing subdivision and development in the district.

Point source (direct) discharges to the Whāngārei Harbour are controlled under the Regional Coastal Plan for Northland. The plan classifies areas of the harbour for water quality purposes and includes water quality standards for each classification. The classifications are:

- General Quality Standard (CA) – provides for virtually all uses, including shellfish collection, and protection of marine ecosystems.
- Contact Recreation Standard (CB) – provides for contact recreation (but not for marine ecosystems).

Two mixing zones for major discharges are also identified (for the discharge from the Whāngārei wastewater treatment plant and stormwater from Marsden Point Refinery). (Mixing zones are a mechanism in law (the Resource Management Act) that allows for discharges to benefit from mixing/dilution before meeting certain standards.) The classifications are shown below.

Direct discharges to land and fresh water in the harbour catchment are controlled separately under the Regional Water and Soil Plan for Northland.

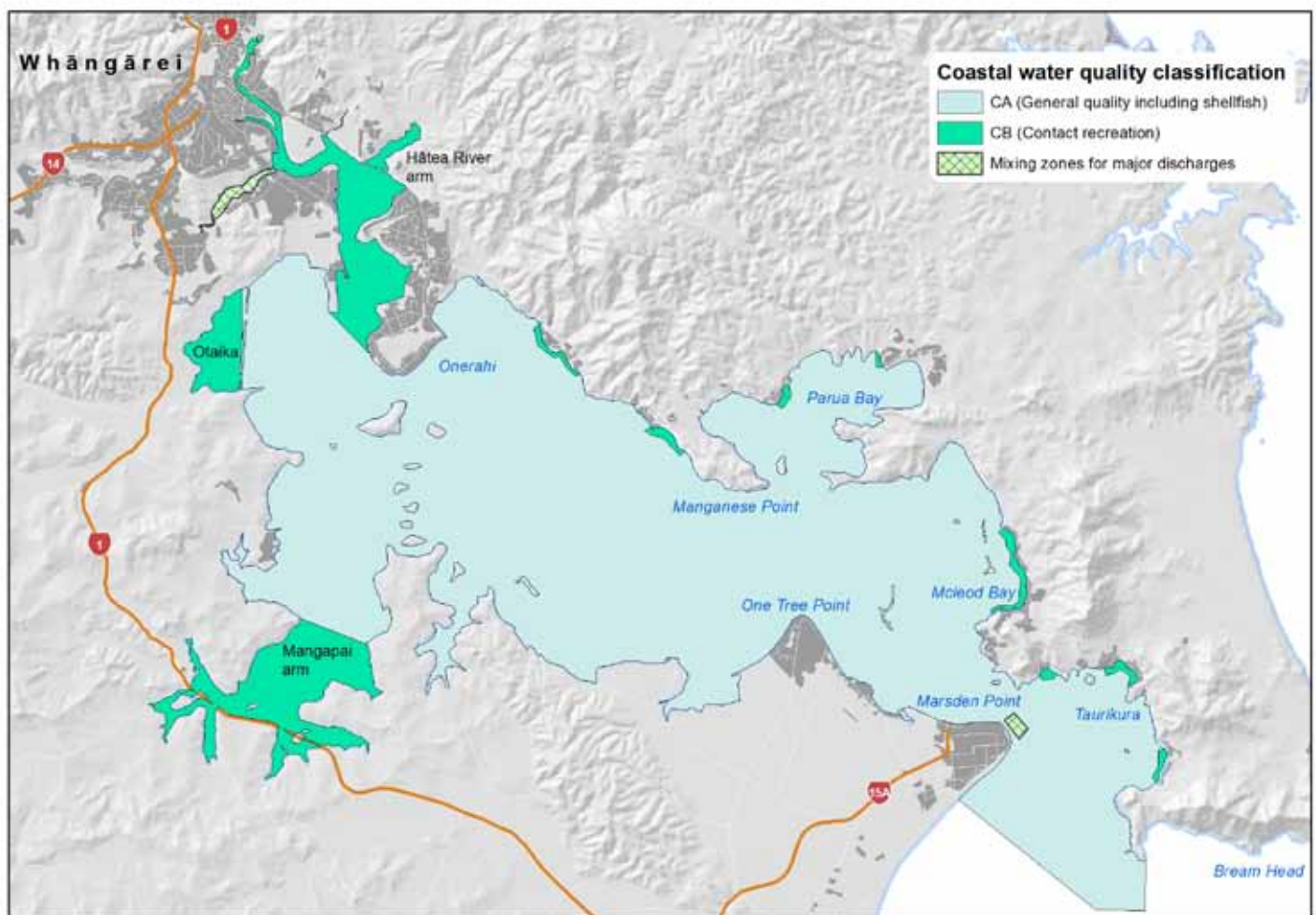


Figure 6: Regional Coastal Plan classifications for Whāngārei Harbour

Sources of contamination

Contaminants enter the harbour from point source (direct) and non-point source (diffuse) discharges. Direct discharges are sources of contaminants that discharge from discrete points or identifiable localised areas. These include discharges from municipal stormwater and wastewater reticulation and treatment infrastructure, industrial discharges, and farm dairy effluent.

Diffuse discharges on the other hand typically arise from land use activities that are spread across a catchment, and they enter the harbour via run-off to streams and rivers and sub-surface drainage. Diffuse source discharges include run-off from agricultural land and plantation forestry, stock access to water bodies, and stormwater run-off from areas that are not reticulated, including roads and driveways.

Management gaps and areas for improvement

Direct discharges

While considerable effort has been spent on improving the quality of water in the harbour, there is still a way to go in terms of upgrading wastewater infrastructure. The Whāngārei District Council is committed to upgrading wastewater infrastructure – as outlined in its Wastewater Strategy.

More attention is also needed on some parts of the Whāngārei urban stormwater network, particularly in critical source areas (areas that generate high yields of contaminants).

There are a number of discharges from both the Whāngārei wastewater and stormwater reticulation networks that require authorisation (by regional plan rules or resource consents). With regard to stormwater discharges, intervention in the form of additional treatment may mean that permitted activity standards can be met.

Diffuse discharges

Managing diffuse discharges is challenging compared to managing direct discharges. This due to difficulties around measuring diffuse source contaminant loads and often individual sources (for example, a discrete piece of land) are only responsible for a small fraction of the total contaminant load entering the harbour. There are also technical and political challenges associated with regulating land use activities for water quality purposes.

Integrated management

Integrating the management of land, freshwater, and harbour water is critical to maintaining and improving fresh and coastal water quality over time. Broadly speaking, integrated catchment management involves managing land use and development and discharges taking into account their impacts on the wider health of the harbour and its catchment.

Northland Regional Council intends to put in place an integrated catchment management framework for the Whāngārei Harbour catchment. This is identified in its Waioara Northland Water programme, which sets out the regional council's approach to implementing the National Policy Statement for Freshwater Management 2011. The integrated catchment management framework will involve catchment-specific objectives and associated water quality and quantity limits which will be collaboratively determined with the community, stakeholders, and iwi and hapū.

To do this we need to understand the desired environmental outcomes (management objectives) for the harbour in order to inform the establishment of catchment-specific objectives. We also need to better understand and quantify sources and loads of key contaminants in the Whāngārei Harbour catchment and its sub-catchments.

We also need to better integrate our regional planning framework. Coastal water quality classifications and water quality standards have been put in place by Northland Regional Council to manage direct discharges to the harbour. However, they do not apply to direct or diffuse discharges to land or fresh water in the harbour catchment. This is a weakness of the current regional planning framework because the Regional Coastal Plan only has partial influence over ensuring that coastal water quality classifications and standards can be met.

Another weakness of the coastal water classification system is that the contact recreation standard is only concerned with the effects of water quality on human health. It does not provide for safeguarding ecological values in Hātea River arm, the Mangapai arm, and the confluence of the Otaika River and the upper harbour.

IMPROVING HARBOUR WATER QUALITY

Proposed harbour water quality objectives

We have proposed three water quality objectives for the harbour (see below). These are based on what we have heard from the community over the past number of years and our understanding that contaminant load reductions will occur as a result of recent and planned future actions of both councils to improve water quality in the harbour and its contributing catchments.

Actions include significant upgrades of the Whāngārei wastewater reticulation network and treatment plant and Northland Regional Council's commitment to promoting and supporting good management practices in primary production activities in the catchment.

- 1. Within 10-15 years sedimentation rates and nutrient levels have reduced in the Mangapai arm of the upper harbour, and within 30 years they have significantly reduced, so that its ecological condition is enhanced.*
- 2. Within 10-15 years faecal pathogen, turbidity, and nutrient levels have reduced in the Hātea arm of the upper harbour, and within 30 years they have significantly reduced, so that it becomes more accessible to a wide range of water-related activities and its impact on the ecological condition of the rest of the harbour is lessened.*
- 3. Good water quality in the middle and lower harbour is maintained for its ecological condition and high recreational, cultural, and economic uses and values.*

The proposed objectives are also intended to inform the establishment of catchment-specific objectives and water quality and quantity limits for the harbour catchment, which once finalised will be included in the Regional Water and Soil Plan (or other relevant regional plan).

The objectives are structured in a way that acknowledges that improvements in water quality will take time and that there are often lags in ecosystem response.

It is important to note that the proposed objectives do not have any legal weight. They are however consistent with water management objectives in the operative and proposed regional policy statements for Northland and in the operative Regional Coastal Plan.

We expect that the proposed objectives will be refined or even changed as information on current contaminant loads and load reductions are agreed, and as a consequence of community and stakeholder collaborative input.

Current and future management actions of both councils

The following table shows what both the regional and district councils are currently doing, and plan to do, to improve water quality in the harbour and its sub-catchments. We believe these actions contribute to achieving the proposed water quality objectives for the harbour.

(More detailed information on the actions is contained in the Whāngārei Harbour Water Quality Improvement Strategy which is available by request from the Northland Regional Council and Whāngārei District Council and online at www.nrc.govt.nz/xxx.)





| | On-going | |
|--|--|--|
| Enforcement of and compliance with current regulation | <p>Monitor and enforce regulatory controls on point and diffuse sources of contamination (Action 1, NRC and WDC).</p> <p>Ensure that discharges of wastewater and stormwater from Whāngārei District Council infrastructure comply with Section 15(1) of the Resource Management Act and conditions of resource consents (Action 2, WDC).</p> | |
| Undertaking, promoting, and supporting good/best management practices | <p>Continue to implement the Whāngārei District Council Wastewater Strategy (Action 6, WDC).</p> <p>Continue to review and update stormwater catchment management plans for all urban stormwater networks in the Whāngārei Harbour Catchment (Action 7, WDC).</p> <p>Work with landowners and land managers (including Whāngārei District Council managers of parks and reserves, roads, and stormwater) in the Whāngārei Harbour sub-catchments to:</p> <ul style="list-style-type: none"> •Reduce loss of sediment, nutrients, and faecal matter from land (Action 9, NRC); •Trap and store sediment, nutrients, and faecal matter that is transported off-site (Action 10, NRC); and •Manage streamside environments to enhance water quality and aquatic ecosystems (Action 11). <p>Promote the Northland Forestry Guidelines (Action 12, NRC).</p> | |
| Other non-regulatory actions | <p>Support community groups undertaking restoration and enhancement initiatives (Action 14, NRC and WDC).</p> <p>Inform visiting boat owners about illegal discharges of sewage to the Whāngārei Harbour (Action 15, NRC).</p> <p>Promote the uses and values of Whāngārei Harbour and its sub-catchments (Action 16, NRC and WDC).</p> | |
| Monitoring and research | <p>Continue current monitoring and research programmes in the Whāngārei Harbour and amend or expand them as necessary (Action 17, NRC).</p> <p>Map the extent and distribution of seagrass in the Whāngārei Harbour every 5 years (Action 20, NRC).</p> | |
| Improving the regulatory framework | | |

Table 3: An overview of the actions of both councils for improving the quality of water in the Whāngārei Harbour

| Short-term (0-3 years) | Medium-term (4-6 years) | Long-term (7years+) |
|---|--|---|
| <p>Obtain resource consent(s) to authorise wet weather overflows from the Whāngārei wastewater network in accordance with Regional Water and Soil Plan and Regional Coastal Plan (Action 3, WDC) *See related Action 5 below.</p> <p>Assess the level of compliance for the discharge of stormwater to the Whāngārei Harbour and contributing freshwater bodies. Where these do not comply with the Regional Water and Soil Plan or Regional Coastal Plan either obtain resource consents or undertake works to meet permitted activity standards (Action 4, WDC).</p> | | |
| <p>Implement and review a programme to reduce the frequency and volumes of wet weather overflows from the Whāngārei wastewater network (Action 5, WDC).</p> <p>Investigate and implement mitigation and/or remediation measures for preventing and treating stormwater contamination (Action 8, WDC).</p> | <p>Implement and review a programme to reduce the frequency and volumes of wet weather overflows from the Whāngārei wastewater network (Action 5, WDC).</p> <p>Investigate and implement mitigation and/or remediation measures for preventing and treating stormwater contamination (Action 8, WDC).</p> | <p>Implement and review a programme to reduce the frequency and volumes of wet weather overflows from the Whāngārei wastewater network (Action 5, WDC).</p> <p>Investigate and implement mitigation and/or remediation measures for preventing and treating stormwater contamination (Action 8, WDC).</p> |
| <p>Develop and implement a targeted riparian and steep land re-vegetation programme for the upper Whāngārei Harbour sub-catchments in urban and rural environments (Action 13, NRC and WDC).</p> | <p>Implement a targeted riparian and steep land re-vegetation programme for the upper Whāngārei Harbour sub-catchments in urban and rural environments (Action 13, NRC and WDC).</p> | <p>Implement a targeted riparian and steep land re-vegetation programme for the upper Whāngārei Harbour sub-catchments in urban and rural environments (Action 13, NRC and WDC).</p> |
| <p>Quantify loads of sediment, nutrients, heavy metals, and faecal pathogens from the upper Whāngārei Harbour sub-catchments and direct and diffuse sources (Action 18, NRC and WDC).</p> | <p>Assess progress towards achieving Whāngārei Harbour water quality objectives and catchment-specific objectives (Action 19, NRC).</p> <p>Investigate and support community monitoring programmes for the Whāngārei Harbour and its sub-catchments (Action 21, NRC and WDC).</p> | <p>Assess progress towards achieving Whāngārei Harbour water quality objectives and catchment-specific objectives (Action 19, NRC).</p> <p>Investigate and support community monitoring programmes for the Whāngārei Harbour and its sub-catchments (Action 21, NRC and WDC).</p> |
| <p>Form a Whāngārei Harbour and Catchment Advisory Group to confirm/amend the proposed water quality objectives for the Whāngārei Harbour and establish catchment-specific objectives for the Whāngārei Harbour catchment/sub-catchments (Action 22, NRC).</p> <p>Translate catchment-specific objectives into water quality limits and targets (Action 23, NRC).</p> <p>Assess the need to amend current policies and rules and/or develop new policies and rules to manage direct and diffuse source discharges to achieve catchment-specific objectives and Whāngārei i Harbour water quality objectives (Action 24, NRC).</p> | <p>Include catchment-specific objectives, water quality limits, and targets in the Regional Water and Soil Plan (Action 25, NRC).</p> <p>Change the Regional Water and Soil Plan to strengthen controls on diffuse source activities, and include any other new and/or amended policies and rules (Action 26, NRC).</p> <p>Include Whāngārei Harbour water quality objectives and any associated limits or targets in the Regional Coastal Plan, as well as any new or amended policies or rules (Action 27, NRC).</p> <p>Assess the need for and, if required, develop an onsite wastewater bylaw (Action 28, WDC).</p> | <p>Review and, where necessary, change conditions of coastal permits and discharge permits to align them with water quality limits and targets (Action 29, NRC).</p> |

(WDC = Whāngārei District Council; NRC = Northland Regional Council)



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