

Baseline data on environmental quality in the Auckland region

	Current status	Notes	Enhanced/ degraded	Indicators & data source
Air quality				
CO	4 days exceeded regional air quality targets for CO in 2003.	CO levels have reduced significantly in the past 5-10 years due to the proportion of vehicles fitted with catalytic converters increasing.	↓	Average annual CO in air; number of days that regional air quality targets are exceeded. Data source: ARC, 2004A.
NO ₂	8 days exceeded regional air quality targets for NO ₂ in 2003.	Exceedences and average NO ₂ levels have not changed significantly over the past 5 years. The peak roadside monitoring site (Khyber Pass) exceeds regional targets more than 1% of the time.	→	Average annual NO ₂ in air; number of days that regional air quality targets are exceeded. Data source: ARC, 2004A.
Fine particulates (PM ₁₀)	40 days exceeded regional air quality targets for PM ₁₀ in 2005.	Annual PM ₁₀ emissions have been reduced due to improved awareness of the effects of smoky vehicles, the reduction of sulphur in diesel and vehicle technology improvements. Maximum 24-hour concentrations have ranged between 58 and 95 µg/m ³ in the past 6 years – exceeding the allowable Air Quality National Environmental Standards (AQNES) concentration of 50µg/m ³ . Annual PM ₁₀ emissions will have to reduce by 53% relative to 2005 levels to meet the AQNES by 2013.	↓/→	Average annual fine particulate matter in air; number of days that regional air quality targets are exceeded; breaches of ambient air quality standards. Data source: ARC, 2004A; 2006A.
SO ₂	Average annual SO ₂ is well below the health limit.	SO ₂ levels increased from 1995 to 1999 due to increasing prevalence of diesel vehicles, but the introduction of lower sulphur diesel reduced SO ₂ emissions.	↓	Average annual SO ₂ in the air. Data source: ARC, 2004A.
O ₃	No days exceeded regional air quality targets for O ₃ in 2003.	Average levels have not changed significantly in the past 5 years and are generally below regional targets.	→	Average annual O ₃ in the air; number of days that regional air quality targets are exceeded Data source: ARC, 2004A.

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Coastal/Marine water quality				
Lead	Of 111 sites monitored, 35 are classified as having elevated concentrations of lead (30-50 mg/kg), and 17 have high concentrations (50.1-100 mg/kg).	Lead levels are declining as a result of lead being banned as a fuel additive in 1996.	↓	Concentration of lead in marine sediments Data source: ARC, 2003; 2004.
Copper	Of 111 sites monitored, 39 are classified as having elevated concentrations of copper (19-33.9 mg/kg), and 9 have high concentrations (34-50 mg/kg).	Copper concentrations are increasing gradually.	↑	Concentration of copper in marine sediments Data source: ARC, 2003; 2004.
Zinc	Of 111 sites monitored, 4 are classified as having elevated concentrations of zinc (124-150 mg/kg), and 31 have high concentrations (151-250 mg/kg).	Zinc concentrations are increasing at all long-term monitoring locations, in some cases very rapidly.	↑	Concentration of zinc in marine sediments Data source: ARC, 2003; 2004.
Polyaromatic hydrocarbons (PAH)	Of 53 locations monitored, 4 are classified as having elevated concentrations of PAH (660-1700µg/kg), and 2 have high levels (>1700 µg/kg).	Concentrations in shellfish tissues fluctuated and decreased until 1997, but have increased since that time. Concentrations in marine sediments appear to be relatively static.	→	Concentration of PAHs in shellfish tissues and marine sediments Data source: ARC, 2003; 2004.
Marine ecology	14 settling zone sites were monitored for benthic community health in 2003. All were ranked as amber (on a 'traffic light' scale of green-amber-red), indicating signs of degraded biological health (note that all these sites have elevated or high heavy metal concentrations).	Abundance of cockles and wedge shells are monitored at Manukau and Mahurangi Harbours. Abundance is stable at Manukau but has been declining at Mahurangi harbour, due to increased run off and sediment input to the marine environment.	↓/→	Abundance of benthic (seabed dwelling) species – e.g. cockles and wedge shells Data source: ARC, 2003; 2004.
DDT, Deildrin, Lindane, Chlordane,		Concentrations have been very low since DDT, Dieldrin and Lindane were deregistered in the 1980s/1990s, and selling or manufacturing pesticides with chlordane was banned in 1988.	↓	DDT, Dieldrin, Lindane and Chlordane concentrations in shellfish tissues Data source: ARC, 2004A.
PCBs		Concentrations have fluctuated since the use and storage of PCBs was prohibited in 1994, but have not consistently declined, probably because historical stores exist on land and in contaminated	→	PCB concentrations in shellfish tissues Data source: ARC, 2004A.

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		sediments.		
Fresh water quality				
Macro-invertebrate health	<p>Biological quality of streams can be ranked according to catchment land use and level of disturbance within that land use as follows:</p> <p>Indigenous forest low disturbance (best biological quality) → Exotic forestry low disturbance → Rural land use low disturbance → Exotic forestry high disturbance → Urban land use low disturbance → Rural land use high disturbance → Urban land use high disturbance (worst biological quality).</p>	The ARC is yet to accumulate enough macroinvertebrate data to perform trend analysis.		<p>Macroinvertebrate community index – this uses benthic macro-invertebrates, including the larval stages of insects, crayfish, snails, and worms, to report on stream health because these organisms are ubiquitous, easy to sample, and sensitive to disturbance.</p> <p>Source: Maxted, 2005; ARC, 2004A.</p>
Stream health	<ul style="list-style-type: none"> • The region's streams tend to have poor visual clarity, be somewhat turbid and, in some cases, have high concentrations of suspended solids. • Many of the region's streams are chronically contaminated with faecal matter. • Several of the streams (notably, Lucas Creek, Otara Creek, Papakura Stream and Puhinui Stream) exhibit low dissolved oxygen values that would not support healthy aquatic ecosystems at times. • Nitrogen and phosphorus levels are mostly low-to-moderate, with the exceptions of Otara Creek and Ngakaroa, probably due to fertiliser use in market gardening. • Some streams (e.g., Oakley and Papakura) have intermittently elevated dissolved reactive phosphorous levels. 	<p>Apart from getting warmer, there has been little change in stream water quality in recent years.</p> <p>All streams but one have a temperature that is increasing at a rate of 0.25°C per year.</p>	→	<p>16 sites in the region are monitored for 22 water quality parameters (including clarity, oxygen, bacteria, ammonia, nitrate, phosphorous and solids) in different land use types (native forest, exotic forest, market garden, rural, urban)</p> <p>Data source: Wilcock & Stroud, 2000.</p>

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	<ul style="list-style-type: none"> Streams in urban catchments or mixed land use catchments have much higher nutrient concentrations than others. The Auckland urban streams have Zinc levels that exceed water quality criteria for the protection of aquatic life more than half the time in two sites, and exceed guidelines for protection of 95% of freshwater species most of the time at all four urban sites. 			
Ammonia	Ammonia levels in the region's streams are consistently below the Regional Plan: Farm Dairy Discharges (1999) requirement of 0.7mg/l.	Ammonia levels in streams around the region have dropped significantly as a result of the Regional Plan: Farm Dairy Discharges (1999). This required farmers to obtain a resource consent to discharge dairy shed washwater to surface water, but made it a permitted activity to discharge the washwater onto land. Monitoring in North East Rodney showed the amount of ammonia being discharged into catchments decreased by 77%.	↓	Monitoring of Ammonia levels in streams, carried out in North East Rodney Data source: ARC, 2004A.
Lake health	<p>In 2005, Lake Ototoa had the highest water quality of the seven lakes monitored, followed in order of declining water quality by Pupuke, Kereta, Tomarata, Wainamu, Kuwakatai and Spectacle.</p> <ul style="list-style-type: none"> None of the region's monitored lakes were microtrophic or oligotrophic (the best trophic states). Ototoa was mesotrophic (moderate levels of nutrients and algae). Pupuke, Kereta, Tomarata and Wainamu were eutrophic (green and murky, with higher amounts of nutrients and algae). Kuwakatai was supertrophic (fertile and saturated in phosphorus and nitrogen, with 	<p>Water quality has probably improved in Lake Kereta and Tomarata. No change was detected in Lake Kuwakatai, Pupuke and Wainamu. Water quality has significantly declined in Lake Ototoa and Lake Spectacle.</p> <p>The changes in trophic level observed in four lakes is a combination of many interacting factors including inputs of contaminants from catchment landuses, internal nutrient cycling, weather patterns, and biotic influences such as phytoplankton abundance and animal and plant pest perturbations.</p> <p>Between 1992 and 2005, conductivity increased in 5 lakes and decreased in 1,</p>	↑/↓/→	<p>7 lakes in the region are monitored for indicators such as: temperature, dissolved oxygen, total phosphorus, dissolved reactive phosphorus, total nitrogen, total ammoniacal nitrogen, total oxidised nitrogen, chlorophyll, visual clarity, total suspended solids, pH, conductivity.</p> <p>Trophic levels are calculated from the indicators chlorophyll, visual clarity, total phosphorous and total nitrogen.</p> <p>Data source: Barnes & Burns, 2005.</p>

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	<p>very high algae growth and blooms during calm sunny periods).</p> <ul style="list-style-type: none"> • Spectacle, the most degraded lake, was hypertrophic (highly fertile and supersaturated in phosphorus and nitrogen - habitat for desirable aquatic species is limited). 	<p>pH levels increased in 3 lakes, total suspended solids increased in 2 lakes and decreased in 1, and total ammoniacal nitrogen and total oxidisable nitrogen increased at 1 lake.</p> <p>Temperature, dissolved oxygen, dissolved reactive phosphorous and faecal coliforms have shown no significant trends in recent years.</p>		
Biodiversity				
Wetland	0.4% of the region's total land area remains as freshwater wetland. Freshwater wetlands are particularly threatened.	<p>Freshwater wetlands have never been extensive in the region, except perhaps on the isthmus in association with explosion craters. Today they are small and scattered, mostly around lake and stream margins, although larger wetlands are found on Great Barrier Island and in the Waitakere Ranges.</p> <p>It is predicted that the region has lost around 90% of the wetlands that existed historically. Development and population pressures are constantly threatening our remaining wetlands.</p>	↓	<p>Percentage of land cover left as wetland</p> <p>Source: ARC, 1999</p>
Scrubland	18% of the region's total land area remains as indigenous scrubland.	Auckland's scrublands are mostly young regenerating native forest, some of which are still dominated by manuka and kanuka, but other scrublands have advanced to a stage where they display a rich combination of trees, shrubs and ferns. Development and population pressures are constantly threatening our remaining scrublands.	↓	<p>Percentage of land cover left as scrubland</p> <p>Source: ARC, 1999</p>
Forest cover	12% of the region's total land area remains as indigenous forest. Historically, forest was the region's predominant land cover.	Most of the remaining forest area in the region exists in the Waitakere and Hunua Ranges. Development and population pressures are constantly threatening our	↓	<p>Percentage of land left as forest</p> <p>Source: ARC, 1999</p>

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		remaining forest.		
Ecological fragmentation	Remaining natural areas in the region are generally small, fragmented, and isolated from one another. For example, of the remaining 296 fragments of forest, wetland and scrub in the Manukau Ecological District, 85% of the sites are less than 5ha in size.		↑ (becoming more fragmented)	Wetland, scrub and forest remnant size Data source: FDC, 2003.
Animal pests	Most ARC animal pest control operations and monitoring is carried out in areas of high conservation or ecological value. The residual trap catch (RTC) of possums within the majority of these areas is below 3%.	Intensive possum control is also carried out in the South Kaipara area as a precaution against bovine tuberculosis, and RTCs of 0% have generally been achieved. The possum RTC in the Waitakeres has decreased from 24 in 1997/98 to 0.9 in 2004/05.	↓	Residual trap catches (the number of possums caught in a given area, expressed as a percentage of the number of traps laid over 3 nights - a level of 5% is considered to be the threshold of possum numbers to maintain a healthy forest ecosystem) Data source: ARC, 2004A.
Native species fauna	The Auckland region contains 150 threatened animal species including 55 birds, 64 invertebrates, a native frog, 2 bats, 11 reptiles, and a number of fish. Our frogs, tuatara and lizards which once numbered 24 different species are now reduced to only 7 species in most areas of the Auckland mainland, and their numbers have reduced from around 100,000 skinks/ha and tens of thousands of geckos/ha to only a handful per hectare. At least 8 bird species have been lost in the Waitakere ranges over the past 150 years. However, due to pest control, native bird counts in the Waitakere ranges are now increasing.	Counts of tuis, kererus, fantails and tomtits in the Waitakere ranges have increased (but also shown some fluctuation) between 1997/98 and 2004/05, in line with intensive possum control. The total kokako population in the 600 ha Hunua management area is 20, and the number of females has increased from 1 in 1994/95 to 9 in 2005/06, as a result of intensive management in the area since 1994.	↓/↑	Native bird counts for indicator species Numbers of species remaining and prevalence in the region Data source: ARC, 1999; 2004B; 2006B.
Plant pests	Over 600 exotic plant species have naturalised in the Auckland region over the past 150 years. Often these exotic species successfully compete with indigenous	The number of total control pest sites monitored by the ARC has increased from under 300 in 1998 to over 800 in 2005. However, the percentage of these	↑	Number of 'active' total control pest sites (plants found within last year), vs. number of 'under surveillance' (clear for 5-10 years) or 'historical'

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	species, endangering their survival and reducing biodiversity. ARC monitors the prevalence of pest plants - presently there are over 320 'active' total control pest plant sites in the Auckland region monitored by the ARC.	pest sites that are 'active' has declined from 60.08% in 1998 to 56.63% in 2003. The number of sites that have progressed from being 'active' to 'under surveillance' or 'historical' has been increasing.		(clear for over 5-10 years) sites. Total Control pest plants are pest plants which have major effects but low incidence; therefore eradication is realistic. Data source: ARC, 2005B
Native species flora	The Auckland region contains 188 threatened plant species, including 149 vascular plants and 39 lower (non-vascular) plants.	Native plant species have become threatened or extinct in the region due to pests and population and development pressures. For example, the Tamaki Ecological District, where vegetation cover is much reduced, is believed to have had 92 local plant extinctions.	↓	Number of native/threatened species in the region Data source: ARC, 1999
Marine protected area	The Auckland region has 3038 ha of marine reserve or marine protected area. This includes one marine protected area at Tawharanui (est. 1982 - 350 ha), and four marine reserves: <ul style="list-style-type: none"> • Cape Rodney to Okakari Point – Leigh (est. 1975 - 518 ha). • Pollen Island - upper Waitemata Harbour (est. 1995 - 500 ha). • Long Bay-Okura (est. 1995 - 980 ha). • Te Matuku marine reserve - Waiheke island (est. 2005 - 690 ha). 	DoC is proposing a new marine reserve at Great Barrier Island (49,500 ha). DoC monitoring of marine reserves shows that marine species are many times more abundant inside the reserves than outside. For example, legal sized snapper are 27.7 times more abundant inside the Leigh marine reserve than outside.	↑	Extent of protected marine area. Data source: ARC, 1999; DoC, 2006.
Landscape				
Outstanding natural landscapes	Our outstanding landscapes include our volcanic cones, the beaches and cliffs, indigenous vegetation, Hauraki Gulf Islands but also urban landscape icons, such as the harbour bridge, Tamaki Drive, and the intermix of beach and cliff found at the East Coast beaches.	Rural subdivision has resulted in more buildings and built structures in rural landscapes, and the move from pastoral farming to intensive horticulture, viticulture and lifestyle blocks means more enclosed landscapes and less open landscape. Development pressures are most intense in the coastal environment, with the result	↓	Regional landscape evaluation (this has focussed on volcanic cones). Public preference landscape assessments to find out the value the community places on landscapes. Data source: ARC, 2004A.

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		that coastal and estuarine landscapes are being modified or disappearing.		
Public open space	The region has 84,803 ha of open public space (16.9% of the total land area).	The amount of public open space has risen from 83,347ha in 2003 due to regional park acquisitions at Waitawa Bay, Atiu Creek Farm, South Kaipara and Pakiri.	↑	Percentage of land that is public open space (owned by territorial authorities, regional council or DoC). Data source: ARC, 2004 (updated to include recent acquisitions)
Protected natural areas	In 2004, an estimated 11% of the region's land area was within protected natural areas, with the majority in regional parks (38,000 ha) and DoC estate, as well as private land covenants (including QEII National Trust covenants) and local scenic and recreation reserves. In 2005, 2338 ha of natural area on private land had been protected by private landowners as QEII covenants.	The number of QEII covenants in the Auckland region is increasing on an annual basis.	↑	Amount of land protected as regional parks, doc estate, private land covenants and local reserves. Data source: ARC, 2006B.
Soil				
Erosion	Most land uses in sandy and hilly country in the region are not causing significantly higher erosion than could be expected. Some land uses have erosion levels close to that of natural vegetation cover.			Data source: ARC, 2004A.
Soil productivity/ quality	Most of the soil quality in rural areas is acceptable given the land use it is under. However, in some areas (especially areas under arable cropping) there are low levels of total organic carbon (20-50 mg/cm ³), which indicates soil quality degradation. 26 sites in the Auckland region were sampled for soil quality in 2000-2001 as part of the 500 soils project. The majority of soils were of suitable quality for their use. The study found that in the Auckland region:	The MfE plan to repeat the 500 soils project to enable trend analysis, but this is yet to be carried out.		Chemical characteristics can be assessed by the total C content, total N content, Olsen P, exchangeable cations (CEC), soil pH and derived measurements such as base saturation. Soil biochemical characteristics can be assessed by the amount of potentially mineralisable nitrogen. Soil physical condition can be assessed using bulk density, particle density and moisture release

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	<ul style="list-style-type: none"> • Low soil macroporosity under pastures and arable cropping was the most common instance of exceedance, caused by soil compaction by cattle treading and wheeled traffic for cultivation. • Low P fertility was recorded under drystock and forestry, but low fertility has little risk to the wider environment. • Indigenous forest sites were markedly more acidic than other land uses, but this is generally desirable for native plant species. • Aggregate stability under cropping and horticulture was much less than under other land uses, but was not below critical levels. • Low macroporosity, loss of aggregate stability and low fertility are generally reversible and can be remedied by appropriate management. 			<p>characteristics (providing information on total porosity, macroporosity, total available water and readily available water), and aggregate stability.</p> <p>Data source: Sparling et al., 2001.</p>
Social trends/responses				
Value Aucklanders place on the environment	In 2004/05, 21% of Aucklanders stated they were 'very concerned' and 52% were 'concerned' about the environment.	There has been a decrease in those who were 'very concerned' from 31% to 21% between 2000/01 and 2004/05, but an increase in those who were 'concerned', from 46% to 52%.	→	ARC Environmental Awareness Survey Data source: Reid, 2005.
Value New Zealanders place on the environment	<ul style="list-style-type: none"> • 90% of respondents in the NZ Values Survey agreed that economic growth should not occur at the cost of environmental damage. • 64% agreed that environmental protection should be prioritised even if it leads to slower economic growth and the loss of some jobs. • 97% agreed that businesses and individuals should be responsible for their 	When asked which factors influence New Zealanders commitment to staying in NZ for the rest of their lifetime, 'A high quality natural environment' is the second most significant factor (after a good public health system).		New Zealand Values Survey 2005 Data source: Rose et al., 2005

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	<p>own environmental damage.</p> <ul style="list-style-type: none"> • 92% agreed that businesses should have to report on the environmental and social costs of their activities alongside financial reporting. • 60% would give part of their income if they were certain the money would be used to stop environmental pollution, but only 52% agreed with this if it was in the form of taxation. 			
Environmental areas/issues which Aucklanders consider to be important	<p>Survey results show that, when asked about their concerns, Aucklanders are concerned with air pollution, water quality and traffic congestion, and also slightly concerned about waste/rubbish.</p> <p>When prompted, Aucklanders will also state that they place value on streams, wetlands, bush, forests and native plants and animals, but the fact that these concerns require prompting indicates that these are not at the front of people's minds.</p>	<p>When asked about what they like about living in the Auckland region, Aucklanders top three responses (unprompted) are beaches and coast, the natural environment in general, and good access to parks and open spaces. This indicates that Aucklanders place high value in their environment.</p>		<p>ARC Environmental Awareness Survey results</p> <p>ARC monitoring of environmental attitudes and awareness for the 'Big Clean Up' programme</p> <p>Data source: Reid, 2005; Feldhaeuser, 2003</p>
Environmental care groups, involvement in environmental programmes	<p>There were 386 environmental care groups operating in the Auckland region in 2005, with a collective membership of 10,699. The most prevalent groups are Wai care and Trees for Survival groups.</p>	<ul style="list-style-type: none"> • The number of Eco Care groups has increased from 2 in 1995 to 86 in 2004, and the number of individuals involved has increased from 2119 to 3679. • The number of participants in Parks Friends' groups has increased from 200 in 1983 to 1100 in 2003. • The number of students involved in ARC's Learning through Experience programme has increased from 12,000 in 1996 to 28,538 in 2003. • The number of 'Trees for survival' participants has increased from 368 in 1994 to 1723 in 2003. 	↑	<p>Number of environmental care groups, number of individuals participating in care groups and numbers of people involved in environmental and volunteer programmes.</p> <p>Data source: ARC, 2004C</p>

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		<ul style="list-style-type: none"> Volunteer hours on regional parks has increased from 14,700 in 1999 to 50,388 in 2003, and the number of individuals involved has increased from 446 to 1685. 		
Consumption and waste - water	<p>The Auckland region consumed 115 million cubic metres of water in 2004 – this equates to 173 litres per person per day, and compares favourably with other cities in NZ where use is closer to 250l/p/d. The region's water use is increasing as population increases.</p> <p>The region discharges around 122 million litres of sewerage per year.</p>		↑	Water use and amount of sewerage Data source: ARC, 2004A
Consumption and waste - energy	<p>In 2002, the Auckland region consumed almost 146 million gigajoules of energy; 43% of this was for transport.</p> <p>The percentage of all journeys by car has increased from 68% in 1981 to 78% in 2001. Walking and cycling have low and declining modal shares. Public transport patronage has decreased significantly over the past 50 years, but recovered slightly between 1994-2003 (train and ferry use have kept increasing since 2003 but bus patronage has declined). The 2001 census showed there were 646,000 cars registered in the region, and every day an additional 35 cars are registered in Auckland.</p>		↑	Transport modal use and car ownership. Energy consumption Data source: ARC, 2004A; 2005A
Solid waste	<p>The Auckland Region produced 1,021,000 tonnes of solid waste in 2002/03. The amount of waste produced by the region has increased significantly from 371,500 tonnes in 1983/84.</p>	<p>Despite valuing the environment, consumption and waste are increasing in the Auckland region, indicating that environmental values are not translating into individual action in these areas. The amount of waste produced is directly linked to economic growth and the amount of goods and services consumed.</p>	↑	Amount of solid waste produced Data source: ARC, 2004A

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Recycling	According to Big Clean Up survey results, 44% of Aucklanders say they do a lot to recycle their rubbish, and a further 44% say they do a little, 7% say they do nothing. 54% of respondents consciously choose to buy products with less packaging some or all of the time. 55% of respondents choose to turn household waste into compost at all, some, or a few opportunities.	Nationally, 84% of New Zealanders make some effort to sort glass or tins or plastics or newspapers for recycling. This percentage remained constant between 1993 and 2000. However, the percentage of New Zealanders who <i>always</i> recycle increased from 27% in 1993 to 40% in 2000.	↑	Big Clean Up survey International Social Survey on New Zealanders and the Environment. Data source: Feldhaeuser, 2003; Gendall et al., 2001.

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