



Ministry for the
Environment
Manatū Mō Te Taiao

Valuing New Zealand's Clean Green Image

The Ministry for the Environment commissioned PA Consultants to carry out this study (funded by the Contestable Research Fund of the Ministry of Research, Science and Technology) to provide an estimate of the value for New Zealand's export trade of our clean green image.

There is considerable discussion about New Zealand's clean green image, but relatively little solid information about its value. This was clear from an earlier study which the Ministry commissioned through the Sustainable Management Fund, *Green Market Signals*, published in 1999. The current study is, in part, a response to the suggestions received from industry groups and others at that time.

The aim of this current study is to quantify the extent to which particular New Zealand exports benefit from positive perceptions about our environment. The project focuses on three export sectors: dairy, inbound tourism, and organic produce. It assesses the potential consumer reaction to an illustrative decline in New Zealand's cleanness and greenness.

The empirical work done in this study reinforces the qualitative evidence that our clean green image is valuable, and provides some useful insights into the size and nature of that value. The results are of course not definitive – no contingent valuation study can ever be so – but they do strongly indicate a significant vulnerability of export value (through reduction in product quantities likely to be purchased by consumers) in the event of a (hypothetical) degradation of New Zealand's environment.

While the research's approach and findings have been robustly peer reviewed, like all empirical economic estimates, the conclusions rest on assumptions and a specific methodology. That said, the study certainly provides food for thought. Main findings are as follows:

- New Zealand's clean green image does have a value. Environmental image is a substantial driver of the value New Zealand can derive for goods and services in the international market place.
- The study suggests this image is worth at least hundreds of millions, possibly billions, of dollars – aggregating value elements from dairy, tourism, and organic produce, and extrapolating to other sectors such as meat.
- New Zealand is relatively clean and green. This is mainly attributable to our low population density resulting in relatively benign environmental pressures.
- However, there are environmental problems that are sufficient to raise questions about the sustainability of the value of New Zealand's exports attributable to its environmental image. There is a risk that New Zealand will lose value that is created by the current environmental image if we are not vigilant in dealing with the problems that could threaten the image.

If you would like to discuss this report further, please contact Dr Ralph Chapman, Manager of the Strategic Policy Group, Ministry for the Environment, at (04) 917 7444 or email him at ralph.chapman@mfe.govt.nz.

APPENDIX C: ENVIRONMENTAL DATA

C.1 ENVIRONMENTAL INDICATORS

The indicators proposed by the Ministry for implementation under the Environmental Indicators Programme are listed below.

C.1.1 Air indicators

Stage 1	Particulate matter (PM ₁₀) Carbon monoxide (CO) Sulphur dioxide (SO ₂) Nitrogen dioxide (NO ₂) Ground level Ozone (O ₃)
Stage 2	Benzene Particulate matter (PM _{2.5}) Lichen diversity/coverage Visibility

C.1.2 Fresh water indicators

Stage 1	Dissolved oxygen Ammonia Temperature Clarity Trophic State Index (TSI) % population with good water supply Periphyton (effects of slime on bathing)
Stage 2	Occurrence of native fish, Giant Kokopu, Red Finned Bully Macroinvertebrates (insects in rivers) Periphyton (effects of slime in rivers) Riparian condition Wetland condition and extent Groundwater – nitrates, abstraction quality Water abstraction

C.1.3 Land Indicators

Stage 1	Changes in areas susceptible to hill country erosion % change in area of slip at selected sites
Stage 2	Change in areas susceptible to high country degradation Change in area susceptible to agricultural impacts Acidity or alkalinity of soil Organic matter Change in area susceptible to reduction in soil health Bulk density of soil pH soil test Organic carbon

C.1.4 Climate change indicators

Stage 1	Total emissions (global warming potential) per sector per year Background levels of greenhouse gases (CO ₂ , CH ₄ and N ₂ O) Monthly average New Zealand temperature
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C.1.5 Ozone indicators

Stage 1	Spectroradiometer UV measurements Dobson spectrophotometer ozone readings Minimum ozone over Antarctica The size of the Antarctic ozone hole Tropospheric concentration of total active chlorine New Zealand's consumption of ozone-depleting substances
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C.1.6 Waste indicators

a. Solid waste

Stage 1	Quantity of waste disposed to landfill and cleanfill from each region Composition of waste disposed to landfill in Waste Analysis Protocol categories Quantity of waste recycled Public access to solid waste resource recovery (recycling) facilities
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b. Liquid waste

Stage 1	Stock density
Stage 2	Nutrient loading to land and water Quantity of major discharges to water (biological oxygen demand) Stock effluent equivalent of total nitrogen

c. Hazardous waste

Stage 1	Quantity of hazardous wastes accepted at: landfills, hazardous or wastewater treatment facilities, exported (interim indicator using existing information collection systems) Quantity of priority hazardous waste generated and stored: physically hauled away, discharged on site, (interim indicator using existing information collection systems)
Stage 2	Quantity of hazardous waste accepted at: landfills, hazardous or wastewater treatment facilities, exported (under national information collection systems) Quantity of priority hazardous waste generated and stored, physically hauled away, discharged on site as required by regulation

C.1.7 Hazardous substances indicators (proposed)

Stage 1	The number of incidents reported The number of new substances registered under HSNO The number of substances deregistered under HSNO The number and quantities of very toxic and ecotoxic hazardous substances: Produced, Imported, Exported
Stage 2	The number of incidents which fall into the following categories: Major, Minor

C.1.8 Contaminated sites indicators

Stage 1	The number of sites that fall into the following categories <ul style="list-style-type: none"> • confirmed contaminated • remediated
Stage 2	The number of sites that fall into the following categories: <ul style="list-style-type: none"> • under investigation moderate to low risk sites • under investigation high risk sites • confirmed contaminated moderate to low-risk sites • confirmed contaminated high risk sites • remediated sites

C.1.9 Toxic contaminants indicators

Stage 1	Toxic contaminants in meat (proposed) Toxic contaminants in human milk (proposed)
Stage 2	Benzene in air Nitrates in groundwater Toxic contaminants in fresh water eels (proposed)

C.1.10 Marine indicators

Stage 1	<p>Confirmed marine spills by type, source and location</p> <p>% monitored beaches complying with the guideline median for marine recreation or shellfish gathering</p> <p>% season beaches or coastal areas were not suitable for contact recreation or shellfish gathering</p> <p>Quantity and category of litter per unit area in the strand-zone of beached</p> <p>% of New Zealand coastline in public ownership</p> <p>Number of different non-fish and protected species caught by species, per fishery, by area, by year</p> <p>Ratio of current biomass to target biomass for modelled fish stocks</p> <p>Percentage of fish stocks modelled that are at or above target level</p> <p>Number of assessed fish stocks about which stock status is known or unknown</p> <p>Level of total catch for each fish stock species by area</p> <p>Ratio of total catch to sustainable yield for modelled fish stocks</p> <p>Current Total Allowable Catch for each fish stock</p> <p>Ratio of Total Allowable Catch to sustainable yield for modelled fish stocks</p> <p>% fish stocks with current biomass below target where rebuilding strategies are in place</p>
Stage 2	<p>Level of fishing effort by method, by area, by year (or season)</p> <p>number non-assessed species (harvested or associated/dependant) of high, medium, low or unknown value with the percentage of associated/dependant species that are fully or partially protected</p> <p>Frequency, location, and species of toxic and non-toxic algae blooms</p> <p>Number of taxa in IUCN and NZ threat categories</p> <p>Abundance and distribution of adventive marine species</p> <p>Change in catchment land use for estuaries, embayments or open coast areas</p> <p>Change in sediment for selected estuaries, embayments or open coast areas</p> <p>Change in catchment land use for estuaries susceptible to eutrophication</p> <p>Chlorophyll 'a' concentrations or Trophic Index for selected estuaries</p> <p>Toxic and ecotoxic contaminants in shellfish at selected monitoring sites</p> <p>Extent of selected marine habitats, ecosystems and environments</p> <p>Biodiversity condition of selected marine habitats and communities</p> <p>% area of each of New Zealand's different marine environments, ecosystems and habitats under protection</p> <p>Area of New Zealand coastline by region with: legally; physically; unrestricted public access</p> <p>% of coastal environment in each category of natural character</p> <p>Change in area of habitats covered by marine farms</p>

C.1.11 Biodiversity indicators

Stage 1	<p>Change in the extent of each land cover class</p> <p>% area of each of New Zealand's different environments, ecosystems and habitats under protection</p> <p>The number and percentage of extinct species in selected taxonomic groups</p> <p>The number of taxa in IUCN and NZ threat categories</p>
Stage 2	<p>The genetic diversity of valued introduced species</p> <p>Change in gross habitat fragmentation of indigenous vegetation cover</p> <p>Change in the abundance and distribution of selected animal pests</p> <p>Change in the abundance and distribution of selected weeds</p> <p>Change in the extent of each land use pressure on biodiversity</p> <p>The biodiversity condition of selected ecosystems and habitats compared with historic and current baselines</p> <p>The evolutionary diversity remaining in selected taxonomic groups (first group, birds) compared to historic and current baselines</p> <p>The extent of selected freshwater ecosystems (wetlands, lakes, rivers, karst and geothermal) compared with historic and current baselines</p>

C.1.12 Transport indicators

Stage 1	<p>Vehicle fleet composition</p> <p>Usual mode of journey to work</p> <p>Total vehicle-kms for road vehicles per year</p>
Stage 2	<p>Road congestion</p> <p>Percentage of main arterial roads with active water treatment</p>

C.1.13 Energy indicators (proposed)

Stage 1	<p>Total primary energy supply (TPES), by energy type per year</p> <p>Total consumer energy (TCE), by energy type by sector per year</p> <p>TCE/TPES as a percentage per year</p>
Stage 2	<p>Non-renewable primary energy supply as a proportion of TPES</p> <p>National average efficiency of thermal electricity generation, including co-generation (MWh/PJ)</p> <p>Avoidable spillage in the hydro-electricity system (GWh) per year</p> <p>Transport sector energy use per vehicle km travelled per year (PJ/VKT)</p> <p>Commercial sector energy use per employee per year (GJ/employee)</p> <p>Residential energy use per household (GJ/household)</p> <p>Industrial; sector energy use as a proportion of industrial GDP (PJ/\$m)</p>

C.2 AIR QUALITY INDICATORS

Air quality is currently being monitored in seven sites around New Zealand with respect to five parameters. This section of the appendix describes the results of the monitoring programme to date.

C.2.1 Measurement

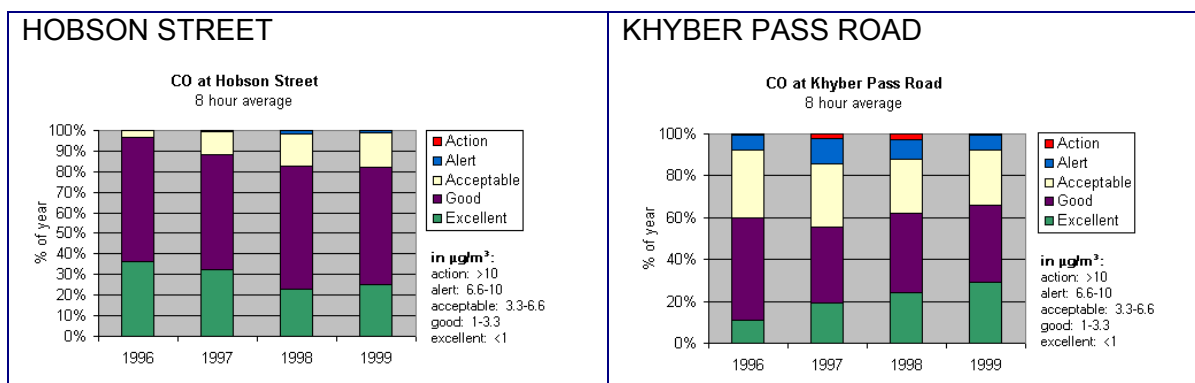
Air quality monitoring currently consists of the tracking of five parameters: Carbon Monoxide, Nitrogen Oxides, Particulate Matter, Sulphur Dioxide and Ozone. For each of these parameters, ambient air quality standards are identified. Air quality is measured by way of qualitative descriptors referenced to the ambient air quality standard (Table 1: below).

Table 1: Measurement of air quality indicators

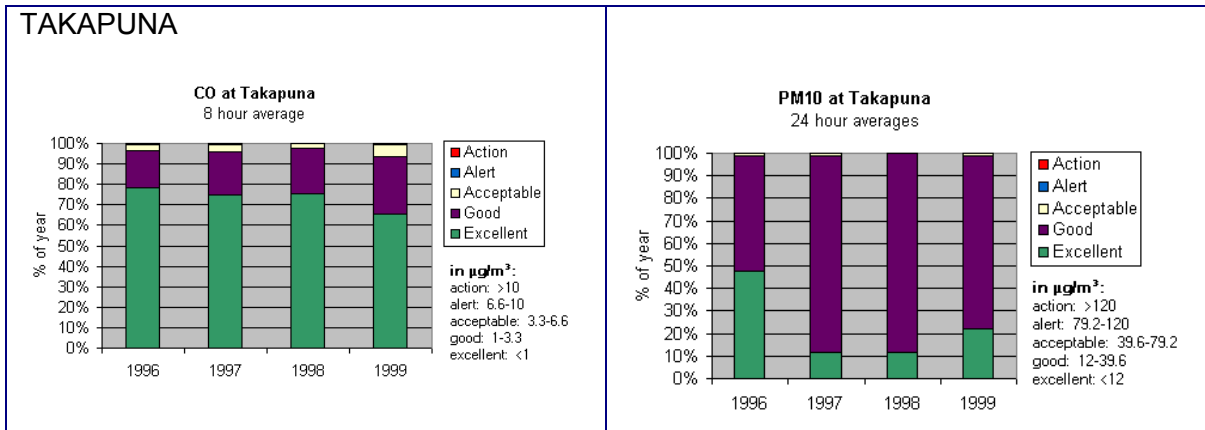
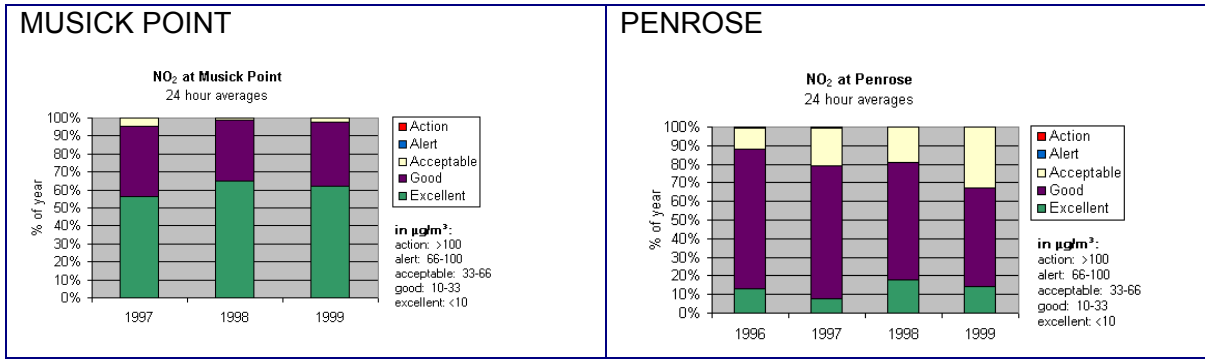
Category	Maximum measure value	Comment
Excellent	Less than 10% of the guideline	Of little concern, if maximum values are less than a tenth of the guideline, average values are likely to be much less
Good	Between 10% and 33% of the guideline	Peak measurements in this range are unlikely to impact air quality
Acceptable	Between 33% and 66% of the guideline	A broad category, where maximum values might be of concern in some sensitive locations but generally at a level which does not warrant dramatic action
Alert	Between 66% and 100% of the guideline	A warning level, which can lead to exceedences if trends are not curbed
Action	More than 100% of the guideline	Exceedences of the guideline are a cause for concern and warrant action if they occur on a regular basis

C.2.2 Results

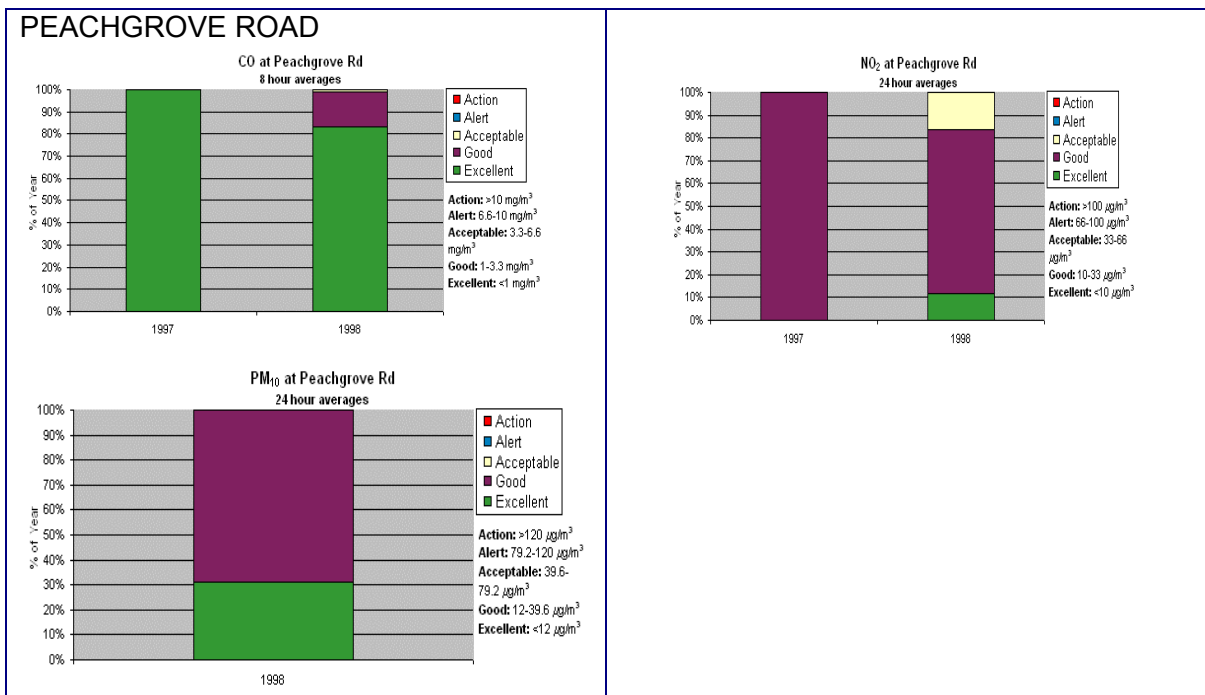
a. Auckland sites



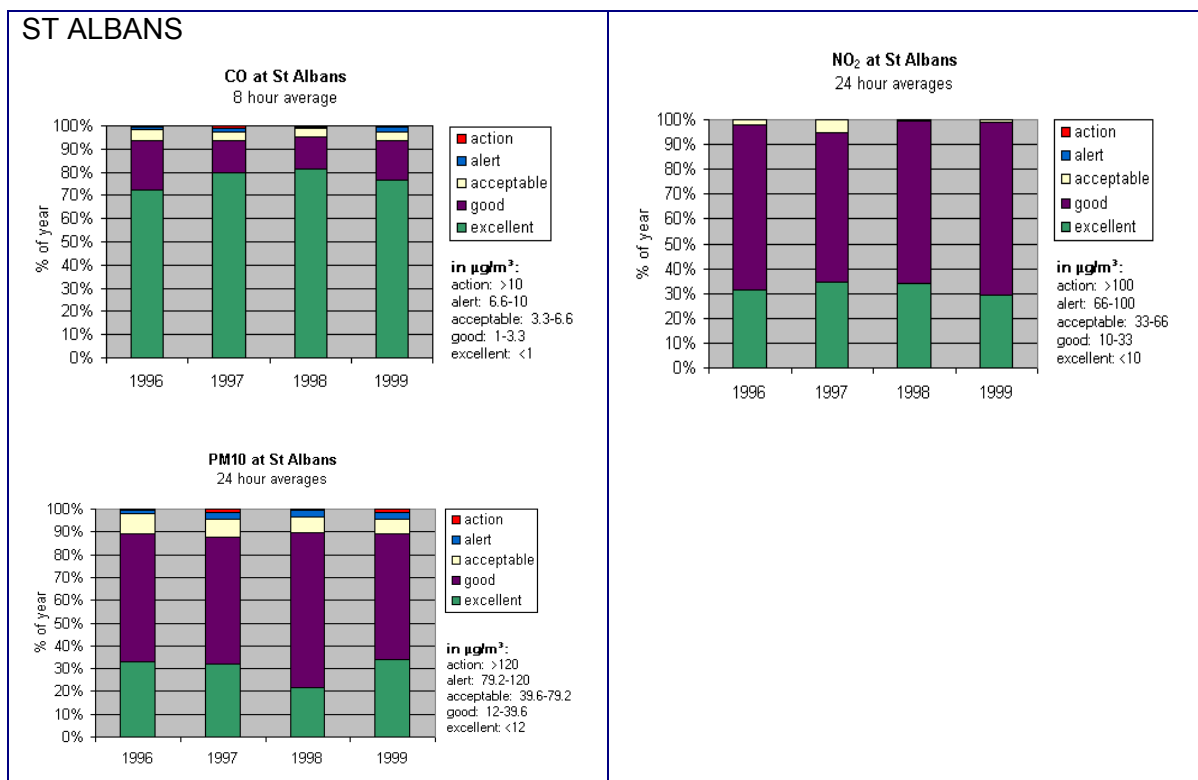
Appendix C: Environmental Data



b. Waikato site



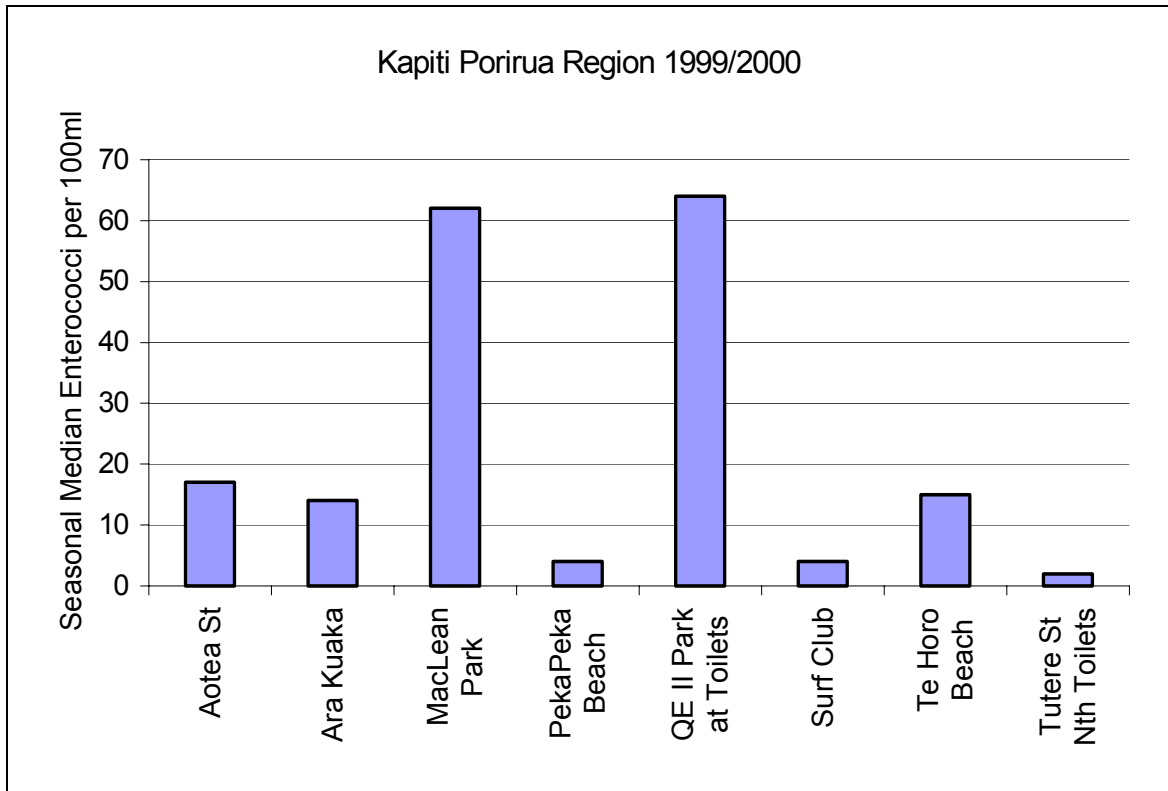
c. Canterbury site



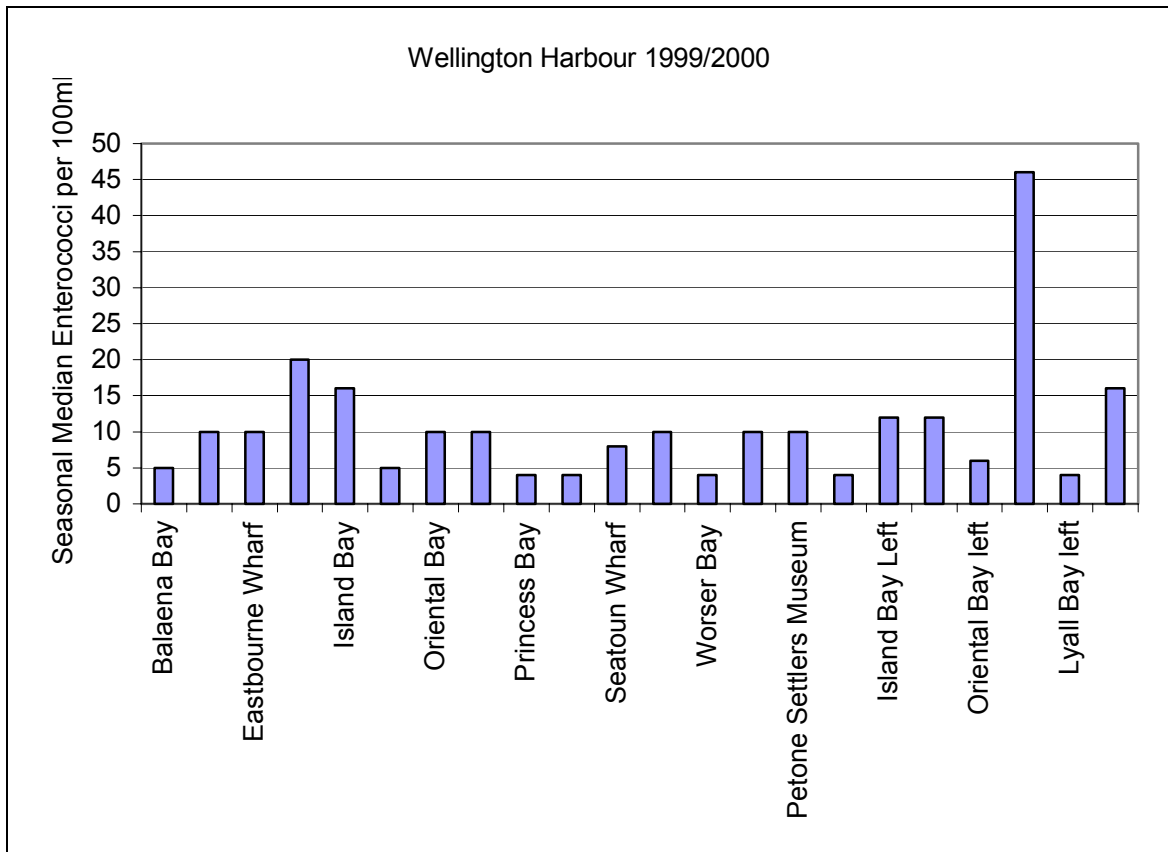
C.3 BATHING WATER INDICATORS

Areas in which bathing water quality has recently reached levels deemed to be unsafe are represented below. Median enterococci levels greater than 35 indicate that water quality at the site is likely to have failed to meet the guidelines at some point during the monitoring period.

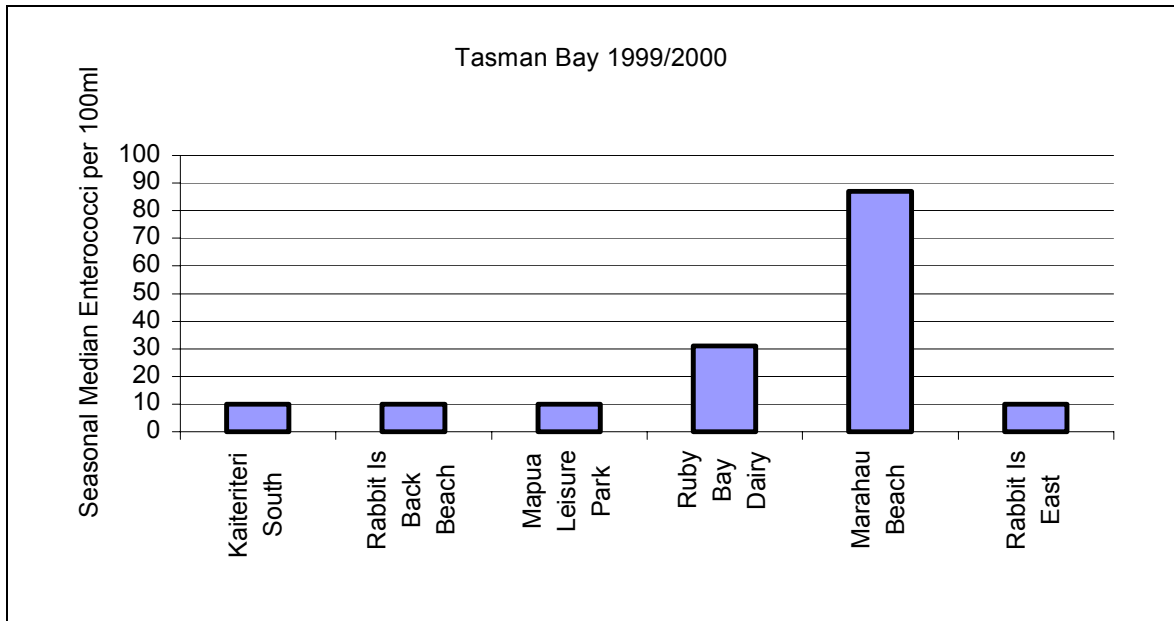
a. Kapiti Porirua area



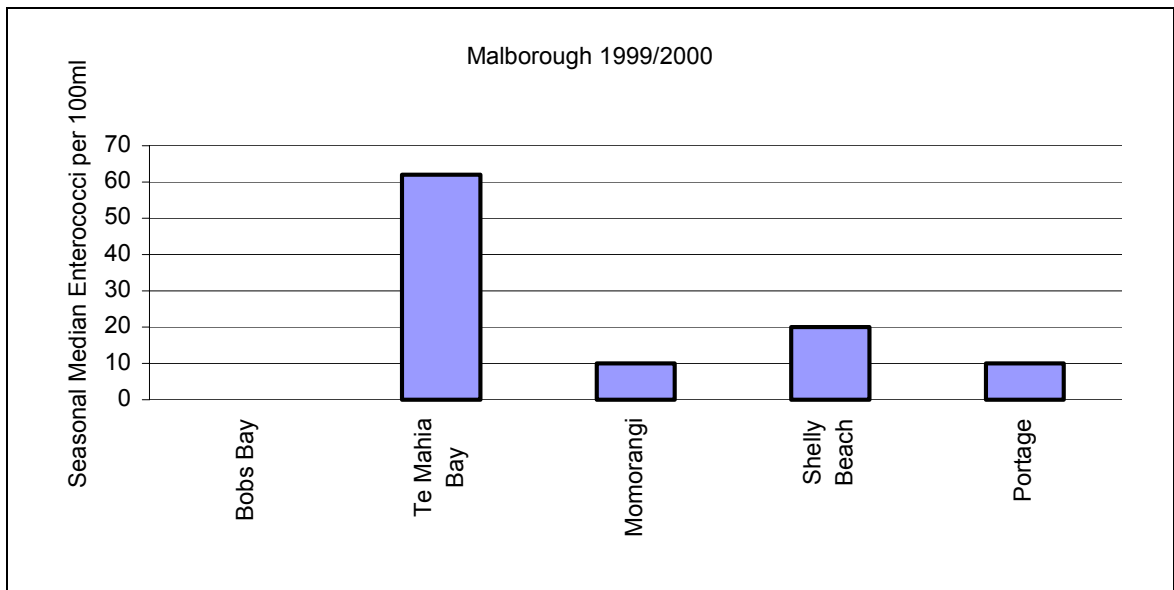
b. Wellington Harbour

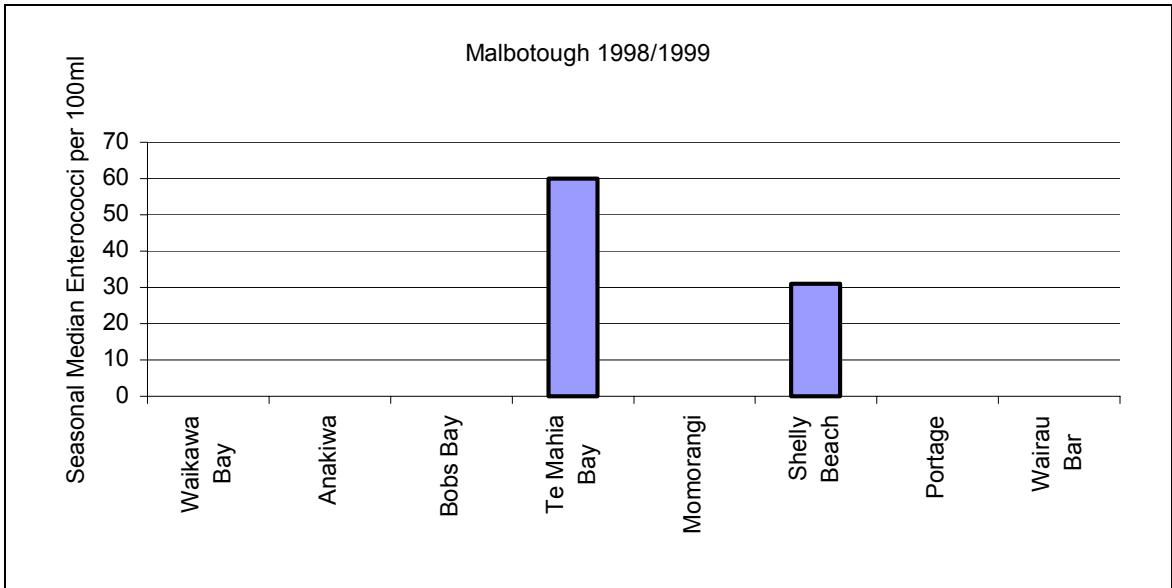


c. Tasman Bay



d. Marlborough area

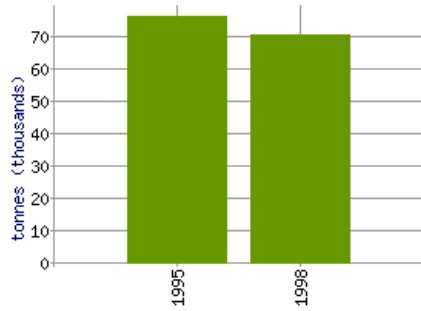




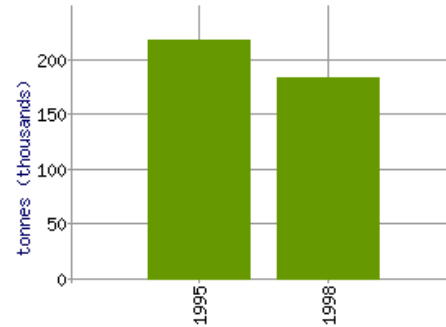
C.4 WASTE INDICATORS

Volumes of waste disposed to landfill.

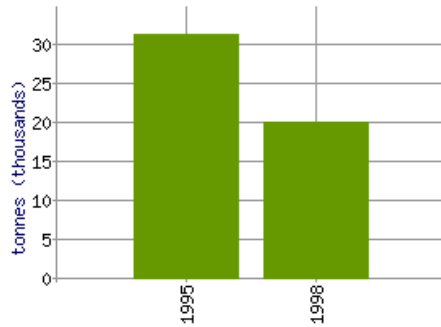
NORTHLAND REGION



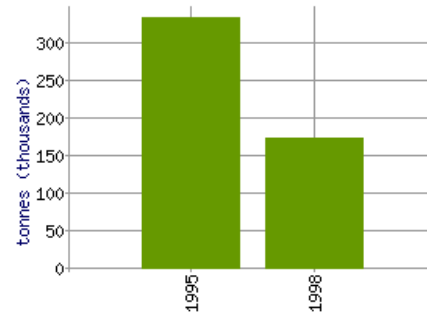
BAY OF PLENTY REGION



GISBORNE REGION



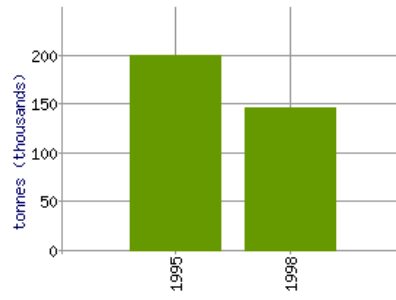
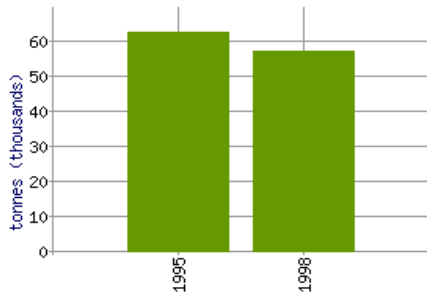
WAIKATO REGION



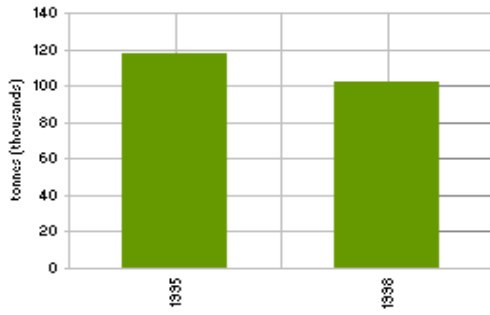
TARANAKI REGION

WANGANUI-MANAWATU REGION

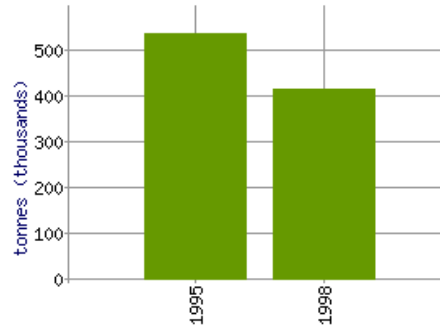
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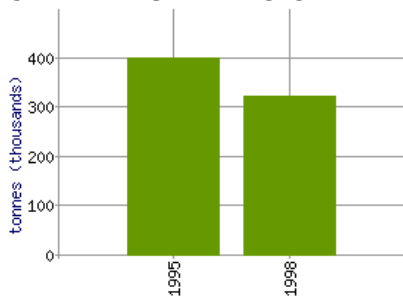
HAWKES BAY REGION



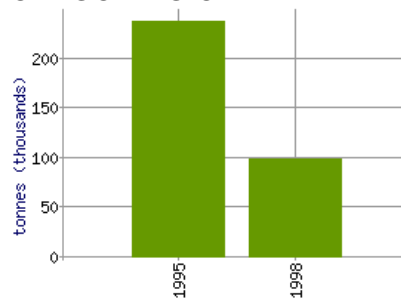
WELLINGTON REGION



CANTERBURY REGION



OTAGO REGION



SOUTHLAND REGION

